

Thomas Kuhn. BY ALEXANDER BIRD. (Chesham: Acumen Press, 2000. Pp. xii + 308. Price Hardcover: £40.00. Paperback: £13.95.)

Thomas Kuhn (1922-96) was one of the leading figures of twentieth century history and philosophy of science. His major book, *The Structure of Scientific Revolutions* (University of Chicago Press, 1962; 2nd ed., 1970; 3rd ed., 1996), is one of the most influential books in the field. In the present volume, Alexander Bird presents a detailed, critical examination of Kuhn's work that is broadly structured by the leading themes of *Structure*.

Kuhn's main aim in *Structure* was to propose a general model of the nature of scientific change. According to Bird, this was not so much a philosophical project, as a project in 'theoretical history of science' (p. 29). For Kuhn sought to show that the development of science displays a certain general kind of pattern, and that attention to the details of this pattern enables the historian to explain episodes in the history of science. This theoretical project, however, is not without philosophical substance.

Indeed, the project of theoretical history led Kuhn both to oppose a widespread philosophical viewpoint, and to propose one of his own. The viewpoint opposed by Kuhn is one which Bird describes as the *Old Rationalism*. The Old Rationalists sought an account of the scientific method, which they took to be the basis of rational scientific theory acceptance and scientific progress (pp. 3-6). By contrast, Kuhn's own positive ideas fall within what Bird calls the *New Paradigm* (pp. 6-8). Proponents of the New Paradigm tend to be sceptical of the existence of a universal, invariant method, and raise problems about scientific rationality and progress.

A central feature of Kuhn's model of scientific change is the idea that the development of science divides into periods of normal science based on a shared paradigm. Normal science

is broken at intervals by revolutionary episodes in which the reigning paradigm is overthrown following a crisis induced by anomalies. Bird argues that a sharp distinction cannot be sustained between normal and revolutionary science. Instead, there is a continuum of cases between paradigm shift and normal science. Anomaly may lead a paradigm to undergo non-revolutionary revision during a period of normal science (pp. 51-3). There may even be revolutionary change in normal science without displacement of paradigm (pp. 58-9).

Bird describes Kuhn's model as a 'cyclical' one (pp. 21, 33). But 'cyclical' may be too strong a word. It suggests that the pattern of normal science followed by revolution and new normal science is destined to go on forever relentlessly repeating itself. But nothing in Kuhn's model entails that the process could not come to a halt with a completed normal science, unlikely as such an outcome may be. Nor is there any reason why a science in a state of crisis could not pull back from the brink of revolution, returning to normal science under the old paradigm.

As for the vexed term 'paradigm', Bird dissolves much of the obscurity that shrouded Kuhn's original discussion. Bird focuses on the distinction between exemplars and disciplinary matrices, which Kuhn introduced in the *Postscript* to the second edition of *Structure* in an attempt to explain what he really meant by 'paradigm' (p. 68). The disciplinary matrix corresponds to the original idea of a paradigm as an overarching scientific world-view. It comprises a set of symbolic generalizations, epistemic values, ontology, models and puzzle-solutions, accepted by a scientific community as the basis for research practice. Exemplars are the last item on the list. They are concrete puzzle-solutions, which serve a pedagogical function as laboratory exercises and problems in textbooks. Bird employs the notion of an exemplar in his discussion of Kuhn's views of perception and scientific

judgement, drawing parallels between the latter and connectionist views of cognition (pp. 71-5).

Kuhn was a well-known advocate of the theory-dependence of observation. Bird introduces an important distinction between *strong* seeing, which requires that what is seen actually exist, and *weak* seeing, which does not (pp. 102-4). Both may be understood in either an *objectual* sense (seeing X) or a *propositional* sense (seeing that p). On the basis of this distinction, Bird argues against the extreme theory-dependence thesis that scientists' perceptual experience varies with change of theory. Bird grants that past experience influences present experience (p. 109), and that conceptualization of experience may be theory-laden (pp. 118-9), but insists that the influence of theory on experience is at best marginal (p. 122). He argues that the extreme theory-dependence thesis runs claims about experience and concepts together (p. 119), and that Kuhn fails to show that observation cannot serve as neutral arbiter between theories (p. 122). Bird's rejection of extreme theory-dependence brings his approach into potential conflict (e.g., pp. 130-3) with defence of Kuhn based on a Kantian metaphysics, since it is at odds with the theory-dependence of scientists' phenomenal world (cf. Paul Hoyningen-Huene, *Reconstructing Scientific Revolutions: Thomas S. Kuhn's Philosophy of Science*, University of Chicago Press, 1993).

Kuhn was also an advocate of the thesis of semantic incommensurability. Kuhn claimed that the meaning of scientific terms undergoes change in the course of a revolution. As a result, the vocabulary of rival theories may be mutually untranslatable, and their content may not be compared in point-by-point manner. Bird notes that Kuhn's critics tend to deny the importance of translation and to insist that theory comparison requires only common reference, which may survive change in intensional aspects of meaning (pp. 159-60). But Kuhn held that reference is not immune to variation with theory change (p. 160). Bird points

out that Kuhn's views depend on the strong intensionalist assumptions that intension depends on an entire theoretical context and must be fully satisfied in order for a term to have a reference (p. 167). Many philosophers critical of Kuhn have espoused causal accounts of reference which sever reference from intension (pp. 179-83). Bird discusses problems with the causal theory of reference determination (pp. 184-5), which have led to the proposal of causal descriptive accounts of reference that Bird sees as a return to intensionalism (p. 185-7). He also provides useful discussion of the 'taxonomic turn' in Kuhn's later work, in which translation failure between theories is due to changes in the classificatory systems which theories impose upon the world (pp. 191ff).

Kuhn opposed realist accounts of science, and often sailed close to the epistemological relativist wind. While Kuhn held that science progresses in an evolutionary sense, he was critical of the realist idea that progress consists in steady advance on the whole truth about the world. Kuhn employs a historical induction against convergence on truth, which, Bird points out, rests on an exaggeration of the falsity of past theories (p. 226). Kuhn also evinced doubts about correspondence between theory and reality, which fall foul of the disquotational T-scheme (pp. 228-9) and intriguingly parallel positivist reservations about correspondence truth (p. 234). As for relativism, in *Structure* Kuhn suggested that criteria of theory evaluation are paradigm-dependent, and that there are no extra-paradigmatic standards which may serve as a neutral court of appeal. Bird draws on recent reliabilist and naturalized epistemology to show that variation of scientific standards does not lead to epistemological relativism in the manner suggested by Kuhn's original treatment in *Structure* (p. 251ff).

In addition to detailed critical examination of philosophical aspects of Kuhn's model of scientific change, Bird discusses the intellectual context in which Kuhn's work originated, as well as the broader impact of his work. Kuhn's work arose against a backdrop of empiricism

in the philosophy of science (pp. 9-13), and was influenced by Gestalt psychology (pp. 13-4) and Ludwik Flecks' early work in the sociology of science (pp. 14-20). *Structure* contributed to a shift in the self-image of the social sciences by altering our conception of the natural sciences and of the scientific status of the social sciences (pp. 267-8). While Kuhn sought to distance himself from contemporary sociology of science, he contributed to the demise of Whiggish history of science, as well as to the recognition of the social nature of scientific knowledge (pp. 269-75). On a more narrowly philosophical front, Kuhn was a transitional figure, many of whose central ideas have a Cartesian and empiricist lineage that has been rejected by more recent work in an externalist and naturalistic vein (e.g., pp. 146-7, 165, 245ff).

Bird's *Thomas Kuhn* is a well-written and incisive book which makes a major contribution to Kuhn studies. It is informed and informative both about Kuhn's own work and the critical literature on Kuhn. For those not familiar with Kuhn's views, the book will serve as a balanced and accessible introduction. For those already engaged with the literature on Kuhn, the book is an important contribution, which advances discussion of several of the leading themes in the literature. I highly recommend the book for the specialist and novice alike, as a readable, informative and critical overview of Kuhn.

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