

THE INSTITUTE FOR CHRISTIAN COLLEGE TEACHERS

CHRISTIANITY AND SCIENCE:
AN
APPROACH FOR PHYSICS TEACHERS

by

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August 1988

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PREFACE

On some occasions when I have promoted the integrating of faith and learning in the discipline of Physics, the response from teachers has been to agree in principle, but, also to express some uncertainty as to how exactly the integration may be achieved properly and satisfyingly. The aim of this paper is therefore not to make the case for integrating faith and learning or to show from inspired writings the necessity for so doing. That has been done quite convincingly by many Christian educators before. It will thus be assumed that for this there is general acceptance. Instead, an attempt will be made to arrive at an approach that would to some extent meet the expressed need for an explicit model for teachers of Physics. Implicit therefore in undertaking this task is the faith that producing such a model is achievable. I say faith because I have not been able to find such explicit models anywhere. A clear pointer indicating a direction to take is given by E G White:

In the study of the sciences also we are to obtain a knowledge of the Creator. All true science is but an interpretation of the handwriting of God in the material world. Science brings from her research only fresh evidences of the wisdom and power of God. Rightly understood, both the book of nature and the written word makes us acquainted with God by teaching us something of the wise and beneficent laws through which He works. The student should be led to see God in all the works of Creation.¹

INTRODUCTION

Having given extensive deliberation to the requirements for adequate treatment of this proposed task, it appeared inevitable that I would have to draw from the work of philosophers as well as from the history of scientific development for the necessary insights and support of my final proposals.

This approach is supported by William Haker:

There is widespread conviction among Christians - expressed in the often-heard phrase "the integration of faith and learning" - that there is need to think through the relationships of all branches of knowledge to the Christian faith, so as to produce an integrated Christian view of things that will be functional in the modern world. But it is impossible that such an integrated view will come about without making heavy use of the resources of philosophy. If philosophy did not already exist for this purpose, it would have to be invented.²

In addition, although I accept that there is no definitive Christian Metaphysic, the metaphysic presuppositions that will be inherent in this is that the ultimate supreme reality is God. Following on from this, is the acknowledgement of theism, the world view that dominated the Western world up to the end of the seventeenth century. Elements of theism are still the foundation of the world view shared by most Christians today. It's main propositions, as articulated by Sire³, are listed below. They are:

1. God is infinite and personal (triune), transcendent and immanent, omniscient, sovereign and good.
2. God created the cosmos ex Nihilo to operate with uniformity of cause and effect in an open system.

3. Man is created in the image of God and thus possesses personality, self-transcendence, intelligence, morality, gregariousness and creativity.
4. God can and does communicate with man.
5. Man was created good, but through the Fall, the image of God became defaced though not so ruined as not to be capable of restoration; through the work of Christ, God redeemed man and began the process of restoring man to goodness, though any given man may choose to reject that redemption.
6. For man, death is either the gate to life with God and His people or the gate to eternal separation from the only thing that will ultimately fulfil man's aspirations.
7. Ethics is transcendent and is based on the character of God as good (holy and loving).
8. History is linear, a meaningful sequence of events leading to the fulfillment of God's purposes for man.

In order therefore to arrive at an approach that effectively addresses the need for a model, it seems reasonable first to sketch the background that led to the present difficulties between Christianity and Science, then, to underline the major points of conflict or departure of science from the world view depicted above with specific reference to Physics, and finally, to suggest a broad approach for teachers.

Later, in another paper, the intention is to delineate in each of the topics taught in the subject, as many specific examples as possible, which could appropriately be treated in the way suggested in this paper.

THE MIDDLE AGES

In the Middle Ages nature was viewed as God's creation and questions about the natural world were answered by His revelation. Science sought to provide explanations in terms of the **essence** of an object and the **purpose** it fulfilled. Thomas Aquinas during this time brilliantly achieved an integration of Christian theology and Aristotelian philosophy and thereby produced the approach for explaining nature that Western civilization accepted until the seventeenth century. In this synthesis both **reason** and **revelation** were accepted as necessary and what is more, the relationship between them was considered to be potentially harmonious. The characteristics of the dominant world view could then be summarised as follows:

- a) All things were created by God.
- b) Creation was the work of a purposeful God. (Greek and medieval science was therefore deductive in nature.)
- c) God continues to rule in nature, sustaining and working through natural order.

THE SEVENTEENTH CENTURY

In the sixteenth and seventeenth centuries therefore, such was the world view influencing scientists like Kepler (1571-1630) and Galileo (1564-1642) until it was realized that natural processes could be isolated from their context and investigated and then described mathematically. The mathematical simplicity promoted earlier by Copernicus was embraced by Kepler and Galileo, and the latter combined the mathematical approach with an emphasis on experimentation to

produce a new methodology for science. As Barbour puts it:

Teleological explanation, characteristic of earlier thought, had given way to descriptive explanation. Galileo asked not **why** objects fall, but **how** they fall ... We cannot presume to know the ends of the Almighty, he suggested, but we can investigate the precise ways in which they are accomplished.⁴

Additionally, Galileo saw the world as fundamentally consisting only of particles in motion, with only the properties of mass and velocity, which, he reasoned were independent of the observer. This, together with his separation of "purpose" or "final cause" from what was measurable and capable of being mathematically represented, was a crucial development. It opened the way for Descartes to develop a radical **dualism** of mind and matter which in turn opened the way for man's body to be treated as a machine, and indeed for the later development of a completely **mechanistic** view of nature. This shift in scientific thought did not occur without reactions from Christians.

Barbour points out that in religion, the nature of the scholasticism that was developing in northern Europe at the time, resulted in fierce opposition to these developments in science, as the new theories were seen as challenges, not only to the greatly respected Aristotle, but also, to the authority of scripture. Galileo who was at the center of this remained a devout christian and clearly viewed his religious beliefs and his science in integrated harmony.

In a letter at the time he wrote:

I think that in discussions of physical problems we ought to begin not from the authority of scriptural passages but from sense-experiences and necessary demonstrations, for the Holy Bible and the phenomenon of nature proceed alike from the divine Word.⁵

The developing shift in world view then was that although God is still the initial creator, i.e. The First Cause (of all the fundamental particles) yet, God being purposeful, however, was being undermined. Nature was considered created to be independent and self-sufficient and not in need of God's continuous intervention.

THE EIGHTEENTH AND NINETEENTH CENTURIES

During the eighteenth century, scientists like Newton (1643-1727) attempted through this new approach, to arrive at the laws that governed the universe. The power of Newtonian mechanics served to confirm for many the reality of a deterministic view of nature. The calculated predictions of the existence of the planets Neptune and Pluto were great triumphs of this view. The calculation of past and future eclipses of the sun for instance gave vigour to the belief that the law of causality was absolute.

Instance therefore at the end of the eighteenth century LaPlace, the great French mathematician and physicist stating:

A Spirit who knew at a given moment all the forces existing in nature, and the relative positions of all existing things or elements composing it, would, if he were able to submit all these data to mathematical analysis, be able to comprehend in a single formula, the motion of the greatest heavenly body and of the lightest atom; nothing would be uncertain for him, and future as well as past would lie open before his eyes.⁶

This thinking thus dominated the classical period of physics. Determinism became established, and, in spite of later conflicting

developments it persists up to today. As Hasker says:

From Physics we learn to see ourselves, our society, our entire planet, as a tiny part of an inconceivably vast universe which is ruled throughout by immutable physical laws. Nowhere in this picture is there room for a person, an individual human being, who determines what shall take place in his own life without regard to the necessary relationships of cause and effect in the universe as a whole.

The issue of free-will and determinism is consequently one of the control-beliefs inherent in Physics which no Christian teacher should ignore or uncritically pass on to students directly or unconsciously.

THE TWENTIETH CENTURY

The nineteenth century had begun with nature seen simply as a set of laws. Now, at the start of the twentieth century, in 1905, Einstein heralded the beginning of a challenge to this view by asserting that Newtonian mechanics were true, only for objects moving at relatively low speeds; but, that at speeds approaching that of light and beyond, departures occurred. The theory of **relativity** was born, and close on its heel came the quantum theory. These two theories profoundly affected our fundamental concepts of reality and demanded that we radically reformulated our ideas. The approach to this new twentieth century physics says Paul Davies, finds "closer accord with mysticism than materialism".

Heisenberg's discovery in 1925 of the "uncertainty relations" also dealt a significant blow to deterministic views. The uncertainty principle introduced theories that show the behaviour of the ultimate physical particles to be **governed by chance**, and, hence, that prediction is only possible in probabilistic terms.

So modern physics now has to live with indeterminism and can be said to be characterized by:

- a) The unavoidable involvement of the observer in the result of observation.
- b) The symbolic nature of the concepts used and the absence of visualizable models.

Obviously there are major implications here for the Christian teacher. Indeterminism in itself does not establish that free will exists, but it surely means that the certitude with which determinism had been propounded can no longer be honestly maintained and modern philosophers like Leibniz, Locke and Hume, or Spinoza, Mill and Alexander must now be read in this new light.

THE LIMITATIONS OF SCIENCE

From the history of science as traced above, it is plain to see that science has at least two critical limitations and at this point, I consider it would be helpful to list them:

- i) scientific propositions are definitely not infallible and, certainty is never truly achieved.
- ii) of necessity, the methods of science are required to be selective, and the methodology adopted depends on the substantive presuppositions accepted by the investigator.

Given these limitations in the ontological and epistemological presuppositions of science, there really can be no comprehensively compelling case for abandoning the theistic world view. It is

interesting again to note Sire's comment:

It may seem strange to suggest to modern man that he throw off modern thought and return to the seventeenth century. But we should be reminded that Christian theism as I have defined it was abandoned not because of its inner inconsistency or its failure to explain the facts, but because it was inadequately understood, forgotten completely or not applied to the issues at hand.⁸

My view is therefore that, rather than abandoning christian theism, there should be instead, greater research directed towards developing strategies for genuine integration of Christian theistic faith with science.

INTEGRATIVE STRATEGIES

1. Heie and Wolfe, define a view of genuine integration:

Genuine integration occurs when an assumption or concern can be shown to be internally shared by (integral to) both the Judaeo-Christian vision and an academic discipline.⁹

They then proposed three strategies for such integration:

- a) Investigating the Substantive and Methodological Presuppositions

Such investigations would reveal compatibility, difficulty, or incompatibility with Christian belief. If there is compatibility, the teacher may show how his discipline may be integrated fruitfully with biblical ideas. If the controlling assumptions of his discipline present problems for the Christian teacher, he may then seek to propose alternative paradigms. If the assumptions of his discipline have very little in common with his basic

Christian presuppositions, "he may wish to remake or transform his discipline into one with a Christian orientation".

- b) Identifying the value commitments within the discipline and finding commonality with Christian values. "The Christian in any discipline must therefore explore the values of his discipline in order to uncover areas of common commitment as well as areas of tension."
- c) Investigating systematic schemata and relating results to Christian beliefs within a broader framework that embraces both.e constructing a world view.

2. Barbour suggests that while religious perspectives have nothing to do with the technical content of a Physics lecture, "they are relevant to a number of aspects of the academic situation".

While keeping in mind that religion should never be extraneously brought into a discussion of technical issues, it must be granted that there are at least occasionally some topics which have religious implications. In these cases, Barbour suggests the following approach. The quotation is long, but I consider it crucial to include it:

The teacher's approach to such problems might start from three assumptions: a) the teacher should be concerned with how science fits into the larger framework of life, and the student should raise questions about the meaning of what he studies and its relation to other fields; b) controversial questions can be treated, not in the spirit of indoctrination, but with an emphasis on asking questions and helping students to think through assumptions and implications; an effort should be made to present view points other than one's own as fairly as possible,

respecting the integrity of the student by avoiding undue imposition of the lecturer's beliefs; c) presuppositions inevitably enter the classroom presentation of many subjects, so that a viewpoint frankly and explicitly recognized may be less dangerous than one which is hidden and assumed not to exist.¹⁰

Any one of those three situations would provide the teacher with a legitimate occasion to make clear to his class how his religious beliefs lead him to a particular position with regard to the matter in question. It would be good if, at the same time, he also indicates the major alternative current viewpoints of scientists, theologians and philosophers, being careful all the time to distinguish between what is evidence and what is interpretation.

3. A third suggestion, this time from Holmes, indicates that one way of approaching the integration of faith learning and life in education is to view it as occurring in four dimensions - attitudinal, ethical, functional and world view formulation. A strategy for Christian teachers could be developed along these four lines. Each dimension could therefore be addressed separately and some appropriate teaching objectives listed.

a) Attitudinal

The relevant teaching objectives here should include leading the student to value service, to aim to please God, and to practice good stewardship of the gifts which God has given him.

b) Ethical

To raise the consciousness of the student regarding the

moral and aesthetic dimensions of life, and to sharpen his sensitivity. To be able to carry out values analysis, in order to clarify his own values and establish what are the value commitments of any discipline. Holmes considers christian principles integrated into ethical discussion when the christian teacher explores the intrinsic relationship between the facts and the values of justice and love by use of "middle-level" concepts, and then, have students reflect on the policy or action called for by the case or situation under scrutiny e.g relating facts about business to ethical questions about wages and prices is the middle-level concept of work, its meaning and its purposes.¹¹

c) Foundational

To be able to perceive the philosophy of the theoretical foundation on which bodies of knowledge are based by being able:

- i) to uncover the methodological and substantive presuppositions (control beliefs) interwoven in the material.
- ii) to state the current thinking of scientists, theologians, and philosophers on the topic at issue.
- iii) to distinguish between evidence and interpretation.
- iv) to personalise the presentation of the above. Example

of this confessional dimension is William Hasker, who declares that he is:

a philosopher who loves Jesus Christ and wants to be known as a disciple. A Christian first, a philosopher second - but neither one at the expense of the other. The insights I have gained from my Christian faith and experience prove to be of immense value as I do my philosophy, even though I cannot appeal to biblical authority as the basis for a philosophical argument.¹²

d) World View (Basic Beliefs about reality - nature, man, God.)

To have arrived at an all inclusive outlook on life which provides the basis for values, and a position from which life or the world may be explored. To be able to carry out world view analysis on any systematic schema.

IMPLICATIONS FOR THE MAIN BRANCHES OF PHYSICS

These strategies provide good insight and directions for the Christian Physics teacher. Guided by appropriateness and the main considerations listed above, it would seem legitimate therefore that for instance, many thought questions should arise in each section of his subject e.g:

- a) What are the basic laws and what can they tell us about God or His purposes?
- b) What are the presuppositions inherent in the formulation of the laws and what is our attitude to them.

It is the hope therefore, that along these lines, a distinctive Christian approach to teaching the subject could be generated to meet the present need.

NOTES

1. E G White, Patriarchs and Prophets p.599
2. William Hasker, Metaphysics: Constructing a World View
3. James W Sire, The Universe Next Door pp.24-41
4. Ian G Barbour, Issues in Science and Religion (Englewood Cliffs, New Jersey, Prentice Hall 1966)
5. James H Jeans, Physics and Philosophy (New York, the MacMillian Company 1944)
6. W Heisenberg, The Physicist's Conception of Nature
7. Willaim Hasker, Metaphysics: Constructing a World View
8. James W Sire, The Universe Next Door (Intervarsity Press, Illinois 1976) p.212
9. Harold Heie/David L Wolfe, The Reality of Christian Learning (Eerdmans, Christian University Press 1987) p.5
10. Ian G Barbour, Christianity and the Scientist (New York: Association Press 1960)
11. Arthur F Holmes, The Idea of a Christian College, Grand Rapids, Michigan: Eerdmans, 1975 p.52

"Middle-level concepts are necessary but not sufficient. We must also be clear about the overall biblical principles of justice and love. In addressing ethical issues, three questions are essential if we are to integrate Christian principles into ethical discussion:

1. What are the facts in the case, including contributing causes and possible consequences? Here the relevant sciences are important.
 2. What middle-level concepts are involved? What are the purposes God intended for this area of human activity? Here theology and philosophy come into play.
 3. What policy or action is called for in this kind of case or situation? How can we pursue proper purposes with justice and with love for all those involved? Here all the above considerations and disciplines come into play.
12. William Hasker, Metaphysics: Constructing a World View

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