ALBERT EINSTEIN: THE METHODOLOGICAL UNITY UNDERLYING SCIENCE AND RELIGION

by Roy D. Morrison II

> Strange is our situation here upon the earth. Each of us comes for a short visit, not knowing why, yet sometimes seeming to divine a purpose.[1]

These are the opening words of Albert Einstein's credo. They reflect a philosophical and religious perspective that is different from that of classical Christianity and from those Western philosophies of history which it has influenced significantly. For Saint Paul and for Saint Augustine our situation on earth was unfortunate, but it was not "strange." We knew exactly why we were here. Our aim was to achieve eternal life in another world or through miraculous transformation by worshipping and by obeying the supernatural, theistic god of the Judeo-Christian tradition. In the Genesis account of creation, in Thomas Aquinas, and in Georg W. F. Hegel, history and the human situation are dramatized. There is a beginning, a middle development, and a cosmic or ontological culmination. Behind the scenes and more or less inscrutable to humans there is a divine person or a divine principle that rationally and purposefully determines the course of history. Individual humans discover their ultimate purpose by faithfully and properly subscribing to the allegedly revealed purpose. The intent of the various dramatizing enterprises is to satisfy a typology, a cluster of potential needs that have been carefully, perhaps neurotically, cultivated in the consciousness of the Western world.[2]

With the Grand Inquisitor functioning alternatively as his raisonneur, Fyodor Dostoyevsky attempts to outline his own allegedly universal typology of human needs. Humans are depicted as needing miracle, mystery, authority, and bread enough for all. The most des-

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perate need is to belong to some great cause—and to lose one's individuality in that great cause—in "one great, unanimous, harmonious antheap."[3] Freedom and the consequent necessity of making one's own decisions constitute an absolutely unbearable burden. Therefore humans gladly lay their freedom and their consciences at the feet of the person or institution that will supply their primeval needs. Dostoyevsky formulated this psychoanalytic typology partly because of his reaction to the Russian Orthodox Church. Recently we saw this same typology unfolding its final terror through the Reverend Jim Jones and the mass suicides in Guyana.[4]

The tranquil agnosticism reflected in our opening quotation from Einstein's credo indicates that Einstein did not have a neurotic dependency on a miracle-working, cosmic authority figure, and he was not incapacitated by the possibility that there might be no ultimate purpose through which the human situation could be interpreted and made more palatable. In other words, Einstein was capable of acceptance. He was able to sustain a philosophical acceptance of the limited horizons of meaning and of moral expectations which characterize the human situation.

Perhaps at this point a few definitions will be helpful. By philosophy I mean an intellectual activity in which the thinker conducts an inquiry into the basic value judgments, attitudes, categories, postulates, and the logic of the various special sciences, including those of philosophy itself. Therefore I am speaking of critical philosophy. Also I designate five major branches of philosophy: epistemology (the study of knowledge), metaphysics (the study of universal or pervasive categories and functions in thought and in external reality), semantics (the study of communication, meanings, and the relevant logic systems), aesthetics, and ethics. I define religion as a cluster of values, symbols, myths, rituals, and commitments through which humans nurture their sense of mystery, awe, and transcendence, explain the meaning of their lives in the scheme of things, establish the foundations of morality, and provide grounds for hope in the future. Religion affords interpretations of reality which at times, from a scientific perspective, may do violence to reality—and to human integrity; nevertheless these interpretations help believers to ward off the terror of history and to grope toward some particular kind of meaning. In religion humans seek not merely reality but that which is envisioned as ultimate reality, god, or in different categories the power which generates the cosmic order and intelligibility that we have been able to discover.

Once upon a time theology was the study of god—a personal god. After the so-called death of god perhaps another definition is

needed. Theology is generated by religious experience and is an attempt to systematize that experience while elaborating its relevant implications for the other major enterprises of human beings. Such enterprises include natural science, psychology, anthropology, critical philosophy, and the interpretation of history.

These definitions provide some clarification for the central purpose of my discussion. My intent here is to celebrate the life and mind of Einstein by arguing that there is a methodological unity underlying his approaches to religion and to science, and that serious, sustained consideration of his religious-theological reflection is just as obligatory and valuable for modern humanity as the consideration of his scientific enterprises. The method that has such revolutionary power to generate verifiable knowledge also has inescapable implications for religion and theology.

Theistic God

Some brief reflection on the idea of the theistic god and on the German enlightenment will illuminate our assessment of Einstein and his thought. Almost three thousand years ago in the earliest tributaries of Western civilization Homer and the tradition of Moses projected their respective theologies. Homer's polytheism reaches its zenith perhaps in the twenty-fourth book of the *Iliad* when Priam, patriarch of Troy, decides to venture into the Greek camp to ransom the body of his fiftieth son, Hector, from the still smoldering wrath of Achilles. Priam prays to the cosmic father god, Zeus; he asks Zeus to have "pity" upon him, to provide safe passage, and to send a sign of good omen. Zeus does take pity and "straightway" sends a great eagle flying over the city on the right.[5] This is an empirical eagle, visible to all the inhabitants, and they rejoice at the immediate and dramatic response from Zeus.

In the Genesis narrative God calls forth the physical universe out of nothing simply by the creative power of his speech. He creates man and then woman, stipulates the limits of their behavior, and punishes them with expulsion from the Garden when they disobey. Aquinas rehabilitates the Mosaic-Christian world view in the categories of Aristotelian philosophy but dualistically retains the personal supernatural theism.

Certain basic characteristics of the theistic god are worth specifying. The attribute which is indispensable for the intelligibility of the theistic idea of god is consciousness. God must possess this attribute if he is to comprehend prayer, think, decide, and intervene in history. In the specifically Christian idea of theism, god also is absolutely righteous

and universally beneficent. He has a plan, a purpose, which when fully revealed to those whom he elects for salvation will make sense of the absurdity that apparently besieges the human situation.

This theistic idea of god is a major instrument in Christianity's shaping of Western culture. It is a theology which belongs to the age of mythology, supernaturalism, and enchantment in the West. However, the period of the German Enlightenment (1650-1800) witnesses the exaltation of rationality and hence an inevitable cultural and religious disenchantment. Relying on an almost mathematical model of logic, Benedictus de Spinoza (1632-77) substitutes monism for supernaturalism and develops an immanental, almost pantheistic notion of god. Spinozism later becomes significant for the thought of Friedrich Schleiermacher, Hegel, and Einstein. Isaac Newton (1642-1727) emerges as a religious man and something of a theologian in his own right.[6] Nevertheless Newton gives us the so-called mechanistic theory of cosmic causality which, according to its critics, leaves no room for divine intervention or for human freedom. David Hume (1711-76) disturbs Immanuel Kant's dogmatic slumber, and Kant proceeds to crown the methodical line of Western thought with the *Critique of Pure Reason*. Kant (1724-1804) formulates the notion of a transcendental horizon; that is, he seeks to designate the limit beyond which human thought and knowledge cannot proceed.[7] Kant is deeply committed to the law of noncontradiction, to respect for the distinction between subjectivity and objectivity, and to the notion that empirical experience must be available, at least in principle, to support any claim to objective knowledge or to objective reality.[8]

The German Enlightenment can be characterized technically but very briefly by these developments: (1) the proclamation of human autonomy, (2) the authentication of reason over faith and revelation, (3) the shift from the primacy of content to the primacy of method, and (4) the shift of the locus of meaning from the supernatural to this empirically known world of space and time.

Once the legitimacy and the power of critical philosophy and scientific method are established, a protracted methodological war erupts between religion and science, and a symposium of rebellion lectures against uncritical faith and against the theistic idea of god. Dostoyevsky (1821-81) has Ivan respectfully return God the ticket to his immoral and irrational world.[9] Friedrich Nietzsche (1844-1900) has Zarathustra murder the theistic god because his omniscience deprives human beings of their subjectivity.[10] Sigmund Freud (1856-1939) practically defines religion as belief in the cosmic father god and then declares religion to be a transference neurosis. Albert Schweitzer

(1875-1965) flatly rejects the notion of a personal or theistic god and also concludes that Jesus himself proclaimed the mistaken and unfulfilled eschatological prophecies of the New Testament.[11] Paul Tillich (1886-1965) concurs with Nietzsche's deicide, explicitly declares that god does not possess a center of consciousness, and then offers Western Christendom the notion of an impersonal, deobjectified "God above the God of theism."[12]

Reflecting upon the history of methodological and conceptual strife between religion and science, Einstein makes the following observations: "During the youthful period of mankind's spiritual evolution human fantasy created gods in man's own image, who, by the operations of their will were supposed to . . . influence the phenomenal world. . . . Man sought to alter the disposition of these gods in his own favor by means of magic and prayer. The main source of the present-day conflicts between the spheres of religion and of science lies in [the] concept of a personal God."[13]

Einstein acknowledges that the "idea of the existence of an omnipotent, just and omnibeneficent personal God is able to accord man solace, help and guidance."[14] Nevertheless he advances two major kinds of reasons for rejecting the existence of a personal god. They involve (1) causality and epistemological limits and (2) theodicy and human values. Methodologically his first reason depends upon the category of causality and thus is situated in his metaphysics and epistemology. Though well-aware that such a postulate could not be "proven," he believed that causality was a "rule," a "law of nature" with "absolutely general validity." He was so "imbued" with the ordered regularity that science discovers in nature that he had "no room left by the side of this ordered regularity for causes of a different nature."[15]

Einstein grounds his notion, or metaphysical postulate, of universal causal order in a religious attitude which he says is faith or something akin to faith. In his more epistemologically technical approach to the problem of a methodological warrant for this postulate, he rests his case on the assertion that certain working postulates are necessary for thinking and for avoiding solipsism.

Einstein's second reason for rejecting the notion of a personal god presupposes a kind of human autonomy—the idea that humans have the right to make a rational critique of the inherited ideas of god, to question the moral behavior of an alleged god, and to reject theologies that are dehumanizing. Consequently this reason is based on his response to the problem of theodicy, and it prepares us for his understanding of religion. Theodicy is the study of an irreducible

question in theology and philosophy: If God is consciousness, omnipotent, and absolutely righteous, why do suffering, injustice, and absurdity persist in the human situation? In his credo Einstein gives his response: "I cannot imagine a God who rewards and punishes the objects of his creation, whose purposes are modeled after our own—a God, in short, who is but a reflection of human frailty. . . . It is enough for me to contemplate the mystery of conscious life perpetuating itself through all eternity, to reflect upon the marvelous structure of the universe which we can dimly perceive, and to try humbly to comprehend even an infinitesimal part of the intelligence manifested in nature."[16] This quotation expresses the core of his notion of "cosmic religion" and also reflects his frequently cited indebtedness to Spinoza. Elsewhere Einstein is more explicit in his explication of religion. He sees the religiously enlightened person as one who has "liberated" himself from the fetters of selfish desires and is preoccupied with thoughts and aspirations that possess superpersonal value. What is important is the overpowering meaningfulness of the superpersonal content "regardless of whether any attempt is made to unite this content with a divine being, for otherwise it would not be possible to count Buddha and Spinoza as religious personalities."[17]

For Einstein science tells us what is; religion tells us what should be. Religion does not deal with facts or with relationships between facts. Rather it deals only with evaluations of human thought and action. Religion evokes aspiration toward truth and understanding. Religion generates "faith" in the intelligibility of the empirical world. In turn religion is nurtured by the reverence and awe which accompany our discovery of the order and harmony in the universe.[18] For Einstein then there is a single attitude which lies at the base of religion, philosophy, and science. This attitude, which is religious in the highest sense of the word, motivates the striving for the highest ethical ideals and the striving for the deepest possible grasp of the intelligibility of the cosmos.

The Core of Einstein's Methodology

In a manner that is necessarily brief and selective I now turn to the core of Einstein's methodology for philosophy, science, and religion. In his "Reply to Criticisms" Einstein explains that one "necessary prerequisite of scientific and pre-scientific thinking is the distinction between 'sense-impressions' (and the recollection of such) on the one hand and mere ideas on the other" and concedes that there is no evidence and "no such thing as a conceptual definition of this distinction."[19] Undeterred by the reproach that he is guilty of metaphysical

"original sin," Einstein designates "the distinction as a category which we use" in order that we can function "in the world of immediate sensations."[20] In this achievement lies the justification of the distinction. In a second methodological "step" Einstein states that

> We represent the sense-impressions as conditioned by an "objective" and by a "subjective" factor. For this conceptual distinction there also is no logical-philosophical justification. But if we reject it, we cannot escape solipsism. It is also the presupposition of every kind of physical thinking.... Insofar as physical thinking justifies itself,... by its ability to grasp experiences intellectually, we regard it as "knowledge of the real."... The theoretical attitude here advocated is distinct from that of Kant only by the fact that we do not conceive of the "categories" as unalterable (conditioned by the nature of the understanding) but as (in the logical sense) free conventions. They appear to be *a priori* only insofar as thinking without the positing of categories and of concepts in general would be as impossible as is breathing in a vacuum.[21]

The preceding quotation indicates that Einstein conducts a critique of Kant's epistemology and then makes his own response to the epistemic problems revealed by Hume. From Hume, Kant had learned that certain concepts such as causal connection dominate our thinking, though they cannot be logically deduced from empirical data. The methodological question which Kant confronted and attempted to resolve can be stated as "what is the epistemic warrant or justification for the use of such concepts?" Einstein suggests that Kant could have made this two-step response: (1) Thinking is necessary in order to understand that which is empirically given, and (2) concepts and "categories" are necessary as indispensable elements of or conditions for thinking.

Einstein then makes the extremely interesting observation that if Kant "had remained *satisfied* with this type of an answer, he would have avoided scepticism and you would not have been able to find fault with him" (my italics).[22] Kant believed that he had proven a priori the existence of synthetic judgments—judgments which are produced by reason alone—and consequently such judgments have absolute validity. In one passage Kant states that "metaphysics consists, at least *in intention*, entirely of *a priori* synthetic propositions."[23] On the one hand Einstein denies the existence of such judgments as Kant formulated.[24] On the other hand Einstein retains the methodological postulation of such universal categories as causality. It is this hypothetical postulation of the categories that are necessary for thinking that Einstein designates as "the really significant philosophical achievement of Kant."[25] For him such postulates refer to an objectively real physical system that is external to and independent of the observer.[26] It is worth noting at this point that his procedure and

presentation are characterized by an almost incredible intellectual economy when compared to the extended speculative intricacy of Kantian transcendental deductions.

One additional element of Einstein's methodology must be cited here. Einstein insisted that when two verified principles or conclusions are contradictory one must go back to the presupposition that causes the apparent contradiction and replace that presupposition with its negative. His methodology relentlessly follows this approach in developing the special theory of relativity as well as in treating the problem of theodicy.[27]

I now summarize my discussion of Einstein's methodology for warranting the postulates which undergird philosophical and scientific thinking: (1) Einstein retains from Kant the indispensability of the distinction between objective and subjective reality. (2) He shares the notion that all knowledge depends upon and is limited by experience. (3) Like Kant, he employs what F. S. C. Northrop calls the "two-termed epistemic correlation."[28] This procedure contains features of rationalism and of extreme empirical orientation.[29] The speculative or theoretically postulated factors are correlated continuously with empirically given data to produce knowledge about reality.[30] (4) Einstein does not posit rigidity or proof for the basic postulates. He regards them as free inventions of the scientific imagination, justified by indispensability and by their operative success in providing intelligibility, and supported, perhaps crucially, by an attitude which is "akin" to religious faith. (5) Einstein's capacity for acceptance enables him to be satisfied with less ambitious moral, theological, and epistemic expectations than Kant. Hence Einstein is in one sense more agnostic than Kant. Moreover, he exhibits a more profound recognition of the limits of human knowledge than Kant. It is my opinion that Kant falls into cognitive hubris in his attempt to provide a transcendental deduction for the rigid categories. Also, though Kant deserves his reputation for having designated the limits of human knowledge, he notoriously violates those limits himself with his notions of noumenal reality, freedom as causality, and the so-called practical extension of reason. (6) Kant draws the limits of human knowledge at the boundary where his categories regulate the phenomenal world. Beyond this "transcendental horizon" there is no knowledge.[31] Yet Kant proceeds with a dualistic, fragmented conceptualization of a noumenal world in which freedom functions as a unique kind of causality.[32] Einstein did not believe that moral responsibility presupposes freedom or that human beings can transcend their causal nexus. Rather he agreed with Arthur Schopenhauer that "a man can surely do what he wills to do, but he cannot determine what he wills."[33] Therefore Einstein was

not under the Kantian compulsion to conceive of another world—of a practical reason—or to postulate a second causal order when formulating an anthropology.

A Three-Tiered Structure

It is possible to picture Einstein's methodology as a three-tiered structure. In the first and foundation tier there is a religious attitude sanctioning value judgments, procedures, and postulates, all of which function in a reciprocal relationship of authentication and limitation. Einstein is able to limit his epistemic aspirations in theology and in science because he is capable of acceptance. Here he comes very close to Tillich's notion of acceptance.[34] However he does not employ the conceptual apparatus of Tillich's dialectical ontology. He does not need to know that which is unknowable, he has no need for a mythological dramatization of history, and he is not dependent upon a theistic father god.

The second tier of Einstein's world view may be designated as "metaphysics" in the sense of a compendium of the categories and principles which must be postulated as universal in order to facilitate thinking and intelligible transactions with the external world. In this sense both Max Planck and Einstein believed that science began in metaphysics.[35] The third and final tier—the one where he did this work—consists of science in general and of theoretical physics in particular. In practice these three tiers constitute a methodological and attitudinal unity.

Einstein's relativity theories and their associated conceptuality appear quite radical in contrast with Newton's notion of absolute space. Einstein's theology also seems quite radical in contrast with the traditional idea of a personal, theistic god in Judaism and in Christianity. Nevertheless other significant figures in our culture conceive of god in nonpersonal, nontheistic terms. Spinoza believed in a kind of cosmic divinity that could be regarded as primordial intelligence but not as a theistic person.[36] Einstein credited Spinoza with the inspiration for his own theological perspective. Schleiermacher explicitly argued that true religion was not dependent upon the notion of a personal god or upon the notion of personal immortality.[37]

Freud and Tillich developed different but somewhat parallel arguments stating why human beings should proceed from the state of theistic transference to psychological health and from theistic faith to the state of absolute faith (i.e., Tillich's "God above the God of theism").[38] Alfred North Whitehead declared that consciousness is an unessential element in experience—which includes the whole of

reality—whether physical or mental. The black philosopher and theologian William R. Jones conducts a relentless critique of theism and argues that "god is the sum of his acts."[40] Jones regards theodicy as the point of departure for the black theological enterprise. Like Einstein, he recoils from the notion of an anthropomorphic deity who presides over the tragedy of the human situation. What these figures all share with Einstein is the removal of the category of consciousness from their theological and philosophical method. They all technically remove the category that is necessary for the intelligibility of the idea of a theistic god. Therefore, despite its apparent radicality, Einstein's approach to theology possesses striking compatibility with certain basic elements in a theological trend that runs from the beginning of the German Enlightenment to the liberal wing of the black theology movement of the 1970s.

It is a long and tortuous journey from Plato and Parmenides, Moses and Homer, Jesus and Nagarjuna, Buddha and Spinoza, Hume and Kant, to Tillich and Einstein. The search for meaning and the terror of history have led to psychological, intellectual, and sometimes physical violence as apologetics were developed for theological projections. All over the world individuals and institutions are celebrating the centennial of Einstein's birth and his contributions to the methodology of natural science. Here I have attempted to show that his scientific method does not stand in isolation. It is one major element among others in a methodological and attitudinal unity, which indicates the limits of human knowledge while achieving almost incredible success in providing verifiable knowledge about the external world and our transactions with it. The scientific-epistemological element cannot responsibly be separated from the elements and implications that directly involve religion and our relation to ultimate reality, however it might be conceived.

Einstein goes beyond Plato, Aristotle, Newton, and Kant; he goes beyond the notion of the theistic father god. Never associating himself with the dialectical speculations of the counter-Enlightenment German romanticists (Friedrich Schelling, Hegel, Martin Heidegger, and Tillich), Einstein offers instead his own path to reenchantment and to a profound but nondogmatic religiosity that is highly compatible with scientific method, with critical philosophy, with a humanistically oriented ethic, and with the human need for a sense of ultimacy.[41] The method and the content of his contiuously verifiable achievements must be taken into account now by any responsible theological enterprise. Serious, sustained consideration of the religious-theological contribution of Einstein is just as imperative as the now

pervasive consideration of the "purely" scientific contributions. I believe that critical philosophy of religion now has the task of reassessing our religious heritage in the light of Einstein's work and its methodological unity.

NOTES

1. Albert Einstein, "Credo," in *Living Philosophies: A Series of Intimate Credos*, ed. Henry Goddard Leach (New York: Simon & Schuster, 1931), p. 3.

2. In the twelfth century Joachim of Fiore used the Christian symbols of the trinity to develop a speculative doctrine of history and eschatology. See the critical discussion in Eric Voeglin, *The New Science of Politics* (Chicago: University of Chicago Press, 1952). Concerning gnosticism and the nonrecognition of reality as a matter of principle see pp. 167-73. See also Paul Tillich, *The Future of Religions* (New York: Harper & Row, 1966), pp. 66-77.

3. Fyodor Dostoyevsky, *The Brothers Karamazov*, trans. Constance Garnett (New York: Modern Library, 1950), p. 267.

4. Henry Allen, "The Lure of Our Many Cults," *Washington Post* (November 26, 1978), p. C-1.

5. Homer *Iliad* 24. 315.

6. See H. S. Thayer, ed., *Newton's Philosophy of Nature* (New York: Hafner Publishing Co., 1953), chap. 3. Jeremy Bernstein states that Isaac Newton offered a theological resolution to the problems of the distinguishability of rest and motion and of an absolute frame of reference for his theory of mechanics. See Bernstein's *Einstein* (New York: Penguin Books, 1978), pp. 40-41 and chap. 3. See also Max Jammer, *Concepts of Space* (Cambridge, Mass.: Harvard University Press, 1957); foreword by Einstein. See pp. 96-99, 112-14 on Newton.

7. Thomas Langan, *The Meaning of Heidegger: A Critical Study of Existentialist Phenomenology* (New York: Columbia University Press, 1961), pp. 72-80.

8. Immanuel Kant, *The Critique of Pure Reason*, trans. Norman Kemp Smith (New York: St. Martin's Press, 1965), p. Bxix. Cf. pp. B246, B247, B269.

9. Dostoyevsky, p. 254.

10. Friedrich Nietzsche, " Thus Spake Zarathustra," in *The Portable Nietzsche*, ed. Walter Kaufmann (New York: Viking Press, 1965), pp. 375-79.

11. Gabriel Langfeldt, *Albert Schweitzer: A Study of His Philosophy of Life* (New York: George Braziller, 1960), pp. 13-14, 29-50, 60, 94; Albert Schweitzer, *The Quest of the Historical Jesus* (New York: Macmillan Co., 1948), chap. 19.

12. Paul Tillich, *The Courage to Be* (New Haven, Conn.: Yale University Press, 1952), pp. 185, 182-90, and *Systematic Theology*, 3 vols. (Chicago: University of Chicago Press, 1963), 3:126.

13. Albert Einstein, *Out of My Later Years* (Totowa, N.J.: Littlefield, Adams & Co., 1967), pp. 30-31.

14. Ibid.

15. Ibid.

16. Einstein, "Credo," pp. 6-7.

17. Einstein, *Out of My Later Years*, p. 29.

18. Max Planck, *Where Is Science Going?* (London: Allen & Unwin, 1933), p. 13. This book contains a preface by Einstein and also "A Socratic Dialogue" involving James Murphy, Einstein, and Planck. Valuable discussion of causality and metaphysics.

19. Albert Einstein, "Reply to Criticisms," in *Albert Einstein: Philosopher-Scientist*, ed. Paul Arthur Schilpp (Evanston, Ill.: Library of Living Philosophers, 1949), p. 673.

20. Ibid.

21. Ibid., p. 674.

22. Ibid., pp. 678-79.

23. Kant, p. B18.

24. Kant's critical idealism and his a priori forms, categories, and propositions are criticized and largely rejected by modern physics, psychology, logic, and relativity theory. See a brief discussion in Jammer (n. 6 above), p. 137; cf. pp. 129-44.

25. Einstein, "Reply to Criticisms," p. 678.

26. "The belief in an external world independent of the perceiving subject is the basis of all natural science. Since, however, sense perception only gives information of this external world or of 'physical reality' indirectly, we can only grasp the latter by speculative means. It follows from this that our notions of physical reality can never be final. We must always be ready to change these notions—that is to say, the axiomatic sub-structure of physics—in order to do justice to perceived facts in the most logically perfect way. Actually a glance at the development of physics shows that it has undergone far-reaching changes in the course of time" (Albert Einstein, *The World As I See It* [New York: Covici-Friede, 1934], p. 60).

27. Einstein was confronted with "two principles: (1) the principle of relativity for Galilean frames of reference and (2) the principle of the absolute finite velocity of light in vacuo. Einstein noted that these two principles contradict each other.... He proceeded ... to note what presupposition makes the two principles contradict each other. He discovered that it is the doctrine of the addition and subtraction of velocities which rests upon the principle that time is absolute. Nothing remained but to reject the latter principle and regard time as relative. Thus a contradiction in traditional electromagnetic theory drove Einstein to the discovery of the principle of the relativity of simultaneity. This is the essential contribution of the special theory of relativity.... It is to be noted that in both cases no new evidence is introduced and no experiments are performed. The conclusions owe their validity solely to logic and traditional evidence. They are the necessary consequences of established ideas" (F. S. C. Northrop, *Science and First Principles* [New York: Macmillan Co., 1931], pp. 68-69).

28. F. S. C. Northrop, *The Meeting of East and West* (New York: Macmillan Co., 1946), pp. 453, 442-54, 468-81, 493. Einstein has offered strong praise for Northrop's interpretation of Einstein's philosophy of science: "The essays by Lenzen and Northrop both aim to treat my occasional utterances of epistemological content systematically.... Northrop uses these utterances as point of departure for a comparative critique of the major epistemological systems. I see in this critique a masterpiece of unbiased thinking and concise discussion, which nowhere permits itself to be diverted from the essential" (Einstein, "Reply to Criticisms," p. 683).

29. Einstein, "Reply to Criticisms," pp. 679-80.

30. "Science is the attempt to make the chaotic diversity of our sense experience correspond to a logically uniform system of thought. In this system single experiences must be correlated with the theoretic structure in such a way that the resulting coordination is complete and convincing" (Northrop, *Meeting of East and West*, p. 443).

31. Langan (n. 7 above), pp. 72-80.

32. Kant (n. 8 above), pp. B472 and B586.

33. Einstein, "Credo," p. 3.

34. Tillich (n. 12 above), pp. 163-67, 170-72, 174-76, 181, 185, 187.

35. Planck (n. 18 above), pp. 81, 128-30, 203.

36. Benedictus de Spinoza, *Chief Works*, trans. R. H. M. Elwes (New York: Dover Publications, 1955) (*Ethics*, pt. 1, propositions 15-17).

37. Friedrich Schleiermacher, *On Religion: Speeches to Its Cultured Despisers* (New York: Harper Torchbooks, 1958), pp. 93-101.

38. Peter Homans, "Transference and Transcendence: Freud and Tillich on the Nature of Personal Relatedness," *Journal of Religion* 46 (January 1966): 153-60. See Paul Tillich's "Rejoinder," ibid., p. 195.

39. Alfred North Whitehead, *Process and Reality* (New York: Macmillan Co., 1929), p. 54.

40. William R. Jones, *Is God a White Racist?: A Preamble to Black Theology* (Garden City, N.Y.: Anchor Press, 1973), pp. 10-24, 114-15, 142, 171-72.

41. Albert Einstein, *Cosmic Religion: With Other Opinions and Aphorisms* (New York: Covici-Friede, 1931), pp. 48-51, 98.