PHILOSOPHICAL AND SCIENTIFIC METHOD

Philosophy of Science

The Delaware Seminar, Vol. 2, 1962–1963. Edited by Bernard Baumrin. Pp. xviii+551. (New York and London: Interscience Publishers, a Division of John Wiley and Sons, 1963.) 109*s*.

THIS is the second volume of the Delaware Seminars and it confirms the expectations aroused by the first, presenting a true image of philosophical activity, one of continual debate that constantly questions old assumptions and results (and, be it said, some not so old); a kind of dialogue between contending personalities, rather than an accomplished set of results. This volume is specifically devoted to problems in the field of the physical sciences—or rather, in physics; chemistry still does not seem to attract the philosophical minds of the present day. Part 2 discusses topics falling under the heading of space, time and relativity; Part 3 is on particles, fields, and quantum mechanics; Part 6 on cosmology. These parts are matched by others of a more general nature, going over some of the bread-and-butter ground of the academic philosophy of science.

Part 1 is perhaps the most interesting, with its attempts at the wholesale demolition of philosophical doctrines which had their heyday, it seems, only yesterday, such as 'logical empiricism', 'hypothetic-deductive theories', requirements for explanation in terms of precision and completeness, or the exclusion of probabilistic approaches from any final point of view. All these assumptions are questioned vigorously. P. K. Feyerabend's chapter in part goes over ground covered in some of this author's earlier writings, but it considerably clarifies his position, which is more clearly seen to have been motivated by an attempt to make the Anti-Copenhagen spirit of physicists like Bohm and Vigier methodologically respectable. The older logical empiricism made use of certain idealized models for theory construction, with certain implicit logical criteria, such as those of consistency and meaning invariance. The reality is (and, Feyerabend insists, certainly ought to be) different. One must not imagine that existing theories can be tested against a background of a certain set of given neutral observational 'facts'. Rather, theories must be tested against alternative theories, and these must first be formulated, so that some of the critical 'facts' (observed, or more often inferred) shall first be forthcoming. Ultimately, these alternative theories need not be mutually consistent, nor need the meanings of the terms which they contain (theoretical as well as empirical) all have fixed connotations.

Wilfrid Sellar's chapter goes into the problem of the reality of theoretical entities by way of the elegant method of a discussion of the nature of the correspondence rules of various kinds which co-ordinate the 'abstract' with the 'empirical' expressions of some given theory, or even the theoretical properties of two different theories, for example, physical and chemical, thus involving incidentally a clarification of the notion of 'reduction' of one to the other.

Part 4 contains the usual expected section on 'inductive inference', and an important paper on the theory of measurement by Brian Ellis. The former, by W. C. Salmon, makes another stab at the so-called 'pragmatic vindication' of induction. This it does in terms of Reichenbach's probabilistic approach, using the frequency concept of probability (sequence of a limit). It purports to prove that the 'rule of induction by enumeration' can be shown to give successful results, provided that the ratio of observed sample values to size of sample has a limit at all (a kind of 'uniformity of nature' maxim) and shows that any competing alternative rules would fail to give successful results, even if the maxim did hold, since they can be shown to sin against a number of necessary logical requirements for success. Of course, this is a vindication only if 'Nature is uniform', and if one limits oneself to a discussion of very simple numerical cases.

Of the specialist sections, I can only single out A. Gruenbaum's attempt to show, by means of an example from relativity, something of the importance of clear philosophical ideas when we try to solve certain questions in the history of science; Hilary Putnam in turn criticizes some of Gruenbaum's anti-conventionalist views on geometry. In Part 2, Hill, Pais and Suppes consider such matters as "the status and applicability of mathematics in physical theories, the plethora of elementary particles, and the non-standard character of the mathematical equipment of quantum mechanics".

In Part 6 N. R. Hanson and J. A. Wheeler contribute discussions on philosophical aspects of contemporary cosmologies; Wheeler's paper, despite a pretty clear beginning (straightforward almost to the point of being bizarre), turns out to be heavily technical.

The contributors to these Seminars, by and large, are leaders in their field, and though no one reader would be likely to follow each and every one of the discussions with equal interest, the standard is uniformly high, even though occasionally it seems as if old wine was being poured into new bottles. Certainly these colloquia try to keep alive the old dream of worth-while discussion between scientist and philosopher without the traditional British depreciation of the other man's interests, knowledge, and intellectual traditions.

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SPACE MEDLEY

Advances in Space Science and Technology

Vol. 5. Edited by Frederick I. Ordway, III. Pp. xvii+334. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1963.) 93*s*.

THIS book, like the first four volumes in the series, brings together articles on widely varied aspects of space science and technology, and it is pleasant to be able to report that this fifth volume maintains the high standard of its predecessors.

The book is divided into six chapters. The first, by R. G. Athay, is a useful short survey of what is not known about the Sun, with ideas for experiments. The second chapter, by R. P. Haviland, discusses techniques for communication satellites. The various possible systems are described, and the important technical problems are clearly stated; there is also a section on the world's desire to communicate and the best ways of assuaging it. The next chapter, by H. W. Ritchey and J. M. McDermott, is a fine review of solid-fuel rocket technology: all aspects of the subject, from detonation tests to the geometry of grain design, are covered in a readable and authoritative text. The fourth chapter, by R. E. Smith, is a thorough survey of the problems of keeping man alive and well during prolonged space flights: such possibilities as hibernation or transient hypothermic torpor are mentioned, and there is an illuminating discourse on the regenerative treatment of waste products. Writers on the subject of man-in-space should, however, beware of wrapping simple facts in layers of abstraction. The news that "very complex matrices of interlocking life systems . . . find their common denominators in terms of mutual requirements for energy . . ." may induce in the reader a "transient state of hypothermic torpor", from which he emerges with the suspicion that the author merely means "all living things need food and warmth".

The last two chapters of the book are the longest, and range widely. Chapter 5 deals with navigational and geodetic satellites, and their applications both on Earth and elsewhere in the Solar System. The historical survey of navigation and navigation-satellites, by J. D. Nicolaides, is particularly good, and brings to light many unfamiliar facts. The section on geodetic satellites, by J. D.