

Review: D.F.M. Strauss, *Paradigms in Mathematics, Physics and Biology: Their Philosophical Roots*, Tekskor Bk, Danhof, South Africa, (2001, revised 2004), 177pp.

The main goal of this book is to reveal the decisive role of philosophical presuppositions in the natural sciences. The author, Dr. D.F.M. Strauss, is professor of philosophy at the University of the Free State in Bloemfontein, South Africa.

Synopsis

The book is divided into five chapters. Chapter I addresses fundamental questions in the philosophy of science. Here Strauss lays the basis. He critiques the widely-held notion that all good science must be practiced without any prejudices or presuppositions whatsoever, and that science must refer only to empirical phenomena. This claim, he rightly points out, is itself driven by the philosophical presuppositions of positivism and neo-positivism. Working quickly through the writings of Kant, Wittgenstein, Popper, Kuhn and others, Strauss discusses the nature of scientific thought. He underscores the yawning gap between empirical data and scientific theorizing.

It soon becomes evident that Strauss's own views on science are closely associated with those of the Dutch Christian philosopher Herman Dooyeweerd (1894-1977). Dooyeweerd's philosophy is a comprehensive and sophisticated framework for understanding the universe as a created entity subjected to various laws. It is by means of these laws God that governs his creation. The rich diversity of the universe entails that we must examine it in terms of a set of fifteen or so different aspects, or *modalities*, none of which can be reduced to any of the others. The first six modalities, in order of increasing complexity, are number, space, motion, energy, life and feeling. Each modality presupposes all modalities preceding it.

According to Strauss, the distinctive feature of scientific thought is *modal abstraction*, the process whereby we identify a particular modality as such and distinguish it from other modalities. Any special science is limited to the perspective of a particular modality. Philosophy, on the other hand, is concerned with constructing a coherent overall view covering the full diversity of reality. Strauss argues that, since only philosophy can engage more than one particular aspect in its theoretical purview, no special science can indicate its own delimited domain of investigation without proceeding from some philosophical view of reality. Hence, he concludes, the nature of modal abstraction as the distinctive characteristic of science implies that all science has a philosophical basis.

To illustrate the influence and implications of foundational philosophical problems, the subsequent chapters examine examples of significant paradigms in math, physics and biology.

In Chapter II Strauss addresses various philosophical problems in mathematics. Mathematics is concerned with number and space, the first two modalities. The prime issue in mathematics is how to treat infinity. Strauss discusses three main foundational crises in the history of mathematics: (1) the discovery of irrationals, (2) infinitesimal calculus, and (3) modern set theory. All three involve the relation between *potential* and *actual* infinity. Much attention is devoted to the conflict between Cantor's treatment of actually infinite sets and the intuitionists' rejection of actual infinity.

The Dutch mathematician L.E.J. Brouwer (1882-1966), an ardent promoter of intuitionism, lived in Amsterdam at the same time as Dooyeweerd and had some influence on Dooyeweerd. Dooyeweerd acknowledged only the potential infinite; he found the idea of the actual infinite unacceptable. Strauss, however, argues that Dooyeweerdian philosophy actually provides grounds for both types of infinity. Strauss distinguishes between the *successive* infinite and the *at once* infinite. The *successive* infinite is associated with *numbers* and determines every denumerable, endless succession of numbers (e.g., the integers or rational numbers). The *at once* infinite, on the other hand, is associated with the continuous extension of *space*. The latter represents a higher order of infinity; it cannot be reduced to a successive infinity since space cannot be reduced to number.

In Chapter III Strauss moves on to basic questions in physics. Physics, presupposing number and space, is concerned specifically with the modalities of *motion* and *energy*. One of the most deep-seated issues in physics concerns the nature of time. Strauss argues that time is itself a creature and that each modality expresses time-order in its own unique way. The two laws of thermodynamics, concerning energy and entropy, are fundamental in that they are universally applicable to all physical entities. Strauss briefly discusses, among other things, relativity, wave-particle duality, and chemical bonding. Much of this involves re-interpreting physics within a Dooyeweerdian framework.

Strauss critiques both determinism, which holds that every effect is strictly determined by a cause, and indeterminism, which denies this. Instead, he asserts, "nothing happens without a cause--but what the effect of a specific cause may be need not be fixed in advance". It would seem, however, that this attempt to avoid the determinism/indeterminism dilemma still leaves us with the unaddressed question of whether the connection between a specific cause and its actual effect is determined or not. As such, it does not really seem to resolve the basic issue.

In Chapter IV Strauss discusses modern biology. The decisive philosophical problem in biology throughout its history concerns the relationship between *life*, the fifth modality, and the physico-chemical aspect of reality in which it is founded. Strauss notes that the origin of life is still a scientific mystery and that the evolutionary origin of the diversity of life is an unproven assumption. He critiques neo-Darwinism, emergence evolutionism and pan-psychism. Strauss seems to favor some form of vitalism, with its stress on the irreducibility of life to non-life.

In Chapter V, the last chapter, Strauss discusses the mystery of being human. If the human being is evolutionistically considered to be nothing but an extension of the animal realm, Strauss asks, what should be made of the distinctive features of being human? This concerns the more advanced modalities, such as thought, language, ethics, and faith. Strauss argues that humans differ significantly from animals. For example, he finds it striking that human lingual ability is dependent on specific anatomical conditions that are absent in anthropoids. He concludes that humans are not simply an extension of the animal realm.

A key element in being human is *freedom*. Strauss argues that being free is not opposed to being determined, since only what is determined can be free and only what is free can be

determined. Humans are unique, not in that they are free from conditions, but that they in subjection to them are actually free to obey them in unique ways. Humans have authentic, accountable freedom to act responsibly in a changing world. In the book's last two pages Strauss briefly outlines a biblical view of humans, who were created to serve God, but fell into sin and can be saved from the effects of sin only through the redemptive work of Christ.

Comment

Strauss has certainly succeeded in his main goal: to demonstrate the crucial role in science that is played by philosophical presuppositions. He has amply shown that paradigms are essential in mathematics, physics and biology. Scientific research is very much guided by one's initial worldview assumptions. Further, Strauss gives a good critique of reductionism, neo-Darwinism, positivism, and many other philosophical positions underlying the various sciences.

As to Strauss's own, essentially Dooyeweerdian, worldview, it properly recognizes the existence of an objective reality and a universal law-order. Also, it rightly acknowledges that the created universe cannot be reduced to only a few modalities; the universe has a multi-faceted richness.

Unfortunately, however, Dooyeweerd's philosophy has a deep level of sophistication that may be beyond the level of comprehension of the reader not well acquainted with Dooyeweerd. This is not made an easier by the usage of Dooyeweerdian jargon such as "anticipation to a retrocipation" and "enkaptic interlacement". Although Strauss does define and explain such terminology, more background on Dooyeweerd's philosophical system would have been helpful.

A further question that arises is the connection between Dooyeweerd's philosophy and the Bible. For example, Strauss concludes Chapter II (on mathematics) with the startling remark, "the acceptance of the integral biblical account of creation guided our preceding analysis" (p.50). Yet, up to this point, Strauss has made no reference to the Bible or, indeed, to Christianity. He has, apparently, been guided solely by Dooyeweerdian philosophy. Not until the second last page of the book is there any mention of biblical Christianity, with reference only to the biblical theme of creation-fall-redemption.

The link between Dooyeweerdian philosophy and biblical Christianity would have been more plausible had Strauss clearly spelled out the connections. As it stands, one is left wondering what, if anything, the Bible has to say regarding the various sciences. Consider, for example, the matter of human origins. Although Strauss extensively critiques evolutionary views, at the same time he seems to grant that humans have been around for hundreds of thousands, if not millions, of years. This raises the question of whether Strauss believes in an historical Adam & Eve and their historical fall into sin, an issue directly linked to the creation-fall-redemption theme.

There are a few technical weaknesses. For example, some of the chapters end rather abruptly. The book could have been improved by adding brief chapter summaries, as well as a

final concluding chapter pulling together the various strands developed in the book. Also, the book would have benefited from better proof-reading: there are scores of typos. Further, although the book is a 2004 revision of an earlier work published in 2001, there are very few references to recent literature in the field (only a dozen references to works published after 1990, out of a bibliography of about three hundred works).

In summary, in spite of some weaknesses, this book contains much useful material and would amply repay a careful reading.