

EDITORIAL

WHAT IS HAPPENING TO THE PHILOSOPHY OF SCIENCE?

Two centuries ago the French mathematician-astronomer Pierre Simon de Laplace developed the nebular hypothesis which proposed that the solar system originated by condensation from vaporous matter. Laplace, who had become famous, decided to present a copy of one of his books to the Emperor Napoleon, who had been informed in advance that the book contained no mention of God. The emperor asked Laplace why he had never even mentioned the Creator of the universe in his book. Laplace replied tersely “that he had no need of that particular hypothesis”.¹

Explanations of origins which excluded God were not new with Laplace. They had been suggested earlier by a number of philosophers and gained further acceptance when naturalistic scientific explanations (those which exclude the supernatural) gained popularity.

The tendency in science towards self-sufficiency as illustrated by Laplace’s comment is important in determining the intrinsic value of scientific conclusions. The much-respected scientific philosopher Michael Polanyi² makes the following comments in addressing the origin of the problem:

This is where I see the trouble, where a deep-seated disturbance between science and all other culture appears to lie. I believe that this disturbance was inherent originally in the liberating impact of modern science on medieval thought and has only later turned pathological.

Science rebelled against authority. It rejected deduction [reasoning based on premises] from first causes in favour of empirical [sense perception] generalizations. Its ultimate ideal was a mechanistic theory of the universe....

One of the important mechanistic explanations has been the theory of evolution.

In the early part of this century science was considered by many as the authoritative source of information with almost limitless potential. These views were strengthened by the work of the group called the Vienna Circle, which consisted of philosophers, scientists and mathematicians who met regularly in Vienna, Austria, in the 1920s and 1930s. A related group met in Berlin. World War II brought on the demise of these groups.

The Vienna Circle advocated logical empiricism, also referred to as scientific empiricism. This concept affirms sense-experience as the basis for knowledge. The Circle also emphasized positivism which in its most extreme form stipulates that the only valid kind of knowledge is scientific. Their famous “manifesto” stated:

*We are struggling for order and clarity. We reject all hazy perspectives and bottomless depths. For in science there are no depths; everything in it is on the surface.*³

Implied in this statement is the concept that metaphysics (the more abstruse aspects of philosophy, such as ultimate beginnings, religion, ethics, and esthetics) is unacceptable. Faith in the methodological perfection of science developed, and attempts were made to make all meaningful concepts fit into physical coordinates such as time and space. Physico-mathematical information was elevated to the level of absolute truth.

Logical empiricism dominated in scientific thinking for many decades to well past the middle of the twentieth century, even though some disturbing, challenging developments had made their appearance earlier. In 1927 the German physicist Werner Heisenberg enunciated the principle of uncertainty which denied the possibility of absolute knowledge of certain physical phenomena. For example, the greater the accuracy in measuring the position of an electron, the less accurately one is able to measure its speed simultaneously. The principle evoked much discussion regarding the subjective nature of what is assumed to be knowledge.

Mathematics and logic were also in trouble. In 1931 the mathematician Kurt Gödel at the University of Vienna published a short and unwelcomed paper which showed that any system large enough to be interesting should have some unprovable elements. Several other scholars developed theorems along the same line. These theorems, known as the limitative theorems, dashed any hopes of finding a logical fool-proof system of truth. Even mathematics, which was free of the limits of observations and other restrictions of science, was found to lack in certainty. It turns out that belief in the consistency of mathematics is a matter of faith and not of logical proof. Likewise no broad scientific statement can be free of uncertainties. This all ran counter to the hopes of the Vienna Circle.

Others addressed more directly the apparent unwarranted respect for science. One of the most vocal critics has been Theodore Roszak, who objected to the reductionist (oversimplification) tendencies of scientific interpretations. In particular he criticized science for oversimplifying reality and for “the turning of people and nature into more, worthless things.”⁴ According to him, man is more than a mere machine.

The noted, and sometimes controversial, philosopher of science, Paul Feyerabend, may be science’s most vocal critic.⁵ He considers science to be an anarchist movement. He points out that since there is no one scientific method, hence no consistency in science, the success of science must depend not only on logic but on persuasion, propaganda, subterfuge, and rhetoric. Due to its subjectivity, he states, science should be given equal

status with astrology and witchcraft. Bemoaning the authority and respect generally given to science and scientists he states, "... the most stupid procedures and the most laughable results in their domain are surrounded with an aura of excellence. It is time to cut them down in size, and to give them a more modest position in society."⁶

All of this and much more contributed to the demise of logical empiricism. The eminent scientific philosopher Karl Popper⁷ points out.

The old scientific ideal of episteme — of absolutely certain, demonstrable knowledge — has proved to be an idol. The demand for scientific objectivity makes it inevitable that every scientific statement must remain tentative for ever. It may indeed be corroborated, but every corroboration is relative to other statements which, again, are tentative. Only in our subjective experiences of conviction, in our subjective faith, can we be 'absolutely certain' (p 280).

Science never pursues the illusory aim of making its answers final, or even probable (p 281).

On the other hand, Popper himself has helped science regain some confidence by suggesting a new approach to scientific investigation that has gained a significant degree of acceptance. He proposes that science should not establish truth by induction or confirmation of consequences or the refutation of rival concepts, but by the more severe empirical (sense experience) tests of trying to falsify the hypothesis itself, and a hypothesis should be empirically falsifiable to be considered scientific. Often it is not recognized in scientific endeavors that this concept tends to narrow science to a rather limited segment of reality.

Another blow to the objectivity of science has come from the pen of historian-philosopher Thomas Kuhn who in his book *The Structure of Scientific Revolutions*⁸ pointed out that normal science is the refining of broadly accepted concepts called paradigms. Examples would be alchemy, uniformitarianism, or evolution. Most scientific data are fitted into a paradigm by varying modes of explanation. The paradigm itself is not tested, since it is believed to be true. Occasionally science has a change in paradigm, and this is called a scientific revolution. During a period of normal science a scientist must fit his data into the accepted paradigm or become discredited by the scientific community. Kuhn did not endear himself to scientists when he described the transfer from one paradigm to another as being a "conversion experience" (p 151), and he emphasized that a new paradigm may not be closer to truth than the rejected one. He states: "We may, to be more precise, have to relinquish the notion, explicit or implicit, that changes of paradigm carry scientists and those who learn from them closer and closer to the truth" (p 170).

Kuhn's concept, first published in 1962, raised many questions and engendered a kind of revolution itself. Up to that time philosophy in general had been dominated by the philosophy of science. This prime role has been declining, and the philosophy of science has been labelled as being in a "crisis stage" due to a loss of confidence in objectivity and also to the collapse of logical empiricism, which has been labelled as "dead."⁹

Science is now being perceived more as a human activity, and the contrast between so-called objective truth and metaphysics is considered a "relic of a bygone philosophy of science."¹⁰ For instance, the question is now being raised as to why cosmology should not be reinstated to its former status as the combined realm of science, philosophy and religion. Science is now perceived more as an activity with sociological dimensions. The focus is more on the factors that determine the origin and formulation of scientific questions than on the answers to these questions; and complex, holistic (broad-approach) methods are replacing reductionistic (simplifying) ones. The scientific philosopher Ronald Giere¹¹ has made a radical proposal that would have struck the pre-Kuhnian logical empiricists as "bizarre if not absurd."¹² He suggests that the philosophy of science itself, which once held a super-eminent place, should be subject to testing by evidence as is required of any other model. He especially emphasizes historical data as significant in evaluation.

The loss of confidence in science is, of course, of major concern to some scientists; unfortunately, many are unaware of the changes occurring in their philosophy. Nevertheless, the primacy science once held in intellectual pursuits is being severely challenged. Two British scientists in expressing their concern state: "Having lost their monopoly in the production of knowledge, scientists have also lost their privileged status in society."¹³ These authors bemoan the resultant loss of funding for science and the ascent of competing concepts such as creation. They are concerned that by releasing a monopoly on truth, science may be reduced to a pointless game.

No one knows where the philosophy of science is going next. In the last few years it has moved well beyond Kuhn's original sociological suggestions. It appears to be going in diverse directions.¹⁴ There are those philosophers who are only presenting old wine in new bottles, while others have made a complete reversal from empirical (verification by sense experience) concepts to more subjective bases. These are interesting intellectual times.

In summary, we can note that the philosophy of science has abandoned the view that science can give us perfect knowledge. Other factors (sociological, psychological, etc.) are considered to be important determiners of scientific questions and the resultant answers. This has resulted in a notable

anti-scientific reaction. While scientism (science as a kind of religion) is still very alive in limited circles, science no longer commands the high respect it had during the first two-thirds of this century.

On the basis of the above there are those who would tend to reject all scientific information as simplistic, biased, and restricted. Such views seem unwarranted. While the adjustment that the philosophy of science has had to take in recent decades is salutary, we must not forget that science is a marvelous enterprise which no one can deny has an impressive record of successes, especially in the naturalistic realm. The limitations and problems inherent to science and its philosophy should not be used as excuses to deny the value of science in its proper sphere. On the other hand, the simplistic worship of science seems to be likewise unwarranted. In too many instances science has gone wrong in trying to explain everything within its own limited system. Science is a great good in bringing us an abundance of new information, but to blindly follow it and follow it alone is not only bad; it is very bad.

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REFERENCES AND NOTES

1. Quoted in: Dampier WC. 1949. *A history of science and its relations with philosophy and religion*. 4th ed. rev. Cambridge: Cambridge University Press, p 181.
2. Polanyi M. 1969. *Knowing and being*. Chicago: The University of Chicago Press, p 41.
3. Quoted in: Zycinski JM. 1988. *The structure of the metascientific revolution: an essay on the growth of modern science*. Tucson, AZ: Pachart Publishing House, p 49.
4. Roszak T. 1972. *Where the wasteland ends*. Garden City, NY: Doubleday & Co., p 252.
5. Feyerabend P. 1988. *Against method*. Rev. ed. London and NY: Verso.
6. Feyerabend P. 1975. *Against method*. London: New Left Books, p 304.
7. Popper KR. 1959. *The logic of scientific discovery*. NY: Basic Books.
8. Kuhn TS. 1970. *The structure of scientific revolutions*. 2nd ed. enl. Chicago: The University of Chicago Press.
9. Blackwell RJ. 1981. A new direction in the philosophy of science. *The Modern Schoolman* 59:55-59. Also see Reference 12.
10. Zycinski JM. 1988. *The structure of the metascientific revolution: an essay on the growth of modern science*. Tucson, AZ: Pachart Publishing House, p 178.
11. Giere RN. 1984. Toward a unified theory of science. In: Cushing JT, Delaney C, Gutting GM, editors. *Science and Reality: Recent Work in the Philosophy of Science*. Notre Dame, IN: University of Notre Dame Press, p 5-31.
12. Durbin PT. 1986. Ferment in philosophy of science: a review discussion. *Thomist* 50:690-700.
13. Theocharis T, Psimopoulos M. 1987. Where science has gone wrong. *Nature* 329:595-598.
14. See Reference 12.