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Metaphysics V: Probabilistic Metaphysics

It is uncommon to claim that probability should be regarded as a fundamental metaphysical concept. The traditional focus of metaphysics is on the nature of being, the nature of substance, the nature of space and time, and similar concepts. On the other hand, it is evident that from the standpoint of contemporary science, the probabilistic character of phenomena is nearly as ubiquitous as their spatial or temporal character.

There are certain general propositions that reflect the nature of probabilistic metaphysics. These propositions are not all accepted but each of them has a serious defence, and a close relation to contemporary scientific work. Five such propositions are given with brief comments on each.

(1) *The fundamental laws of natural phenomena are essentially probabilistic in character.* The defence of this proposition, which is far removed from central theses of traditional metaphysics, is the probabilistic character of the main fundamental theories of matter and energy in the 20th century, namely, quantum mechanics and quantum field theory. There have been and there will continue to be efforts to develop deterministic theories of quantum phenomena, but the general assessment is that these efforts have as yet been unsuccessful. Moreover, the fundamental probabilistic element of the phenomena will remain with or without the subsequent development of such theories. Examples would be the transition probabilities for states of the hydrogen atom or the radioactive decay of substances such as radium.

(2) *Our conception of matter must contain an intrinsic probabilistic element.* The defence of this proposition again rests on the fundamental theories of physics just mentioned. The contrast with the concepts of matter to be found for example in Aristotle or René Descartes is apparent, although it is possible that a revision of Aristotle's ideas of matter could accommodate modern views.

(3) *Causality is probabilistic in character.* In older popular accounts the idea of causality being intrinsically probabilistic would cer-

tainly be unacceptable. The classical dictum has been that where there exists a difference in effects there must exist a difference in causes. But this is just what a probabilistic theory does not accept as an essential ingredient of a theory of causality. The best physical example is radioactive decay of a substance such as radium or uranium. Differences in the decay times of pure atoms of a given substance do not indicate a difference in causes according to the standard probabilistic theory of such decay.

There is another aspect that is perhaps more important. A probabilistic analysis of causes is the only possibility for intrinsically complex phenomena. It is important to emphasize that not all traditional metaphysics has been deeply concerned with the ultimate nature of being or ultimate causes. Philosophers such as William James and John Dewey (1859–1952) have been more concerned with the phenomenology of experience as the right approach to metaphysics, although this is not meant to suggest that they were purely phenomenologists. The point is that it can be an appropriate part of metaphysics to be concerned with the complexity of phenomena and how a general theory can be developed to account for this complexity. The theory of probabilistic causality constitutes one such approach. An agnostic standpoint toward ultimate causes can be taken but the need for dealing with causal ideas in a probabilistic framework can be seen as the only computationally feasible possibility. Of course, the idea of computational feasibility is itself not at all a classical metaphysical conception but one that is very much in order as part of current scientific thinking. There is an important metaphysical distinction to be made between phenomena that are computationally accessible and those that are not. Probabilistic causality is one way of dealing with such complexity.

(4) *Certainty of knowledge is in general unachievable.* From Descartes to Bertrand Russell, a central theme of modern philosophy has been to characterize methods by which certainty of knowledge can be established. The concept of sense-data has been central to the search for certainty in the foundations of empirical knowledge. Modern scientific theories of perception have cast serious doubts on the possibility of such knowledge, because of the impact of past experience and present context on 'direct' perception of phenomena. In the case of scientific knowledge acquired through experimentation and procedures of measurement, the central role of variability in the phenomena and errors in the procedures of measurement has made certainty of results generally unattainable. Probabilistic analysis is the natural methodology in such circumstances, supported as it is by such fundamental theoretical results as the Heisenberg uncertainty principle in quantum mechanics.

(5) *The collection of scientific theories is not converging to some bounded fixed result that will in the limit give us complete knowledge of the universe.* A common philosophical conception of science is that it is an ever closer approximation to a set of eternal truths that hold always and everywhere. This conception of science has ancient antecedents in Plato and Aristotle. A good example would be the theory of demonstration of scientific propositions in Aristotle's *Posterior Analytics*. This same conception of science has dominated modern philosophy with Descartes and Kant as the most prominent exponents. To be contrasted with this is the view congenial to C. S. Peirce and Dewey among modern philosophers. Scientific activity is a kind of perpetual problem-solving. The aim of enquiry is to settle a particular problem, not to provide all truths of a relevant nature. The modern theories of complexity already alluded to buttress this view. From many directions a good argument can be made that all the relevant details of many complex phenomena are computationally inaccessible. Our knowledge of such phenomena must remain incomplete. Probabilistic metaphysics is designed to deal with such uncertainty and incompleteness.

It should be emphasized that such a view of scientific theory does not imply that we do not increase our knowledge of given phenomena as one theory is succeeded by another. The vivid image to be held in mind as a way of thinking about the unbounded character of experience and what is to be discovered about it is a sequence of increasing integers.

It is not at all necessary that such a sequence converge to a fixed finite limit, just as it is not given that increasing knowledge of the universe will converge to a closed view. In fact, probabilistic metaphysics is in many respects quite congenial with William James's concept of the open universe.

Other Propositions. The five propositions I have discussed are not meant to characterize in any detailed way probabilistic metaphysics. It would be part of the theory itself that no simple set of general propositions would give an adequate characterization. Apart from this general remark, probabilistic metaphysics is also concerned with the plurality of science as well as with the incompleteness of it. The evidence is rather good that the individual sciences are diverging, rather than converging as is often hoped by many speculative scientists. There is no particular reason to believe that we shall see in science an increasing unification of language, subject matter, or method, but rather a continual divergence of all three, so that the understandability of what is transpiring at the frontiers of a given subdiscipline of science will be increasingly difficult of comprehension. Although there are general propositions of probabilistic metaphysics, the metaphysical analyses of particular scientific disciplines will also be different from each other.

In the same spirit, there is no general theory of rationality to guide our enquiries. The theory of rationality or of enquiry is also pluralistic and to a large extent probabilistic in character. Back of this view is a deeper one that the aims of enquiry are to a very large extent instrumental in character. Such a view of science and knowledge has had considerable currency in this century but the cognitive view of traditional metaphysics has held sway for a much longer period of time. Also, admittedly, there are difficulties with working out a purely instrumental view in a satisfactory way. One of the functions of a proper probabilistic metaphysics is to provide a proper place for both the instrumental and the cognitive view of enquiry. It is doubtful that at any time in the near future we can dissolve one into the other.

Another feature of probabilistic metaphysics is that it is intended to be descriptive and therefore continually subject to revision on the basis of new philosophical and scientific developments. The scientific theories of today will surely not be the theories of tomorrow. The same should be true of metaphysics.

FURTHER READING

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