

**Steven French.** *Philosophy of Science: Key Concepts*, 2<sup>nd</sup> ed. Bloomsbury. 240 pp. \$88.00 USD (Hardcover ISBN 9781474245241); \$24.95 USD (Paperback ISBN 9781474245234).

Steven French is Professor of the Philosophy of Science at the University of Leeds. He is the author of *The Structure of the World* (Oxford University Press, 2014) and numerous articles on the philosophy of science. He is also Co-Editor of *The British Journal for the Philosophy of Science* and of *The Bloomsbury Companion to the Philosophy of Science* (2014). In this title, he notes that science has made a huge impact on human society over a hundred years, but many people do not know how it works. How do scientists, for example, do the things they do? How do they come up with the theories? How do they test their theories? How do they use these theories to explain phenomena? How do they draw conclusions from them about how the world might be?

Thoroughly updated, this second edition of *Philosophy of Science: Key Concepts* looks at each of these questions. Taking in turn the fundamental theories, processes and views that are at the heart of the philosophy of science, this introduction to it illuminates scientific practice and provides a better appreciation of how science actually works. It features chapters on discovery, evidence, verification and falsification, realism and objectivity; a new chapter on explanation in science; and various study exercises. In what follows, I will more directly interact with salient points in the text.

Chapter 1 serves as an introduction to the text. The fundamental question chapter 2 seeks to answer is how scientific theories, models, and hypotheses are discovered. He describes what he calls ‘eureka moments’ of discovery, the ‘romantic view’ of creativity, the ‘hypothetico-deductive’ account, and the ‘inductive’ account. Chapter 3 discusses the heuristics, which is the study of methods and approaches used in the process of discovery. He notes that a heuristic lies somewhere between the formality found in logic and the seemingly random and irrational flash of inspiration. Heuristics, in the modern environ, builds upon the seminal work of Polya, who noted that it consisted of first understanding the problem, then making a plan, thereafter carrying out your work, in order to then finish by reviewing your work.

In chapter 4 French presents his views on explanation. He notes that the job of a philosopher of science is to ask what the nature of scientific explanation is, and for example, whether one type of explanation fits all forms of science, or whether each discreet science warrant its own type of explanation. He discusses the deductive-nomological view of explanation, causal accounts of explanation, the unification potential of scientific explanations, and pluralism and pragmatic types of explanation. The fifth chapter explores the role of justification in science. The fundamental question of this chapter is what is the impact of experimental data on theories? He contends that the role of data is either to verify theories, or to falsify theories. He notes that the latter view, that advocated and popularized by Karl Popper, is the more Darwinian view of justification.

Chapter 6 focuses on observation in science. He explores the common-sense view of observation, but notes that there is more to seeing than meets the eye, so to speak. There is a common view that science should be a dispassionately conducted enterprise, but French points out that the notion of an unbiased observer is a myth. Chapter 7 explores the notion of an experiment. If all observation is theory laden, and consequently there can be no unbiased reporting of facts, how can one ensure the accuracy of what science tells us? French contends that such warrant is gained by repeated and reproducible experiment. The eighth chapter discusses realism with respect to scientific theories. To the question of what scientific theories tell us, French proffers three responses: they tell us how the world is in both its observable and unobservable aspects (realism); they tell us how the world is in its observable aspects only (instrumentalism); and they tell us how the world is in its observable aspects, and how it could be in its unobservable aspect (constructive empiricism).

Anti-realism, in its constructive empiricist form is discussed more fully in chapter 9. The author notes that the ‘pessimistic meta-induction’—problem that of past theories being seen as accurate for a time, but thereafter discarded—is a positive contributor to this theory. Moreover, the under determination of data argues for this position. Chapter 10 answers the question of whether science is independent of its social context. French notes that social factors may determine what and how a scientist investigates what she investigates, as well as the content of the scientific beliefs held by the scientist. The eleventh chapter looks at gender bias in scientific practice and notes that it may determine the proportion of men and women in science, it may determine what science investigates, it may determine how science investigates, and it may determine the content of science beliefs. The final chapter concludes with a summary of the book, given in the form of a question and answer session. The book also includes an annotated bibliography for each chapter and its topic.

This illuminative introduction of scientific practice provides the reader with a better appreciation of how science actually works. *Philosophy of Science: Key Concepts* outlines some of the most important scientific questions, problems and arguments but does not assume prior knowledge of philosophy. In sum, I could well see it used as an undergraduate introductory text in philosophy of science courses.

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