

FAITH AND THOUGHT

VOLUME 114 ● NUMBER 2 ● OCTOBER 1988

*A Journal devoted to the study of the inter-relation of the
Christian Revelation and modern research*

GENERAL EDITOR: Dr. A. B. Robins



Published for
THE VICTORIA INSTITUTE



by
THE PATERNOSTER PRESS

J. W. Hass Jr.

Relativity and Christian Thought: The Early Response*

Introduction

The desire to relate Christian faith and the scientific enterprise has a long and varied history. One traditional meeting point of faith and science has involved Christian reaction to dramatic changes in scientific perspective. Few would argue against the assertion that the early twentieth century work of Albert Einstein changed the way that we view nature. In postulating a four-dimensional universe, he removed classical notions of absolute space, time and motion. The 'new physics' developed by Einstein and his contemporaries espoused concepts of space and time, mass and energy, waves and particles and their interrelations which radically altered our perspective of the atom and the cosmos. These concepts have, in turn, raised foundational philosophical questions concerning the basic nature of science and the relation of science to Christianity.

Papers dealing with the religious implications of relativity appeared shortly after the public announcement of the first successful measurements of the bending of starlight by the sun. Religious discussion continued at a lively pace until the early 1930s. From that point until the 1970s interest was at a minimum. Recently, there has been a revival of interest in Einstein's thought and the significance that his work holds for theology and theistic world views encompassing science.¹

* Reproduced, with permission, from the Journal of the American Scientific Affiliation 1988, 40, pp. 10-18.

1(a) A. R. Peacocke, 'The Theory of Relativity and Our World View', in Maurice Goldsmith, Allen MacKay and James Woudhusen, eds. *Einstein: The First Hundred Years* (New York: Pergamon Press, 1980) pp. 73-91. (b) Thomas F. Torrance, *Transformation & Convergence in the Frame of Knowledge* (Grand Rapids: Wm. B. Eerdmans Publishing Co., 1984). (c) Ian Paul, *Science and Theology in Einstein's Perspective* (Edinburgh: Scottish Academic Press, 1986). (d) Harold P. Nebelsick, 'Theological Clues From the Scientific World', *Journal of the American Scientific Affiliation* 38 (1986), pp.110-121. (e) Ralph G. Mitchell, *Einstein and Christ: A New Approach to the Defense of the Christian Religion* (Edinburgh: Scottish Academic Press, 1987).

In evaluating early reactions to relativity there is a factor not usually associated with scientific discovery. In most cases, a scientist receives attention at the time that his work is published but soon fades from public view, even though his science may endure. Uniquely, Albert Einstein was to remain in the public eye until his death in 1955. In this paper, I will examine the early religious response to relativity and discuss ways that relativity was thought to bear on questions involving science and Christian faith. In addition, I will seek to establish links between early interpretations and current interests. By focusing on this early period we can avoid the confusing and sometimes vitriolic reaction that arose later when Einstein made public statements on religious and philosophical issues.

Einstein the Legend

Although he had published his major papers on relativity over the period of 1905–1915, Albert Einstein did not come to world prominence until November 7, 1919 with the headlines in the London *Times* 'Revolution in Science/New Theory of the Universe/Newtonian Ideas Overthrown/Space "Warped"'.² The article reported a joint Meeting of the Royal and Astronomical Societies held on the previous day, where the results obtained by British observers of the total eclipse of the previous May were formally presented.³ The *New York Times* published a full and accurate report on November 9, and from that year until his death the *New York Times Index* had at least one record of his name, often with respect to topics unconnected with science. Einstein's rise to fame was rapid, and endured throughout his life.⁴ He had a lifelong interest in philosophy, was an excellent amateur violinist, wrote occasionally about religion, was a passionate advocate of pacifism, had deep concern for moral Zionism, and was an outspoken opponent of Hitler.⁵

The Scientific Context

The twentieth century revolution in physics came in various stages through the work of Maxwell, Planck, Einstein, Bohr, Schrodinger, de Broglie, Heisenberg and others. As the nineteenth century drew to a

2. Abraham Pais, *Subtle is the Lord . . .: The Science and Life of Albert Einstein* (New York: Oxford University Press, 1982), p. 307.

3. *Ibid.*, p. 306.

4. Lewis Elton, 'Einstein, General Relativity, and the German Press: 1919–1920', *Isis* 77 (1986), pp. 95–102.

5. Pais, *op. cit.*, p. 315.

close, classical physics garbed in the clothes of Newton and Euclid was confident that all the essentials of nature were understood and that all that remained were minor adjustments and filling in the gaps. The world was made of solid material particles; physical phenomena could be analysed by breaking them into their component parts localized in time and space; nature could be visualized in observable or easily imaginable images.

The world view developed in the early part of the twentieth century showed that matter was not composed of inert hard particles; indeed, the negative particles surrounding the nucleus were found to have both mass and wave properties and their position in space was describable only in statistical terms by using complex mathematical equations. This new perspective on the micro-world was accompanied by an equally mind-boggling change in the cosmos. Light travelled in curved lines, and therefore space was curved. Gravitation is not a pull of attraction between two portions of matter, but rather the 'warpage,' which matter produces in the space-time continuum. In Einstein's world, gravitation appears not as an esoteric force, but rather as a mathematical necessity of the geometry of the space-time continuum. This new perspective interpreted the cosmos in 'relational' terms, in contrast to the 'container' perspective of the old physics.

Einstein's mysterious new theory required interpretation for the masses, and scientists the world over were called upon to offer expertise to newspapers, magazines, and audiences large and small. More than one hundred books on the subject appeared within a year.⁶ Arthur Eddington's influential *Space, Time and Gravitation* provided an early (1920) popular explanation of relativity and was to be widely quoted by religious writers of the period. He concluded his work with these words:

It [relativity] has unified the great laws, which by the precision of their formulation and the exactness of their application have won the proud place which physical science holds today. And yet, in regard to the nature of things, this knowledge is only an empty shell—a form of symbols. It is knowledge of structural form, and not knowledge of content. All through the physical world runs the unknown content, which must surely be the stuff of our consciousness. Here is a hint of aspects deep within the world of physics, and yet unattainable by the methods of physics. And, moreover, we have found that where science has progressed the farthest,

6. Ronald W. Clark, *Einstein: The Life and Times* (New York: The World Publishing Co., 1971), p. 245.

the mind has but regained from nature that which the mind has put into nature.⁷

The Religious Climate in England and America

The 1920s were a time of conflict for the Protestant church in America. Issues raised by late nineteenth-century desire to develop a synthesis of Christian faith and modern thought had come to a head. Conservatives saw a shift in the 'locus of authority' from the Bible to scientific and historical critical methodology, and lamented the erosion of traditional ideas in ethics, morals and social questions stemming from the new ways of thinking.⁸ Theological liberals (Modernists) and evangelical conservatives found themselves unable to find a middle ground and new denominations, seminaries, mission agencies and colleges were formed as the old institutions were lost to the liberals. While England and the American South were spared the schisms of the American North, the issues were still heatedly debated.

The dominant scientific issue was evolution. Clergy, theologians, scientists and laymen—liberal and conservative alike—obsessively addressed the topic in a flood of books and articles in learned and popular religious literature. One mark of the conservative was a disdain for evolution in any form. It was but a short step to what Bernard Ramm described as

hyperorthodoxy [which] assumed that unsaved man is in open rebellion against God and will use science as well as anything else to oppose Christianity. The Bible it asserted was not in conflict with true science, but obviously in conflict with most of the world's practicing scientists. These scientists unsaved and antichristian must be written off the record in science as well as in religion.⁹

However, Ramm observed that the Roman Catholic scholars of the day had worked out a 'set of principles setting forth the boundaries of science, the boundaries of theology, and the canons of interpretation' which allowed them to avoid the excesses of conservative Protestantism.¹⁰

7. Arthur Eddington, *Space, Time and Gravitation: An Outline of General Relativity Theory* (Cambridge: Cambridge University Press, 1920), p. 200.

8. Robert A. Handy, *A History of Churches in the United States and Canada* (Oxford: Oxford University Press, 1976), p. 286.

9. Bernard Ramm, *The Christian View of Science and Scripture* (Grand Rapids: Wm. B. Eerdmans Publishing Co., 1955), p. 27.

10. *Ibid.*, p. 26.

If conservatives had problems with evolution, their liberal counterparts were not particularly pleased with a science which they felt led to a technology that devalued human labour and increased the power to wage war. Since conservative Christianity of that period placed almost total emphasis on evangelism and the defence of the faith, there was little encouragement for the serious study of science or for the integrative concerns found today. Thus, few conservatives had the background in science and mathematics to engage in fruitful discussion of the new physics.

The Philosophical Mood

The early part of the twentieth century saw the 'New Realism' as the most significant philosophical development in English-speaking countries.¹¹ Realism during this period stood for the view that one can have knowledge of a real world which exists independently of our view of it. The 'New Realism' arose in revolt against the twin evils of 'idealism,' for which the world is in some sense mind-dependent, and 'materialism,' for which matter was all. Realist metaphysicians recognized: (1) the reality of the world in space and time; (2) Mind, or the act of knowing, as one factor in reality among others; (3) a closer connection with science than in the past; (4) the notion of process; and (5) various levels of understanding in nature extending to the levels of spirit, and even deity.

Although many of the realists were indifferent or hostile to religion, realism provided no inherent disposition against religion. Thomistic philosophy, and other theistic philosophies of this period, incorporated realism in their systems.

The Response to Relativity

An Overview

A wide spectrum of religious response to relativity appeared in the period following observational verification in the solar eclipse of 1919. Over twenty periodicals from America and England offered articles from a broad range of Protestant, Catholic and non-theistic perspectives. The famous and not so famous were drawn to discuss the religious implications of this revolutionary scientific change. At the very least, readers of journals of religious thought were exposed to unprecedented levels of mathematics.

11. John Macquarrie, *Twentieth-Century Religious Thought: The Frontiers of Philosophy and Theology, 1900-1960* (New York: Harper & Row, 1963), p. 226.

The periodical literature reflected for the most part the views of clerics, theologians and philosophers of religion. Practicing scientists had their day in the 'science and religion' books which appeared in great number during this period. The British scientific journal *Nature* provided an important forum for early scientific and philosophical discussion.

Generally, American and English religious conservatives ignored Einstein; a few were critical of relativity itself or the interpretations which others had drawn. The quality of the response in the religious journals varied widely in terms of scientific accuracy, and philosophic and theological acumen. The greatest depth of interaction came from the university centres of England, which had a tradition of dialogue between theologians and scientists not possible in American intellectual circles where theology was (and still is) kept separate from the other disciplines.

The period between the world wars saw unparalleled progress in many areas of the physical sciences, it was also a time when many scientists vigorously addressed the philosophical and religious implications of the new science. Prominent figures such as Haldane, Jeans, Russell, Whitehead, Weyl, and Planck lectured and wrote papers and books which stimulated a spirited response on the part of clerics and philosophers. Sometimes writers used the term 'metaphysics' to avoid the use of religiously coloured words in scientific journals, or to avoid offending the sensitivities of anti-theistic editors. For other writers deity, god, and gods were terms which had little connection with the triune God of Holy Scripture.

The Initial Reaction

The journal *Nature* played an important early role in discussions of the scientific and philosophical implications of relativity. London University philosopher H. Wildon Carr's pioneering papers, 'The Metaphysical Aspects of Relativity' and 'Metaphysics and Materialism', stimulated a vigorous debate carried on in the Letters to The Editor section of *Nature*.¹²

12(a) H. Wildon Carr, 'The Metaphysical Aspects of Relativity', *Nature* 106 (1921), pp. 809-811. (b) H. Wildon Carr, 'Metaphysics and Materialism', *Nature* 108 (1921), pp. 247-248. (c) Norman R. Campbell, 'A Response to Carr', *Nature* 108 (1921), pp. 399-400. (d) H. Wildon Carr, 'A Response to Campbell', *Nature* 108 (1921), p. 400. (e) Hugh Elliot, 'A Response to Carr', *Nature* 108 (1921), p. 432. (f) H. Wildon Carr, 'A Response to Elliot', *Nature* 108 (1921), p. 467. (g) Edmund McClure, 'A Response to Campbell', *Nature* 108 (1921), p. 467. (h) Harold Jeffreys, 'A Response to Campbell and Elliot', *Nature* 108 (1921), p. 568. (i) S. V. Ramamurty, 'A Response to Carr, et. al.', *Nature* 108 (1921), p. 569. (j) Norman R. Campbell, 'A Response to McClure', *Nature* 108 (1921), p. 569.

Many commentators of the early period were enthusiastic about the potential that relativity offered for Christian thought. Theologian Orrock Colloque wrote: 'The new Einstein theory of relativity will doubtless prove of tremendous interest to Catholic theologians since it deals, as does theology, with the fundamental nature of matter, space and time.'¹³ Jesuit Leslie Walker wrote: 'it is highly probable that the theory of Einstein and the philosophy of Aristotle and St. Thomas will harmonize, since both claim to be based on the same foundation of sound common sense.' Walker further noted that 'the story of Einstein is not a revolution, but as far as the notions of space and time are concerned, is a return to conceptions which modern philosophy has rashly disregarded.'¹⁴ H. Wildon Carr felt that relativity was going to produce 'a revolution in religious thought.'¹⁵ Catholic theologian T. O. Patterson found that Scholastic methods were 'quite developed for coping with the discursive side of relativity theory' since each system claims 'an empirical foundation.' Patterson proudly noted that 'Scholastic philosophy has always postulated the relationship of space, motion and time'—something that 'relativist writers claim to have discovered.'¹⁶

British M.P. Austin Hopkinson observed 'how much simpler is the conception of divinity now possible due to the formulation of the general theory of relativity,' and found in the new physics 'a shadow of a dream of God which is more satisfying than the traditional anthropomorphisms.'¹⁷ Albert Clarke Wyckoff wrote 'No scientific position since the birth of the new era has meant so much to Theism.' For Wyckoff, 'Theism's golden opportunity awaits.'¹⁸

Other writers, if not as enthusiastic, at least found no conflict between Christianity and relativity. F. J. McConnell, Pittsburg Methodist Episcopal Church Bishop, observed: 'there is nothing in Einstein . . . to forbid or discount theism,' and 'nothing in the Einstein doctrine of space which would deprive the theist of the right to think of the Divine Mind as absolute in relation to space.'¹⁹ A Catholic

13. Orrock Colloque, 'Einstein and Catholic Theology', *American Church Monthly* 6 (1920), p. 525.

14. Leslie Walker, 'Concerning Einstein', *Dublin Review* 171 (1920), p. 275.

15. [anon.], 'Relativity in Religion', *Homiletic Review* 83 (1922), p. 27.

16. J. O. Patterson, 'Relativity: Some Metaphysico-Theological Considerations', *The Ecclesiastical Review* 66 (1922), pp. 263, 256.

17. Austin Hopkinson, 'Relativity and Revelation', *Hibbert Journal* 21 (1922-23), pp. 54, 55.

18. Albert Clarke Wyckoff, 'The Downfall of the Mechanistic Dynasty', *Biblical Review* 16 (1931), pp. 331, 343.

19. F. J. McConnell, 'Relativity and Theism', *Methodist Review* 107 (1924), p. 17.

theologian stated that 'although a readjustment of notions of space and time was required, their objective character such as understood in the scholastic sense was not impaired.'²⁰

Some commentators were sceptical of the correlations which were being drawn, British philosopher C. Dawes Hicks, co-editor of the *Hibbert Journal* felt that the 'bearing of relativity on philosophical [and religious] problems had been exaggerated and misunderstood.'²¹ A suspicious American Methodist cleric cited the quick acceptance of relativity as an example of the 'boundless self-conceit of the times which seeks to destroy respect for the past.' He noted that the new relativity 'has many parallels with the insidious effects of evolution on Christian faith and society.'²² N. G. Augustus saw in relativity 'an attempt to have nature conform to our senses rather than educate our senses to the apprehension of the reality about us.'²³ Anglican Bishop Archibald Robertson expressed doubt about some of the correlations that were being drawn, noting that 'the values of Christian thought and experience are qualitative not quantitative.'²⁴

Later Views

Authors of the late 1920s and early 1930s were often critical of the responses of their earlier counterparts. F. L. Cross, Librarian of Pusey House, Oxford warned against the 'precipitant use of Einstein or Planck for apologetic purposes', and commented that physicists such as Whitehead, Eddington and Jeans have 'received little assent from the learned world' for their attempts to relate physics to faith.²⁵ Philosopher Herbert Dingle, writing in the *Hibbert Journal*, asserted that 'whatever spiritual reality may underlie the events of nature is eternally inaccessible to science.'²⁶ Joseph Dudley sounded a similar note in *The Bible Champion* by suggesting that relativity was another case of 'extending theoretical speculation far beyond the data.'²⁷

20. C. Bruehl, 'Theory of Einstein and Scholastic Epistemology', *Ecclesiastical Review* 64 (1921), p. 305.

21. C. Dawes Hicks, 'Recent Philosophical Literature', *Hibbert Journal* 19 (1920-21), p. 158.

22. N. G. Augustus, 'Re Einstein', *Methodist Quarterly Review* 73 (1924), pp. 477, 485.

23. *Ibid.*, p. 477.

24. Archibald Robertson, 'Revelation and Relativity: How it Strikes a Bishop', *Hibbert Journal* 21 (1922-23), p. 534.

25. F. L. Cross, *Religion and The Reign of Science* (London: Longmans, Green and Company, 1930), p. 36.

26. Herbert Dingle, 'Physics and God', *Hibbert Journal* 27 (1928), p. 46.

27. Joseph Whitney Dudley, 'A Revolution in Astronomy', *The Bible Champion* 35 (1929), p. 209.

Some writers, however, continued to maintain the earlier enthusiasm. The Rev. M. Green found that 'the new science offers new fields for faith to triumph.'²⁸ Jesuit C. W. O'Hara, writing in *Science and Religion: A Symposium* (1931), found that the work of Einstein and Planck had 'closed the gap between religion and science.'²⁹ Burnett Streeter, Fellow of Queens College, Oxford saw relativity as offering 'new apologetic possibilities.'³⁰ Theodore Graebner observed 'the most up-to-date scientific speculation is proceeding along lines of spiritualism, idealism, the recognition of the supernatural and the divine.'³¹

Specific Correlations

Science is Not All

Both scientists and theologians saw a new sense of humility emerging in the physical sciences. Physicist Robert A. Millikan noted: 'We have learned not to take ourselves as seriously as the 19th century physicists took themselves. We have learned to work with new satisfaction, new hope, and new enthusiasm because there is so much that we do not understand.'³² Oxford Bishop Archibald Robertson welcomed the new role of physics in checking 'the self-confidence of science.'²⁴ The limitations imposed on scientific measurement by the new physics were seen by some commentators as allowing a window for other (religious) ways of thinking.

Materialism on Trial

One prominent theme was found in the view that relativity did away with the ancient Christian adversary of materialism. Philosopher H. Wildon Carr championed this position in early interpretation of relativity in the *Times Educational Supplement*, and a pair of controversial articles in *Nature*. Carr asserted that 'rejection of the Newtonian concept of absolute space and time and the substitution of Einstein's space-time is the death-knell of materialism.'^{12b} For Carr:

28. M. Green, 'The New Revolution in Science and Its Implications for Religious Faith', *Homiletic Review* 99 (1930), p. 3.

29. C. W. O'Hara, in *Science and Religion: A Symposium* (London: Gerald Howe Ltd., 1931), p. 111.

30. Burnett Hillman Streeter, *Reality: A New Correlation of Science and Religion* (New York: MacMillan Co., 1926), p. 31.

31. Theodore Graebner, 'Is the New Science Hostile to Religion?' *Concordia Theological Monthly* 3 (1932), p. 921.

32. Robert A. Millikan, *Evolution in Science and Religion* (New Haven: Yale University Press, 1927), p. 28.

... the principle of relativity IS the rejection of materialism. Materialism is a causal theory of scientific reality. It is the argument that when we pronounce anything in our sense-experience to be real we imply an independent cause for it. According to the principle of relativity, the inference is entirely unnecessary and to insist on it unscientific. Instead of this causal theory relativity offers a simple correspondence theory.^{12d}

F. R. Tennant, Lecturer and Fellow of Trinity College, Cambridge crystallized the thought of many writers in observing that relativity is a 'potent tool in the case against anti-theistic naturalism implicit in the closed-system thinking of the Newtonian world.'³³ M. Green wrote: 'the old determinism is dead both in physics and theology.'³⁴

Creation

Correlations with the theme of creation were a common feature. L. Franklin Gruber concluded that 'a finite and temporal and therefore created, universe issues from this scientific world-view.'³⁵ For Patterson, 'relativity provides an additional endorsement that space belongs to the finite and physical order.'³⁶ J. Arthur Thompson found the new physics to provide a picture of 'impressive grandeur' whose 'unification is congruent with the religious concept of a creator.'³⁷ C. W. O'Hara asserted, 'the Creator is seen to be the origin of the whole universe—the gap between religion and science has been closed.'³⁸

Immanence vs. Transcendence

The Newtonian model had been traditionally interpreted in deistic terms, with God far removed from the self-functioning natural order. H. Wildon Carr found a new role for relativity in his suggestion that 'while drawing us away from the idea of a separate or transcendent God, it interprets the idea of an immanent God.'¹⁵ For J. J. B. Coles, 'Relativity can only be interpreted in terms of an Immanent God, a Reality which in its very nature is Life and consciousness.'³⁹ On the

33. F. R. Tennant, 'The Present Relation of Science and Theology', *Constructive Quarterly* 10 (1922), p. 284.

34. Green, *op. cit.*, p. 5.

35. L. Franklin Gruber, 'The Einstein Theory', *Bibliotheca Sacra* 79 (1922), p. 88.

36. Patterson, *op. cit.*, p. 259.

37. J. Arthur Thompson, *Science and Religion* (New York: Scribners and Sons, 1925), p. 104.

38. O'Hara, *op. cit.*, p. 113.

39. Coles, *op. cit.*, p. 123.

other hand, Bishop McConnell warned that 'some of the present day theorizing about the immanence of God seems to be intended to shut God into the present system.'⁴⁰ Patterson emphasized the fact that time had been shown to be part of the finite and physical order and was not to be confused with the eternity of God as found in Newton and Clarke.⁴¹ Many writers emphasized the new 'unification of nature' stemming from relativity.

Various Levels of Knowledge

McConnell, in viewing space in divine perspective, asked: 'may there ... be ... in the Divine Will and Mind possibilities of other spaces independent of us, but to which we might be conceivably introduced?'⁴⁰ Hopkinson found room for 'fleeting glimpses' of divinity at higher levels. He concluded: 'the mind is led to the conception of a still higher order of intelligence, and thence to an infinite series of yet higher orders, of which each is God to the order immediately below it.'⁴² Robertson, however, was sceptical about this notion.

I welcome Mr. Hopkinson's step from space to the Divine Intelligence which is above space, without feeling at all compelled to take a step from outside space to an infinite series of Gods, one over the other. When the mind has reached God it finds Him, One and self-sufficient.⁴³

F. R. Tennant felt that the new physics offered a place for religion not available in nineteenth-century thought: 'The attempt to picture and model with exactness has given way to satisfaction with being able mathematically to conceive.' 'Nature so neatly ordered by number for exact quantitative relationships can at the same time be characterized by an indefinite number of other relations and qualities.' He saw the physicist as 'interested in the one sort of quality or relation that is relevant to physical science while he leaves abundant opening for the philosopher [and theologian] to posit such additional elements as he may find necessary for the explanation of the world of experience as a whole.'⁴⁴

Ontology

The ontological status of the universe is important since some sort of

40. McConnell, *op. cit.*, p. 18.

41. Patterson, *op. cit.*, p. 261.

42. Hopkinson, *op. cit.*, p. 58.

43. Robertson, *op. cit.*, p. 530.

44. Tennant, *op. cit.*, p. 287-289.

'realism' is required if the notion of God as creator and sustainer is to make sense. Philosopher Ray H. Dotterer found that relativity implied that the world is 'objectively real and independent of the cognitive relation,' and warned his readers against 'all too hastily inferring that the world of relativity must be a world of caprice and subjectivity. . . . Indeed, the relativity theory is, precisely, an attempt to give a description of the world which shall transcend the view of any particular observer, or even, if that be possible, of all observers.'⁴⁵ Robertson reminded his readers that 'the admission of the general relativity of knowledge does not carry with it the admission of the relativity of truth.'⁴⁶ This point has often been missed by Einstein's interpreters. Indeed, Einstein would have preferred that his theory be called 'The Theory of Invariance' rather than Relativity Theory.⁴⁷

Implications for the 'Afterlife'

Orrock Colloque speculated that the Einstein theory might help us to better understand the life of those who are in the place of departed spirits.

What do space and time mean to them? They enjoy motion at a velocity greater than light and may go everywhere in God's great universe. It is in their travels and in their studies of God and His creation that they grow in the knowledge and love of God. They learn to think in terms of mathematics, the universal language of God, and so enter into the mysteries of the laws of grace and of the laws of nature both. Whatever of truth they learned from past efforts is of use to themselves and to others but now they see, not from within the box of three dimensions, limited by time, but from without, from timeless eternity.⁴⁸

Morrison notes with approval the assertion of Bishop Barnes that in unifying space and time 'we have no right to postulate that in the world to come part of this complex will be destroyed while the other part remains intact.' Morrison felt that he 'now had the support of physics' in firmly repudiating the notion that 'God's wonderful world of nature . . . would be scrapped in the afterlife.'⁴⁹

45. Ray H. Dotterer, 'The Einstein Theory From the Standpoint of Philosophy,' *Reformed Church Review* 2 (1923), pp. 234, 235.

46. Robertson, *op. cit.*, p. 529.

47. Gerald Holton, in *Some Strangeness in the Proportion*, Harry Woolf, ed. (Reading, MA: Addison-Wesley Pub. Co., Inc., 1980), p. 57; and Note 21, p. 63.

48. Colloque, *op. cit.*, p. 529.

49. J. H. Morrison, 'The New Physics and Religious Thought,' *The Expository Times* 40 (1928-29), p. 380.

Colloque felt that the Catholic notion of time 'has something in common with Einstein's relativity.'⁵⁰ In his words:

Time fades for us into the relative eternal and will fade for creation into eternity itself . . . just as time is embraced within eternity, as one circle is included within another, so our life and thought is included within the consciousness of those who dwell with Christ in the other world. We are fellow-citizens with the saints.⁵¹

Chance vs. Necessity

The perennial issue of chance vs. necessity in accounting for physical causation was extrapolated to the domain of theology. One writer rejoiced that 'the new physics allows man a greater place to mold his destiny and transform his personality as over against an oppressive Calvinism, stern and inexorable.'⁵² The tightly determined universe of the nineteenth century, evolving along a predetermined path, left little room for freedom and responsibility. It seemed congenial only to deistic indifference or the iron grip of Calvinistic predestination. William B. Smith thought otherwise:

The vigorous and uncompromising doctrine of universal relativity leaves no escape from the conclusion that the subjects of its treatment are themselves the creatures of the intelligence that so boldly, so audaciously manipulates them in whose hands they are more plastic than wax, being fused and compounded and contorted at will.⁵³

A Sceptical Note

H. E. Barnes' anti-Christian polemic, *The Twilight of Christianity*, included a scathing denunciation of religious apologists who used scientific theories to support religious views. He was particularly vexed by the assertions of the typical prominent scientist 'whose scientific views are in the adult phase, while in the religious field he is intellectually a youth in short pants.' Barnes stated: 'Whitehead's conception of God was a highly abstruse physical notion, yet he frequently lapsed into attributing to his abstruse God many orthodox theistic qualities, thus affording a loophole for the satisfaction of the faithful.'⁵⁴ Barnes accused astronomer Eddington of reading his

50. Colloque, *op. cit.*, p. 526.

51. *Ibid.*, p. 530.

52. Green, *op. cit.*, p. 6.

53. William B. Smith, 'Relativity', *Mind* 31 (1921), p. 510.

54. Harry Elmer Barnes, *The Twilight of Christianity* (New York: The Vanguard Press, 1929), pp. 357, 358.

Quaker leanings into relativity. J. H. Randall, Jr. echoed this view in lamenting the fact that 'many physicists have blossomed forth as liberal theologians. . . . Aware that modern physics has abandoned doctrines that were once hostile to religious claims they imagine that there is no further conflict between religion and science and are ignorant of the way that anthropology, psychology and higher criticism have changed the nature of modern religion.'⁵⁵

British Philosopher Herbert Dingle sharply criticized Arthur Eddington's understanding of the implications of relativity for religion. In Dingle's eyes, Eddington had closely examined the external world and found nothing whose behaviour is not mechanically determinable, and thus nothing worthy of worship that we can call 'God'. In using this approach, Eddington sought to hold on to the Victorian world view that the external world existed independent of the observer, whose task lay in taking measurements of various kinds to find out what was already there. The new perspective of relativity recognized physics to be a description of the relations between the results of operations chosen and performed by the investigator. They are the results of his definitions, not the magnitudes of objective features of the external world. The world is thus inferred from experience. The Victorian observer could not find God in his world because religious experience had not been taken into account in its construction. In the new world of relativity, the religious man no less than the scientist has the right to find the experience that he seeks.

Eddington knew all this, but betrayed himself to the pre-Einstein approach in seeking to find something 'real' in the external world which could be understandable in a spiritual sense. Quaker Eddington was viewed as 'leaving his mystical outlook on nature and looking for the fossilized remains of a real Victorian Great First Cause.' Dingle went on to say that Eddington confused himself and his readers because of 'his inherent predispositions which forced him to look for more behind when the essence of the matter was not behind, but up front and led him to banish the roots of religion to the world of the physically unknowable instead of recognizing them where he really knew they were—in that which is known more immediately than any external or physical world, in experience itself.'⁵⁶

55. J. H. Randall, Jr., 'The Effects of Science and Industry on Religion, I. The Forces That Are Destroying Traditional Belief', *Current History* 30 (1929), pp. 360–361.

56. Herbert Dingle, *The Sources of Eddington's Philosophy* (Cambridge, England: Cambridge University Press, 1954), pp. 28, 29.

Process Theology

The process theologies of realist metaphysicians, such as mathematician-philosopher Alfred North Whitehead, stand as the most enduring positions to find roots in relativity. Whitehead felt that the time was ripe for a new synthesis of knowledge—one free from materialism, but still in touch with science. He saw the religious vision as one element in the human experience which shows an upward trend—man's one ground for optimism. His estimate of religion was based on a dynamic 'philosophy of organism':

Whitehead wants us not to think of an elemental 'substance' underlying the world or dualistically of 'mind and matter', but rather of process in an interconnected conception of reality in which all aspects of experience are interjoined—aesthetic, moral and religious interests of the world as well as those ideas which have their origin in natural science.⁵⁷

Some Generalizations

The reader may well regard many of the quotations of the previous pages as meaningless in the light of current interpretative fashions. The pressure to 'come up with something' may have caused the pundits of the day to offer half-baked notions that do not stand up to the test of time. We should remember that the ideas of a previous generation should be first judged in terms of the theological and religious concerns of that day. The cherished notions that we so passionately argue today may be viewed with the same unsympathetic eye in the twenty-first century. These writers felt that a revolutionary scientific development should have major significance for a variety of areas of religious thought. Nonetheless, by the early 1930s it seemed that 'relativity' had raised no new religious problems nor settled any old ones. The optimism of the early period had been dulled by a failure to establish new correlations between science and religion; indeed, there was a rather strong reaction against the contribution of scientists who were often viewed as being out of their depth when they attempted to apply science to philosophy or theology.

Science was able to provide for the properly motivated viewer 'glimpses of the divine', and 'metaphors of great power' for gaining new insights into the categories of faith. It offered the potential for a new sense of unity between God and nature and, when properly understood, an ontology which supported orthodox Christian views of

57. Macquarrie, *op. cit.*, p. 264.

creation and providence. Unfortunately, other observers thought differently and little consensus was achieved. If the old mechanistic materialism appeared to be discredited by relativity, it was not replaced with theism. However, not all of the earlier discussion has been relegated to history. The next section will note some of the themes of the earlier period which have emerged in current discussion with new vigour and direction.

While Einstein was to remain in the public eye throughout his life, for one observer 'the year 1919 represents the culmination of his career.'⁵⁸ Unfortunately, he chose to leave the mainstream of physical thought by rejecting the quantum theory that he had done so much to establish. He spent his remaining years in a fruitless effort to unify electromagnetism and gravity within the framework of a 'unified field theory.' As physicists turned increasingly to quantum theory, 'Einstein's views became for his peers a source of puzzlement, sorrow, and finally indifference.'⁵⁸ This bypassing of Einstein by the scientific mainstream may have contributed to the loss of interest at the philosophical-religious level evidenced by the mid-1930s.

The current theological concern with Einstein has been paralleled by a renewed scientific and popular interest in relativity, starting in the 1960's with the discovery of quasars, cosmic fireball radiation, pulsars, black holes and gravitational lenses. Theorists such as Stephen Hawking, Igor Novikov, James Bardeen, John Wheeler and others began to make discoveries in general relativity that had been missed for four decades. They have written widely in the scientific and popular press, and brought back to the general public some of the flavour of the field which had been lost after 1919. Today, Einstein is back in fashion in scientific and theological circles alike!

Enduring Themes

A number of areas of correlation in early discussions may be found in the work of today's writers. Theologian Thomas Torrance, a key figure in current integrative thought, emphasizes the new unity in science brought about by Einstein's thinking as 'not inconsistent with the Christian faith ...'⁵⁹ Torrance more recently reflects earlier thinkers in his assessment of the significance of Einstein's work 'as reaching down to the very foundations of our understanding of the

58. Robert P. Crease and Charles C. Mann, *The Second Creation: Makers of the Revolution in 20th-Century Physics* (New York: Macmillan Pub. Co., 1986), p. 40.

59. Thomas F. Torrance, *Theology in Reconciliation* (London: Geoffrey Chapman, 1975), p. 270.

universe, affecting everything we know far beyond the limits of physics . . . [which] . . . imports a radical alteration in the regulative basis of knowledge, transforming not only the structure of science but our basic ways of knowing.' For Torrance, 'the liberation of the human spirit from a closed determinist continuum of cause and effect, which is now taking place, makes for the resuscitation of belief in divine providence and divine response to human prayer. . . .'⁶⁰ Other early themes captured by Torrance include the idea that nature is characterized by 'a unitary rational order,' and that 'the universe is found to comprise interrelated levels of being, each of which is far from being closed in upon itself, but is open to and explicable in terms of its immediately higher level and indeed of the whole multi-levelled structure of the universe.'⁶¹ A further theme emphasizes the relational perspective of nature over and against the container perspective of pre-Einstein physics.

Arthur R. Peacocke, writing in a book commemorating the 100th anniversary of Einstein's birth, mentioned other ideas which parallel the thinking of the 1920s. He recognized 'a scepticism within and towards science itself . . . [and] . . . a much more humble view of physical law,' an emphasis that 'science arises from interaction between the world of nature and ourselves . . .', a realist ontology, and finds that time as part of time-space owes its existence to God and supports the traditional Judeo-Christian doctrine of creation.⁶² Barrie Britton has recently commented on the transcendence of God: 'If it is accepted that both time and space are actually dependent on the existence of the physical universe for their very meaning, then it is but a small step to realize that the Creator of such a universe must, by logical necessity, be *outside* and *independent* of the time and space perceived within his creation.'⁶³

Conclusion

In this historical study we have shown that theologians, philosophers and scientists found a broad range of religious implications stemming from Albert Einstein's work on relativity. These early correlations were often strained, inconclusive and conflicting, yet some themes have shown enduring significance.

60. Thomas F. Torrance, *Christian Theology and Scientific Culture* (New York: Oxford University Press, 1981), pp. 12, 18.

61. *Ibid.*, pp. 31, 39.

62. Peacocke, *op. cit.*, pp. 75, 77, 83, 86.

63. Barrie Britton, 'Evolution by Blind Chance', *Scottish Journal of Theology* 39 (1986), p. 351.

The current crop of thinkers has developed the religious and philosophical implications of relativity at a level of sophistication and application far beyond the expressions of earlier writers, in a context of theological and philosophical perspectives not present in the 1920's. It remains to be seen if these expressions will provide a lasting framework for an integrative approach, or suffer the same fate as the vision of those who wrote so enthusiastically six decades ago.

Acknowledgements

The author thanks two referees for their constructive assistance, and the Pew Foundation for travel support under a Christian College Consortium Faculty Incentive Grant.