Reviews

Meaning. By MICHAEL POLANYI and HARRY PROSCH. Chicago: University of Chicago Press, 1975. 246 pages. $12.50.

Michael Polanyi's multifaceted career as a physician, chemist, social scientist, and philosopher in three countries—Hungary, Germany, and England—enabled him to catalyze dialogue among scholars in a variety of disciplines. *Meaning* will continue that dialogue, particularly among scholars interested in the relationship between science and religion. It is both a compendium of the expansive breadth of Polanyi's thought and a further application of his theory of personal knowledge to visual and literary art, myth, and religion. Chapters 1–3, 12, and 13 adumbrate previously published materials which provide a coherent context for chapters 4–11, which consist essentially of heretofore unpublished lectures delivered at the University of Chicago and the University of Texas between 1969 and 1971. The successful alloy of old and new produces "the essential Polanyi," accompanied by a useful eighteen-page index. *Meaning* is a synopsis of the confluence of the numerous tributaries of Polanyi's thought.

Even though *Meaning* is published under dual authorship, it is primarily the work of Michael Polanyi. Harry Prosch edited the book in consultation with Polanyi during Polanyi's declining years. Polanyi died in 1976.

The vast compass of *Meaning* may make it an exceedingly difficult work for one unacquainted with the development and shape of Polanyi's thought. Therefore I will outline what I consider to be the triad of interrelated elements that form his conceptual framework. These elements are reflected aptly in the title of his *Science, Faith, and Society* (Chicago: University of Chicago Press, 1964; originally published 1946), and they assist one in uncovering both the historical development of Polanyi's thought and his philosophically pivotal assumptions.

The first element, the general nature of scientific inquiry and the status of scientific knowledge, arose in Polanyi's response to a specific debate in England in the 1930s over planning in science. In contradistinction to Marxist philosophy of science in which science was understood as applied science, that is, in which scientific inquiry was subjugated to the service of societal ends established by a political and economic ideology, Polanyi asked, "What philosophy of science had we in the West to pit against this? How was its general acceptance among us to be accounted for? Was this acceptance justified? On what grounds?" (ibid., p. 9). His answer called for an autonomous science, free from external political, economic, and social controls. At the same time, however, he argued for an internal "principle of mutual control" in science whereby scientists themselves would exercise critical judgment upon one another. In short, Polanyi believed that science ought to be self-regulated and

[*Zygon*, vol. 12, no. 3 (September 1977).]

not planned. His view of science is more adequately comprehended when it is linked to the second and third elements of his triadic conceptual framework. With regard to the fiduciary element, Polanyi averred that the ultimate justification for his view of science was based upon a personal, responsible commitment. "At some point," he wrote, "I can only answer, 'For I believe so' " (ibid.). With regard to the societal element, Polanyi held that the scientific community, "a moral association of persons" acting on the basis of "a common belief" (*Meaning,* p. 196), established a tradition which was the basis for all free inquiry. Polanyi's answer to the question of the nature of scientific inquiry and scientific knowledge was one of several similar contributions which have led to an incipient revision of Western philosophy of science toward a view which seeks to include the personal and communal elements inherent in scientific inquiry. Polanyi himself found the views of Jacob Bronowski, Stephen Toulmin, Thomas Kuhn, and N. R. Hanson akin to his own (*Science, Faith, and Society,* p. 12), and, if he is correct in this judgment, it locates him on the landscape of the philosophy of science. This is not a small matter, since Polanyi is sometimes presented as a lone, anomalous pioneer with nowhere to call his intellectual home.

The second element, the fiduciary, which lies at the foundation of Polanyi's thought, includes both critical and constructive aspects. First, Polanyi provided a critique of the ideal of a wholly explicit, self-guaranteeing knowledge in the Cartesian tradition when he demonstrated, and I believe convincingly, that all knowledge includes irreducible personal or tacit elements. Then he sought to answer the question of the justification of holding dubitable, personal beliefs by positing his theory of personal knowledge which held that all knowledge is rooted in an unspecifiable "fiduciary framework." Both the critical and constructive aspects of Polanyi's epistemology are related to the scientific and societal elements of this thought. His critique of a wholly specifiable, explicit knowledge emerged from his analysis of the nature of scientific inquiry and the status of scientific knowledge; his analysis of scientific communities led him to conclude that scientific inquiry and knowledge—and indeed all knowledge—were rooted in societal beliefs, commitments, and traditions, none of which could be shown necessarily to be the the case.

The third element in Polanyi's conceptual framework concerned the nature of a free society. This element arose historically from a double-edged dilemma—the rise of totalitarian societies based upon Marxist ideology and the growing disintegration of free Western societies toward chaotic nihilism. Polanyi's answer to the double threat of totalitarian Marxism and anarchical nihilism, which he considered to be the logical outcomes of authoritarian "closed societies" in the case of the former and radical "open societies" in the case of the latter, was a "free society" in which authority and freedom were mutually and irreducibly related (see *Meaning,* chaps. 1, 12, and 13). He wrote that "a free society must exist within the context of a tradition that provides a framework within which members of the society may make free contributions to the tasks involved in the society" (ibid., p. 202). Only then could a society "be bound traditionally to certain standards and values and yet be free—both in the sense of being innovative and in the sense of being self-governing or autonomous" (ibid., p. 197). The nature of a free society was tied inextricably to the other two elements in his thought. With regard to the "science" element, the scientific community was considered a paradigm for all free associations of persons dedicated to ends that are worthy of respect (ibid., p. 196).

With regard to the "faith" element, the traditional beliefs, values, and mores of a society—its fiduciary framework—were considered to be normative and true (ibid., p. 203).

The triad of elements in Polanyi's thought is evident in the following quote which summarizes my analysis of the last several pages: "We have now, in the instance of scientific inquiry . . . a kind of moral association of persons, through the exercise of mutual authority, [which] welds traditions and freedom together in a pursuit of the truth" (ibid., p. 196).

This explication of the conceptual trinity of elements—science, faith, and society—that underlies Polanyi's thought, though severely condensed, I hope will provide interpretive clues for readers of *Meaning*. I shall now select for focal analysis two tributaries which feed into *Meaning* and are of particular interest to *Zygon* readers, namely, Polanyi's definition of the relationship between science and religion and his definition of religion.

The belief that there is but one kind of knowledge, personal knowledge, which consists of two types—the natural type and the artificial type—grounds Polanyi's view of the relationship between science and religion. Personal knowledge of the natural type occurs in the sciences (chaps. 2, 3, 11–13); personal knowledge of the artificial type occurs in literary and visual art (chaps. 4–7), myth (chaps. 8–9), and religion (chap. 10). Polanyi chiefly intended in *Meaning* to show that personal knowledge of the artificial type is "no less real than the perceptual and scientific coherences he [the scientist] so readily accepts" (ibid., p. 68). Given this structure of the nature of knowledge, which is by no means a consensus viewpoint and will be rejected flatly by many, one is able to perceive the interface between science and religion. Science, a natural coherence, and religion, an artificial coherence, share the same fundamental methodological and epistemological structures; both are aspects of personal knowledge. Their diversity appears only within this common context: Science studies subjects with an emphasis on their parts; religion studies the most comprehensive subject of all, God. Apart from *Meaning*, where the relationship between science and religion is more assumed than demonstrated, Polanyi's most explicit and sustained treatments of this relationship appeared in "Faith and Reason" (*Journal of Religion* 41 [1961]: 237–47) and "Science and Religion" (*Philosophy Today* 7 [1963]: 4–14), as well as sections of *Personal Knowledge* (Chicago: University of Chicago Press, 1958). I cannot undertake here an adequate evaluation of Polanyi's view of the science-religion relationship. I can say that its adequacy depends upon the cogency of his theory of knowledge. Some critical questions about his epistemology appear at the end of this review.

I shall turn now to Polanyi's interpretation of the meaning *of* religion and the meaning *in* religion in chapter 10. The meaning of religion appears as a "work of the imagination involving rites, ceremonies, doctrines, myths, and something called 'worship' " (*Meaning*, p. 152). Polanyi claims that "religion involves sacred myths that inform rites and ceremonies imbuing their intrinsically metaphoric meaning with something more than the kind of poetic or artistic meaning they would possess simply as metaphorical works of art" (ibid., p. 152). The "something more" is that "we participate in an ultimate reality, God, who is the "focal point that fuses into meaning all the incompatibles involved in the practice of religion. God becomes . . . the integration of all the incompatibles in our own lives" (ibid., p. 156). Meaning in religion "is a transnatural integration of incompatible clues and is achieved

through our indwelling in various rituals and ceremonies informed by myths" (ibid., p. 179). And what are the incompatibles? Polanyi's chief illustration—I assume there could be others—is drawn from what he considers Saint Paul's understanding of Christianity. There are those actions we know we must do and those achievements we must accomplish but cannot because we do not have the power. In the situation where one must but cannot, the religious man hopes in faith, holding "these incompatible factors together in a sort of permanent tension, hoping that somehow he may be given the power to do what he knows he must but living in the meantime humbly within the limits of his capacities" (ibid., p. 156). Thus the meaning of religion is meaning in and through religion when "meaningful integrations of quite incompatible clues move us deeply and help us to pull the scattered droplets of our lives together into a single sea of sublime meaning" (ibid., p. 157).

It appears that for Polanyi religion is a cognitive and ritual expression of the ultimates in which one believes and acts upon; thus religion links knowing and doing. Further, the cognitive expression of religion takes the form of myth; thus religion links knowing and being. The character and function of mythic language in Polanyi are therefore of central importance for understanding his interpretation of religion. His view of myth is unveiled in chapters 8 and 9. Polanyi cites Mircea Eliade's contention that adherents of archaic myths of creation believed that the myths were true, and he asks whether it is possible for contemporary religious myths to be considered true. Polanyi maintains that the crucial issue for modern religion is that the content of its myths "must seem possible to us to be actually plausible if we are to be able to accept [them]" (ibid., p. 158). He fully recognizes that the contemporary mentality has difficulty affirming the historical plausibility of the content of religious myths, and he concludes that meaningful religion "will not be likely to be restored to man until his views of the universe are such that he can once more seriously entertain these meanings as representations of the way things could indeed be" (ibid., p. 160).

In *Meaning* Polanyi points toward a solution to this dilemma but does not elaborate it. He holds that religious knowledge is an aspect of personal knowledge which takes the form of religious myth. The chief stumbling block to belief in such religious myths is their apparent implausibility. Plausibility, to go a step further, is a direct function of what we believe about "the way things could indeed be." Therefore, the question of the plausibility of religious myth becomes the question of the nature of the world or reality. And this raises questions of an ontological and metaphysical nature.

Polanyi scholars seldom have emphasized the crucial significance of requiring a plausible world view as a foundational element of Polanyi's theory of knowledge. (Recently, however, John Apczynski has described schematically this element of his thought with superb clarity in *Doers of the Word* [Missoula, Mont.: Scholars Press, 1977], chap. 4). Polanyi bases his model of reality upon his analysis of the evolutionary emergence of the natural world, life, and humanity (see *Personal Knowledge,* chaps. 12 and 13, and *Meaning,* chap. 11). The ontological structures of this emerging complexifying, hierarchical reality are elucidated in his "Life's Irreducible Structure," in *Knowing and Being,* ed. Marjorie Grene (Chicago: University of Chicago Press, 1969). One critical question that must be pressed in order to assess Polanyi's synoptic vision is the question of the plausibility of his model of reality. The internal machinery of Polanyi's entire conceptual framework, including the ontologi-

cal aspect of his epistemology, is dependent upon one's acceptance of his description of reality.

Only when the ontological structures of Polanyian reality are clarified and criticized will it be possible, at least in principle, to define the nature of Polanyian plausibility, which in turn will allow one to assess the plausibility of a particular religious myth and hence the status of religious discourse about that myth. At stake, of course, is the question of the plausibility of religious myths which Polanyi seems to equate with their truthfulness. The possibility of meaningful religion in the Polanyian sense is dependent upon the adequacy of that equation.

While Polanyi's solution of the problem of a credible religion in terms of plausible myths which are embedded in a hierarchical world model will not satisfy a multitude, it is clear at least that Polanyi creatively has addressed a major issue that religion faces, namely, that of being both meaningful and plausible. What eludes modern man, he claims, is religion about which one can say, "If not this story exactly, then something like this story is how all things are put together" (*Meaning,* p. 160). Polanyi, to my mind, has diagnosed accurately the schizophrenic condition of the modern mind in which critical skepticism and affirmative belief are divided against each other. I believe he is correct in asserting that one must attempt to integrate the seeming incompatibles of belief and criticism, faith and doubt, the natural and the transnatural, if one is to have a world which makes rational, moral, religious, and personal sense. *Meaning* is a daring attempt at such a synthesis.

DONALD W. MUSSER

University of Chicago

The Relevance of Natural Science to Theology. By WILLIAM H. AUSTIN. Library of Philosophy and Religion. Edited by John Hick. New York: Barnes & Noble, 1976. 132 pages. $22.50.

The question of the relationship between two disciplines can be answered in one of three ways. The disciplines are directly related, indirectly related, or unrelated. William H. Austin, associate professor of philosophy at the University of Houston, takes up the question of the relationship of the discipline of natural science to the discipline of theology. He observes that theologians "have tried to show that natural science is in principle irrelevant to their enterprise" (p. 6), which is to say that contemporary theology views itself as unrelated to natural science. He proceeds to show that arguments for the irrelevance of natural science to theology fail on logical grounds.

Austin considers two classes of arguments which attempt to demonstrate that natural science is unrelated to theology. They are (1) instrumentalist arguments, which deny that either scientific or theological assertions are about what is the case (chaps. 2 and 3), and (2) two-realms arguments, which allege that scientific and theological statements are about entirely different things and hence can neither support each other nor conflict with each other (chaps. 4 and 5). The writings of Pierre Duhem, R. B. Braithwaite, and W. T. Stace illustrate instrumentalist arguments. The works of Karl Heim, D. M.

[*Zygon,* vol. 12, no. 3 (September 1977).]

McKay, D. Z. Phillips, W. D. Hudson, Peter Winch, Donald Evans, and Alasdair MacIntyre illustrate two-realms arguments. Austin concludes, after a careful analysis of each case, that both classes of arguments fail to establish that natural science is in principle irrelevant to theology on internal, logical grounds.

Austin's clear-headed, critical analysis of the instrumental and two-realms arguments for the unrelatedness of science and theology merit careful consideration by anyone dealing with the conceptual relationship between the two disciplines. That it can be shown, as I believe Austin has demonstrated, that science and theology may not be irrelevant to one another on purely critical grounds is a conclusion of great import. This is not to establish, however, as Austin himself points out, that science is relevant to theology or, if relevant, precisely how.

Chapter 6 explains how the doctrine of providence evaporated from theologies which accepted the arguments for the irrelevance of science to theology and suggests strategies that may be employed to resuscitate a contemporary doctrine of providence. One proposed strategy is to interpret scientific data as illustrations or consequences of providential activity. The other proposed strategy is to employ a method, such as that of Alfred North Whitehead, in which the conceptual foundations of science itself are reinterpreted. Austin himself opts for neither strategy.

The book's chief and considerable merit is its analysis and criticism of the instrumental and two-realms arguments for the unrelatedness of science and theology. The author's modest intentions preclude a discussion of how science and theology ought to be related, if indeed they ought. He does sketch how they have been thought to be related in the past (pp. 6–8) and provides thumbnail criticisms of the several historical options. Austin writes as a critical philosopher of religion. He mainly describes, analyzes, and criticizes arguments by philosophers and theologians about the nature of the relationship between science and theology. But the author is not without an opinion about how theologians ought to view science at the present time. He writes, "*For the moment,* theologians *may* be tactically wise to ignore science, while working to recapture a firmer grasp of what their discipline essentially aims to do" (p. 11). He continues, however, that if science is relevant to theology, then science cannot be ignored indefinitely.

Recent publications on theological method such as Anders Nygren's *Meaning and Method,* Bernard Lonergan's *Method in Theology,* and Wolfhart Pannenberg's *Theology and the Philosophy of Science* do not share Austin's view that theologians ought to ignore science for a season. Each of the works cited, in its own particular way, considers science in rethinking the conceptual foundations of theology. And can it be otherwise? Can theology ignore, even for a moment, that discipline which remains paradigmatic for any contemporary epistemology? It appears highly problematic that theology can "recapture a firmer grasp of what [it] aims to do" (p. 11) in ignorance of science.

I do not want to be overly harsh in this criticism. This is primarily a book in critical philosophy of religion and not in theological method, though its implications for theology are readily apparent. Within its own carefully defined contours it is an excellent piece. However, once it is shown that science and theology are not necessarily unrelated, the question of how they are related remains to be asked. *Zygon* represents one forum that seeks to discuss how that relationship can be conceived. There are others. These efforts would

profit immensely if Austin now devoted his critical acumen to their arguments for the relatedness of science to theology.

The astronomical price of this book regrettably will limit its audience.

DONALD W. MUSSER

University of Chicago

Rhythms of Vision. By LAWRENCE BLAIR. New York: Schocken Books, 1976. 234 pages. $8.95.

The Tao of Physics. By FRITJOF CAPRA. Berkeley, Calif.: Shambhala Publications, 1975. 330 pages. $12.50.

Although these two works are thematically the same, dealing with science and mysticism, they are essentially different in both form and content, Lawrence Blair, a mystic, explores the occult sciences, while Fritjof Capra, a research physicist, explores Eastern mysticism. In form Blair employs a poetic style as the vehicle of his vision, while Capra employs expository analysis to defend his thesis. In content Blair envisions the dawning of Aquarius where the fragmentation of society will be healed and science and religion will "merge into a single majestic river of vision" (p. 234). In contrast Capra argues that science and mysticism are complementary representations of the rational and intuitive aspects of the human mind but as disciplines they are quite independent. Capra does not search for a synthesis. Instead he searches for "a dynamic interplay between mystical intuition and scientific analysis" (p. 307).

The format of *Tao of Physics* is summarized succinctly in its subtitle, "An Exploration of the Parallels between Modern Physics and Eastern Mysticism." One of the most intriguing features of Capra's work is the comparison of numerous quotations from Eastern religious texts and contemporary physicists' writings. Coupling this methodology with an analysis of the foundations of modern physics, Capra argues that developments in modern physics require a new view of reality as a dynamic and interrelated whole. This new view replaces the reductionism of the Newtonian world view and is related closely to the Eastern world view which grows out of a mystical experience of reality.

Capra's work is divided into three parts. First, Capra lays the foundation for understanding modern physics by reviewing the history of Western science and contrasting the mechanism of the West with the organism of the East. He shows that modern physics (namely, relativity and quantum mechanics) has been developing both epistemologically and metaphysically in directions strikingly similar to Eastern mysticism. Second, he traces in five chapters the general features of Hinduism, Buddhism, Chinese thought, Taoism, and Zen. While an introduction to the history of science and Eastern religions is necessary for some readers, the first half of Capra's book demonstrates only that there is a metaphorical similarity between modern physics and Eastern mysticism.

In the final part of *Tao of Physics* Capra's creativity begins to emerge as he tries to delineate precisely the nature of the integration and interpenetration of physics and mysticism. After completing an excellent introduction to recent developments in particle physics, especially S-matrix theory, he outlines

[*Zygon*, vol. 12, no. 3 (September 1977).]

through successive chapters the striking parallels between the particle physicist's encounter with the microcosm and the mystic's encounter with the macrocosm. Both experience a dynamic universe exhibiting a cosmic dance of changing patterns in an interrelated whole. But in the final chapter Capra moves his thesis one step further. Not only are particle physics and Eastern mysticism similar in their metaphors and imagery, but the "bootstrap" hypothesis (a school of thought in particle physics) is "in harmony with Eastern thought both in its general philosophy and in its specific picture of matter" (p. 286). Capra suggests the future possibility of a direct interaction between physics and mysticism. In this case the bootstrap *theory* of nature would become the bootstrap *vision* of nature, which would transcend the realms of thought and language (p. 301).

Capra's anticipation of a new vision of nature takes him far beyond his original thesis that science and mysticism are parallel and unified only as the rational and intuitive aspects of the mind. The frustration I find in Capra's work is his failure to explore in any depth the underlying reason why there is a striking similarity between the physicist's description of the microcosm and the mystic's description of the macrocosm. Capra's answer, which may be gleaned from the pages of his book, is rooted in a philosophical idealism. Science and mysticism are not unified as disciplines. Instead the unification is a function of the mind in its rational and intuitive dimensions. At one point he goes so far as to claim that modern physics may be approaching the Eastern position where "the structures of the physical world are *maya,* or 'mind only' " (p. 278). One wonders if the similarity between modern physics and Eastern mysticism is less a function of the mind than of the world itself.

In spite of the ongoing debate between realists and idealists, Capra's book deserves serious consideration by philosophers, theologians, historians, and scientists. Whether or not we agree with the implications Capra draws, we must admit that there are numerous points of contact between the physics of the West and the mysticism of the East.

While Capra approaches the issue of science and mysticism by examining the well-established "paths" of the East and West, Blair in *Rhythms of Vision* focuses on the outer fringes of science and mysticism, arguing that developments in the occult sciences are the trumpet call signaling a new age in which "the outer myth of science is giving way to the inner myths of subjective meaning" (p. 42). Highly reminiscent of Herbert Marcuse, Norman O. Brown, and Theodore Roszak, Blair criticizes the one-dimensionality of our science-dominated culture. In its place he envisions a multidimensional existence where symbolism and feeling flourish.

Rhythms of Vision is an excellent compendium of detailed information on developments in the esoteric or occult sciences. The work moves from the outward toward the inward—from the astrological to the inner self. Blair covers such topics as astrology, numerology, Kirlian photography, and palmistry (to mention only a few). He seeks to uncover the scientific face of each of these "sciences" in order to support his claim that they are in fact the bearers of apocalyptic news. He hopes that his readers who are still caged in by the false myth of objective science will have the courage to see beyond the narrow horizons of their conditioned environment and move from the age of rationalism to the age of feeling.

Blair does have a message, for it is clear that the dreams of one age may become the reality of the next. The issue is whether Blair's message is mean-

ingful or not. That is, are the occult sciences in fact the true prophet for a new age?

The thrust of Blair's book is to demonstrate that the occult sciences are the connecting point between the outer myth and the inner myth—between science and religion or reason and feeling. Therefore it is crucial to the defense of Blair's thesis that the occult sciences are in fact sciences to some degree. If they are not, no union between science and religion has taken place, and in this case Blair's thesis would be based on an equivocation.

I believe it is at this crucial point that Blair's thesis is vulnerable. He constantly shifts the meaning of the term "science" in order to draw his conclusions. While he never gives a precise account of what characteristics something must possess to be classified as "science," he does reveal from the examples he uses that for him something is "science" if it involves electronic gadgetry and the five senses. Two examples should clarify my point. First, Blair discusses Cleve Backster's experiments on the emotional and mental capabilities of plants to support his conclusion that science is turning inward. Second, he mentions the paraphysical laboratory in Britain where electronic devices are used to measure the physical manifestations of hauntings and poltergeists (p. 191).

I would question whether the pseudosciences are in fact the place where science and religion are merging into a single vision. Instead I believe that Blair is swinging the pendulum to a dangerous extreme not where reason and feeling are synthesized but where feeling reigns supreme and reason is overthrown.

DEAN R. FOWLER

Marquette University

Teleological Explanations. By LARRY WRIGHT. Berkeley: University of California Press, 1976. 162 pages. $10.00.

Teleological explanations are explanations involving intentions, goals, purposes, motives, functions, aims, drives, or needs. The question of purposive activity arises in many contexts—from the order and arrangement of natural phenomena to the structural stability or instability of cultural phenomena. (For some teleologists, of course, these are not discrete areas of concern.) The controversies over purposive and functional explanations center around two broad issues: (1) the question of the legitimacy of teleological ascriptions and (2) the question of assimilating teleological explanations to causal ones. Larry Wright's book is concerned primarily with teleological explanations of behavior, but his analysis has important consequences on a wider conception of teleology. Because of the pervasive use of teleological concepts in the biological and social sciences and in philosophy and theology, interest in this book will be far ranging.

The mainstream of current interest in the nature of teleological explanations has shifted from total rejection to the attempt to bolster various successive defenses of the principle of teleology. Few philosophers of science still argue that the methodology of teleology is wholly wrongheaded. Wright, like many others in this decade, argues for the legitimization of teleological explanations, but unlike others he believes earlier versions of teleology are more defensible than the more recent derivative refinements. Interestingly enough,

[*Zygon*, vol. 12, no. 3 (September 1977).]

Wright's analogical argument for this point, that a presently discredited teleological principle is less defensible than an earlier, less precise version, is based upon the history of the development of nonteleological scientific theories. Here, just as an imprecise theory is difficult to test, so also a precise theory is easy to falsify. Consequently, one object of the book is to extend and clarify some preanalytic formulations of teleology and to exhibit in some detail legitimate teleological explanations.

Wright thinks that previous philosophers (Ernest Nagel, Carl Hempel, R. Braithwaite, and Morton Beckner, among others) have modified or rejected teleological arguments for the wrong reasons. Moreover, scientists often have directed charges against the teleological approach, and initially Wright selects three common but misguided objections: (1) Teleological explanations are illegitimate because they presuppose backward causation; (2) they attribute mental characteristics to physical phenomena; and (3) they tend to close down further scientific research. First, the charge of reverse causality stems from the belief that the goal of a process determines specific initial conditions. Wright cogently argues that this "determination" is not a "cause" in the normal sense. Since the goal or function itself is not part of the initial conditions (whereas the *having* of a goal or function may be, but this is a different matter), there is no backward causation. The second objection, that of anthropomorphism, is not directly confronted—Wright argues that appeals to conscious purposes are metaphors which, if appropriate, give insight and (hence) understanding. Indeed, a central point of the book is to show "that teleological expressions in most non-human applications represent dead anthropomorphic metaphors" (p. 21). A "dead" metaphor is a former figure of speech which has acquired a meaning in its own right such that its original connotation is no longer essential to its definition. Additionally, in answer to the third objection Wright points out that many useful scientific concepts were once metaphorical expressions (e.g., in chemistry "bond," "shell," "orbit," and "element"). Therefore all teleological expressions do not obstruct scientific progress.

An integral feature of teleological characterizations and explanations is the manner in which consequences of a process function in its causal history. Accordingly, Wright terms all teleological explanations "consequence-etiologies." The contrast between the various kinds of causal and teleological explanations then becomes a contrast among etiologies since both kinds of explanations attempt to account for the production of the behavior in question. The clarification and extension of this theme occupies the two central chapters of the book. Wright first examines goal-directed behavior (sometimes expressed by statements of the form, "Something happens for the sake of something else") and second analyzes functional behavior (usually characterized by statements of the form, "Something happens *in order that* something else happens"). Although goal-directed and functional behavior are closely connected, Wright is careful to distinguish them. One important difference is that the function of something does not necessarily imply goal direction (as in the case of artifacts), and goal directedness does not always imply that the goal is a thing's function (as in the case of food gathering).

Wright thinks that the paradigm cases of functional behavior are exhibited in a formulation derived from an analysis by Charles Taylor. The derivative analysis is termed a "weakened requirement-etiology" and is referred to as *T*: *S* does *B* for the sake of *G* if and only if (1) *B* tends to bring about *G;* (2) *B*

occurs because (i.e., is brought about by the fact that) it tends to bring about *G* (*T* formulation) (p. 39). In this formulation, *S* is the subject or individual concerned (e.g., a rabbit), *B* is the behavior in question (e.g., running through a fence), and *G* is the goal (e.g., escaping the dog). Such a formulation, as Wright crisply argues, does capture an essential feature of teleology: Goal-directed behavior occurs precisely because of the consequences of that behavior. Also, *T* is similar to the form of a causal explanation—the notable difference is that *T* includes the behavioral consequences in the etiology of the behavior.

Several basic principles underlie *T*: (1) Judgments of goal-directed behavior (and in some cases the etiology of that behavior) are as reliable as other observational judgments. (2) Teleological characterizations are by their very nature explanatory. (3) Any analysis of efficient causality is likely to be more questionable than the use of an unanalyzed notion of causal connection. (4) Any account of an event presupposes that the event has occurred and does not argue that the event must occur. If the arguments for these principles are acceptable, then *T* becomes more perspicuous. For example, by 1 a judgment that the rabbit is fleeing to escape from the dog is normally reliable; by 2 this characterization of the behavior explains why the behavior takes place; by 3 the behavior is said to occur because behavior like this is appropriate for bringing about a specific goal (even though that goal might not be obtained); and by 4 the behavior of the rabbit is presupposed, not proved, by *T*. Since a variety of appropriate responses by an organism in a set of circumstances may be covered by *T*, *T* is compatible with a dispositional account where the behavior in question causally depends in part upon a factor of its own consequences. Wright's unanalyzed notion of causal connection includes the underlying order of the behavior as a causal factor (see p. 68). Such a proceeding tends to stretch the application of an unanalyzed notion of cause, but this seems to be necessary on an etiological analysis. Nevertheless, he argues at some length that the *T* formulation does not obviate an underlying mechanistic account; therefore the consequence-etiology does not imply the irreducibility of teleological behavior in order to establish the legitimacy of teleology.

The *T* formulation may be applied to the explanation of human behavior also. It often has been thought that human behavior is irreducible to mechanistic or neurophysiological explanation because the disposition to perform some act in the absence of countervailing factors logically necessitates the doing of that act. Consequently the antimechanist argues that a mechanistic explanation of a logical truth is pointless. Wright retorts that teleological dispositions, just like nonteleological dispositions, are manifestations of certain underlying structures. Since the underlying regularities are related contingently to the disposition, a mechanistic account still might be given relating structural factors (including the causal role of the intention) to the behavior itself—and this is not inconsistent with the above action tautology. Several other more technical arguments against the possibility of an underlying mechanistic account are rejected by Wright. He reaffirms that the integral feature of human intentions is given in the *T* formulation.

Functions, although having much in common with goal directedness, are not elucidated by the *T* formulation. A function (of an artifact or an organ) is there by design and is a consequence of "what a thing is there for" or "its being the way it is." The function is also a consequence of the etiology of the object in question. This etiological condition distinguishes between the func-

tion of something and a merely fortuitous use of something. Wright's formulation of these conditions then pertains to nonbehavioral things: The function of X is Z if and only if (1) Z is a consequence (result) of X's being there; (2) X is there because it does (results in) Z (F formulation) (p. 81). It may be helpful to consider an example. The function of chlorophyll is photosynthesis in plants. Photosynthesis in plants is a consequence of the chlorophyll being there, and the chlorophyll got there (on an evolutionary account) because it enables plants to undergo photosynthesis. Although in T the goal of behavior need not be realized, in the typical instance of formulation F the consequence of the function is not in doubt. F is applicable to artifacts or biological organs: "For just as conscious functions provide a consequence-etiology by virtue of conscious selection, natural functions provide the same sort of etiology as a result of natural selection" (p. 84). Of course, the kind of etiology of some artifacts will be considerably different from the causal history of a natural function, but still Wright contends that F is appropriate to either kind of function. Wright contrasts his analysis of functions with ten other well-known positions in a discussion which not only traces out many ramifications of his own views but also indicates their effectiveness in accommodating several derivative kinds of functions.

The position that consequence-etiologies typify teleology is not at all inconsistent with the design argument for God's existence. From one point of view (presently to be explained) Wright's position is supportive. Elements of organismic behavior are interrelated complexly and exhibit design or selection, and in Wright's view these intricate behavioral patterns could be explained in either of two ways. Teleological features might require a powerful and intelligent supernatural maker, and they might require something else (such as that given by an evolutionary account). Wright thinks that the specification of this "something else" is irrelevant to the security of teleological explanations even though the propriety of function statements hinges on the presence of the source of the function. Yet Wright thinks that the nature of the source is unimportant. How do organic structures get their functions? Even if an answer in terms of the details of an evolutionary account is proffered, it is arguable that such an appeal is "explaining by naming." The consequence-etiological explanation requires something to support it. In several places Wright grapples briefly with this problem, but his solution is incomplete.

Wright's arguments are intended to sustain the philosophic acceptability of teleological explanations, although the arguments are not meant to preclude underlying causal analyses. The book's motif is that causal and teleological explanations are fundamentally etiological. For theologians, philosophers, and scientists alike, this can be a fruitful change of perspective. Wright's book is a significant contribution and is highly recommended for anyone interested in teleology.

LEE C. ARCHIE

Lander College