Philosophy of science for the uninitiated

Review of Samir Okasha's *Philosophy of Science: A Very Short Introduction*
Forthcoming in *Metascience*

Samir Okasha's *Philosophy of Science: A Very Short Introduction* (2nd edition) is a fantastic entry point for all those who would like to get themselves an overview of the issues philosophers of science grapple with. Okasha's book is written in a highly accessible and clear fashion, and manages to cover an impressively wide—and I would say, representative—range of topics on a mere 130 pages. Although the book format sets obvious limits on the depth the discussion can take, Okasha's book is a wonderful teaser for further reading.

The book is divided into seven chapter, none of which contain any major surprises—exactly as it should be for a book like this. But as with any textbook, and textbooks in philosophy in particular, it is to be judged by the way it arranges the (known) material and by its (personal) emphasis. On both of these dimensions, Okasha's book scores very highly for me.

In Chapter 1 ('What is science?'), Okasha sets the stage by outlining the notorious demarcation problem and by providing a neat historical overview of the scientific revolution (in physics) and in biology (Darwin, Watson and Crick). He then suggests a role for the philosopher of science (to 'question the assumptions that scientist take for granted', as illustrated with the problem of induction) before returning to the demarcation problem and Popper's (not entirely satisfactory) solution to it. Okasha closes the chapter by questioning the presupposition (held by Popper and others) that there is a set of features that all sciences share and by hinting at the possibility of a Wittgensteinian family resemblance (an idea that has become quite popular recently).

In Chapter 2, Okasha delves deeper into the problem of induction and discusses Popper's (unsuccessful) attempt to avoid it. He then introduces the inference-to-the-best-explanation (carefully and plausibly distinguishing it from basic inductive and deductive inferences) and briefly mentions one of the issues associated with it (why should a theoretical virtue like simplicity be a guide to truth). It is nice to see Okasha proceeding to discuss a topic that strangely, one encounters not all too often in philosophy of science introductions—despite its importance in science and recent popularity in the philosophy of science—namely the topic of *causal* inference. Okasha uses the problem of common causes to illustrate some of the intricacies of causal inference and mentions randomized control trials (RCTs) as a powerful method to disentangle causal relations (whilst at the same time urging that it cannot be the *only* method). Okasha then spends the rest of the chapter giving a crash course to the Bayesian theory of confirmation and by raising some of its notorious problems (new theories, priors, subjectiveness). It would have been nice for the reader to also learn about the problem of old evidence for Bayesianism and some of the issues of RCTs (raised by some of the literature Okasha mentions at the back of the book). But given the harsh space limitations, these are of course niggles.

Chapter 3 is concerned with explanation. Of course, Hempel's classical Deductive-Nomological model and two of its notorious problems (symmetry and irrelevance) take centre stage. Okasha duly emphasizes the importance of causality in addressing these issues (judiciously, I think, without going into much detail about the specific accounts that have been proposed), whilst at the same time pointing out limitations to the reach of causal explanation (e.g., in the identification of water = H_20). Okasha then briefly ponders possible limits of scientific explanation

(all explanations have to come to an end) and seeks to illustrate this with the problem of consciousness. Lastly, Okasha resists explanatory reductionism by highlighting the idea of multiple realisability.

Chapter 4 gives quite a bit of space to a central debate in the philosophy of science (which, again, is strangely often treated rather sparsely in many intros), namely the realism-antirealism debate. Okasha discusses the realist's central no-miracles argument, the antirealist's pessimistic meta-induction, and realist responses to it. Okasha also problematises the observable/unobservable distinction, which underlies the whole dispute. The rest of the chapter Okasha critically reviews the thesis of the underdetermination of theories by evidence and concludes that it might just be a version of the problem of induction (rendering it toothless in the hands of the antirealists).

Chapter 5 turns to T.S. Kuhn's *Structure*, situating it as a critical reaction to logical positivism and its neglect of the context of discovery. There is a suitably critical discussion of Kuhn's ideas of incommensurability and theory-ladenness. Interestingly, Okasha also highlights Kuhn's view of theory-choice (developed in the postscript to the *Structure* and in the *Essential Tension*, in particular) and suggests that we read Kuhn not as rejecting any kind of rationality in theory-choice, but rather a particular conception of rationality, namely an algorithmic one. In his concluding remarks to this chapter, Okasha briefly (perhaps slightly too briefly) portrays the Strong Programme as taking inspiration from Kuhn's more radical views.

Much recent philosophy of science has tended to investigate problems *specific* to particular sciences. Okasha reviews a couple of these problems and the ensuing debates in Chapter 6. It is perhaps the most illuminating chapter for the more advanced reader. First, Okasha attends to the question of whether or not space is absolute, with Newton and Leibniz as prominent defenders of the respective views, introducing along the way Leibniz's widely discussed principle of indiscernibles and Newton's bucket thought experiment. Second, Okasha discusses the notorious species problem and problematizes the solution offered by the biological species concept. Although the biology is interesting, the philosophy here is maybe a little thin: the only philosophical position he mentions (briefly) is the (somewhat bizarre, but historically admittedly important) species-as-individuals view. Third, Okasha discusses the question of whether the mind is modular. Although Okasha himself notes that this issue seems to be foremost an empirical one, he does insist that philosophy has an important role to play here in discerning the *kinds* of cognitive tasks psychologists and neuroscientists ought to find modules for. I don't find that very convincing. After all, any scientific investigation into the mind must take this step (most of the times—for better or for worse—without the help of philosophers). In the end, Okasha does helpfully distinguish between massive modularity and modularity plus central processing (as held by Fodor) and points out that the question about modularity is distinct from the innateness issue (though they often get mixed up).

In the final chapter ('science and its critics'), Okasha discusses whether there are any questions out of reach for science (or natural science), and whether these questions include ones that can be addressed only with philosophical (or social science) methods. He also spends a few pages on the relation between science and religion, with a particular focus on creationism and evolution. It's a little unfortunate, however, that Okasha does not mention alternative views to the (by now widely undermined) 'conflict thesis'. The final pages of the book, Okasha dedicates to the question of whether science is value-free. This has been hotly debated recently with many new contributions. Okasha however chooses more traditional (and biology-centred) examples:

evolutionary psychology and the classification of mental disorders. Interestingly, he concludes that the latter may well be more value-laden than the former (because the former could in principle overcome the biases it has been accused of, whereas mental categories seem to be inherently value-laden).

Naturally with a book like this, there are omissions. In particular, Feyerabend and Lakatos, for example could indeed have been mentioned in the chapter of 'scientific change and scientific revolutions' (at the very least, in the bibliography!). The total absence of any mention of the Duhem-Quine problem is also quite striking and even less excusable. It is also hard to understand why for example the chapter on value-ladenness of science was not at all updated in this 2nd edition with some of the recent developments (again, at the very least in the bibliography). In fact, I wonder whether anything at all was changed from the first to the second edition (I couldn't find any obvious differences and there is no preface outlining potential changes). Despite that, however, I believe that Okasha has done an excellent job at presenting a core piece of philosophy of science to the uninitiated.