INTERNATIONAL STUDIES IN THE PHILOSOPHY OF SCIENCE, VOL. 14, NO. 1, 2000

Book Reviews

Philosophy of Science
ALEXANDER BIRD, 1998
Montreal & Kingston, McGill-Queen's University Press
x + 313 pp., Can$19.95 (paperback)
ISBN 0-7735-1772-3 (bound), 0-7735-1773-1 (paperback)

Alexander Bird's *Philosophy of Science* is a general introduction to the philosophy of science and an installment in the series *Fundamentals of Philosophy*. As the editor of the series, John Shand, tells us in an introductory note, the series is designed to present "an up-to-date set of engrossing, accurate, and lively introductions to all the core areas of philosophy". These works are meant to be "evenhanded", but "not mere bland expositions" of the areas they cover. Bird's contribution to the series certainly lives up to this description. In the Preface he tells us that while positivist and "related programmes" failed to develop a philosophy of science built up from an empirical basis or an account of inductive logic and confirmation appropriate for this task, the reactions to this failure have faired no better. Sociological and historical approaches to the philosophy of science, though "fruitful in many ways", aligned themselves with relativism and, more importantly, thereby divorced themselves from mainstream philosophy. With Bird's even hand at the wheel, we embark on a prudent middle road, one which he thinks represents current trends in the philosophy of science toward mainstream philosophical concerns, albeit with a fuller appreciation and sensitivity to historical and sociological factors. Bird welcomes this shift back into the fold and hopes that his introduction will not only describe that move, but contribute to it as well.

The divisions of the book represent this orientation well. Part One, entitled "Representation", is designed primarily as a discussion of metaphysical issues concerning how and what scientists try to represent. Part Two, "Reason", addresses epistemology. It aims to show that an "externalist, moderately naturalized epistemology" can best account for how scientific knowledge, which has no unique method, is possible and indeed progresses. By this account, scientists currently represent the world in terms of the following categories, which are the chapter titles: "Laws of Nature", "Explanation", "Natural Kinds" and "Realism". The prospects and problems for an epistemology of science fall under the following headings: "Inductive Skepticism", "Probability and Scientific Inference", "Inductive Knowledge" and "Method and Progress". Each chapter ends with a short list of suggested readings in that particular area. The book also has a useful Glossary and a full bibliography and index.

The problem of induction and its correlated issues will largely inform the way we think about our question and it sets the tone for the presentation and organization of the material to follow. For instance, in the introduction, entitled "The Nature of Science", we lead off with the familiar question "What is science?" Beginning to answer this question starts with understanding induction, and the problems of Hume and Good

0269-8595 print/1469-9281 online/00/000083-17 © 2000 Inter-University Foundation

man, which leads Bird to make some initial distinctions by way of Judge Overton. William R. Overton was the judge who presided over a famous case in Arkansas where a legal challenge was brought against a law that attempted to have creationism taught alongside theories of evolution. A fine student of fundamentals of philosophy of science, Overton's 1982 judgement exemplifies many of the standard principles used to distinguish science from other pursuits. Bird argues that Overton's criteria (that science should be guided by natural law, should be explanatory in reference to natural laws, as well as testable, tentative and falsifiable) not only provide a relevant starting point for this inquiry, but also show why the answers fall into the two categories which organize the book. Thus, "one of the basic aims of science is to provide an accurate representation of the world—what sorts of things there are in it, how they interact, what explains what, and so on". The first part of the book canvasses the various responses to these questions, while the second part considers the question "How much can scientific reasoning tell us about the world?". Science, guided by induction, represents the world in various ways and has various ways of reasoning about what it represents.

Each chapter provides a concise exposition of the topic addressed. The major issues are introduced and the topics unfold either argumentatively or by paralleling the historical progression of the various debates within the field. Bird not only surveys the various positions, but often weighs in with his own perspective, which usually emerges as representative of the best contenders in the field. Consider, for instance, the discussion as it develops in Chapter One. Here we find that regularities license generalizations about the world and would seem to offer insight into the Laws of Nature; yet, not all regularities are law-like. While we may want to be "minimalists" about such regularities, because we want to distinguish the accidental from the nomic, such "Simple Regularity Theories" (SRT) will need to be increasingly augmented. Counterfactuals do this, but Bird points out that they are as epistemically inaccessible as laws. Probabilistic laws seem incompatible with SRTs because they exhibit a kind of regularity seemingly inadequate as an instance of a law. Alternatively, the minimalist may want to find a way to systematize regularities efficiently so that only those sufficient to describe the facts are required. For instance, we might axiomatize a system and treat those of its regularities as law-like that can be most simply and strongly deduced from the basic principles. But simplicity is difficult to define and there may be more than one system that efficiently organizes the facts. Ultimately, Regularity theories, simple or augmented, cannot explain instances of regularity the way we expect a law of nature to. We need something like necessity, which might show how the presence of one property brings about another. Still, it seems difficult to analyze necessity (or necessitation between universals) without relying on the concept of regularity. So, Bird introduces a criterial account of nomic necessity. The relationship between a criterion and that for which it is a criterion can be evidential—litmus paper turning blue is evidence for the presence of an alkaline and thus its turning blue is a criterion for a nomic relationship. We need not analyze the relationship itself in terms of necessity, but can instead take the relationship as a criterion of lawful regularity. Thus, "particular instances are criterial evidence for a law and the regularity is a limiting case for such evidence". Reasons for regarding regularities as accidental will likewise undermine regarding that regularity as criterial evidence. The idea of nomic necessity becomes somewhat heuristic, guiding expression of the laws, while still standing in need of an explanation, which can now be given in terms of criteria.

The chapters are each tight and tidy, while the treatment of topics is, for the most part, neither cursory nor too technical. Nonetheless, this judgement may depend on

ones own agenda or perspective on the topic. For instance, Falsification, according to the index, is dealt with in about eight pages and in Chapter Five, "Inductive Skepticism", it is introduced as a way to circumvent Hume's problem. However, because falsification is so restrictive, too much good science fails to count as scientific. Statistical and probabilistic hypotheses fall by the wayside and Popper can only save them by introducing a kind of conventionalism that surreptitiously allows induction back into his account of science. Thus, induction has to be dealt with squarely and Popper's attempt to diffuse it is "a dead end". Perhaps this is short shrift for all Popper's hard work and one wonders whether his historical influence at least has not been diluted (though it is worth pointing out that his spirit is overtly well represented in the 10 pages on Lakatos). Yet, given this book's emphasis on contemporary approaches to the problem of induction, this is understandable and even appropriate.

Although the full chapter on "Natural Kinds" is presented in the context of classifying the sorts of things there are in the world, contemporary approaches to induction hover in the background here as well. (And indeed we find in the final section of this chapter that, "Laws connect natural kinds. Induction can be seen as inference to the best explanation, where the explanation is a law. Therefore natural kinds are the kinds one should make use of in inductive inference".) This chapter begins with a "descriptive" view of natural kinds and moves on to "essentialist" varieties and, in particular, nominal essences. Kripke and Putnam show respectively that nominal essences are neither necessary nor sufficient for an account of natural kinds. But problems endemic to the natural kinds discussion crop up. Problems of grouping, similarity, homogeneity of relevant classes, and issues of classificatory schemas, etc., lead Bird to conclude that what counts as a natural kind will be less a matter of how nature packages the world, than how we unpack it. Thus, he endorses an explanatory role account. Putting the explanatory role account together with the work natural kinds are thought to do for induction leads to circularity, a problem which Bird responds to by arguing that, "We have natural propensities to make inductive inferences with intuitively recognized kinds". Again, this chapter reflects a prevalent view in contemporary philosophy of science that understanding natural kinds might take us some way toward a better account of induction, but some have wondered whether natural kinds discussions are in this way overwrought. Nonetheless, as an introduction this chapter illuminates the issues by the light of current discussions and it does so well.

In fact, a major strength of this introduction is its clear and concise discussion of recent developments in the philosophy of science. From the section on constructive empiricism (which Bird argues runs aground in trying to make sense of inferences from evidence, hence his strong, though not uncritical, reliance on Inference to the Best Explanation), to the section on internalism and justification, to the sections on Kuhn and Lakatos in the final chapter, one has the sense throughout that most major currents in the field are represented. Another strength is the generous use of historical events to illuminate philosophical problems, though here again one's preference may be to have philosophical approaches illuminate the history of science.

This would be an ideal text for upper-level undergraduate classes and could be augmented (in addition to the "further readings" lists) with an anthology of original writings for those inclined to think that reading original works in the field is an important component to understanding the topic. And, although Bird's perspective cuts a broad swath through the center of current topics in the philosophy of science, such additional readings would allow for discussion of alternative approaches from both a historical and contemporary view. With two such texts in hand one could feel confident

in presenting the best of the history of the philosophy of science and the best current philosophy of science.

MICHAEL X. ASHOOH
Department of Philosophy
University of Toronto
Toronto, Ontario M5S 1A1
Canada

Rocks of Ages: Science and Religion in the Fullness of Life
STEPHEN JAY GOULD, 1999
New York, Ballantine Books
viii + 243 pp., Can$26.50, ISBN 0-34-543009-3

In the battle between science and religion, Stephen Jay Gould is a dove. He urges an end to war and peaceful co-existence hereafter. Indeed, he thinks there is simply no grounds for conflict, since each has its own domain to tend to. NOMA, as he calls it, is the doctrine of "non-overlapping magisteria", the contention that religion and science have separate areas of concern and research and teaching. And what are those domains? The religious domain of meanings and values and the scientific domain of facts. (Rock of ages vs ages of rocks.) Those who understand this can henceforth live in peace.

Gould claims no novelty; the idea is already widespread. But he does, of course, present it with rare grace and clarity. He is surely one of the great essayists of our times. Like his other works, this one is elegant and thoughtful. I count myself a big fan of all his previous books, and in all his battles until now found myself on his side. But, as baseball fanatic Gould himself might say, even Joe Dimaggio's hit streak had to end. The argument presented in *Rocks of Ages* is hopeless.

The chief claim Gould makes is that there is no conflict between religion and science when both stick to their proper, non-overlapping roles. To accept this, however, the religious will have to back down from any claims about the factual world, such as the Genesis account that God created things in six days. Few modern Christians take Adam and Eve literally, anyway, so most won't find Gould's injunction a new burden. Fundamentalists, however, will reel. But even liberal Christians like to say that God made the laws of evolution and set the ball rolling with the Big Bang. Gould is vague about this. But since these are claims about the factual world, they fall into the magisterium of science. There, isn't of course, a shred of evidence for (or against) any such role by God—it is, as they say, a matter of faith—so claims such as these would have to be rejected as shoddy science. Or even worse for the religious, Gould would have to rule out claims about creation as being an illegitimate attempt by religion to go outside its rightful turf. There may be many believers who compartmentalize their lives and who are happy with the view Gould articulates, but it's only because they haven't thought it through.

Practising scientists, according to Gould, have to realize the limits of their legitimate role, too. Discovering how to fiddle with an organism's DNA does not confer the right to do so. So far so good. How such technological innovations are used—if at all—is largely a question to be decided on the basis of considerations drawn from the other realm. But Gould fails to note what he surely knows. Many key concepts of science (notions of health and disease, for instance) are loaded with value. Is homosexuality a disease? The answer—whatever it is (though I'm sure it's No)—draws heavily on both of Gould's magesterium. His NOMA are anything but "non-overlapping".