Revisiting *Structure*

Vasso Kindi and Theodore Arabatzis (Eds): *Kuhn's The Structure of Scientific Revolutions Revisited*. New York and London, Routledge, 2012, *ix* + 259 pp., £80 HB

By Howard Sankey[1]

The year 2012 marked the fiftieth anniversary of the original publication in 1962 of T.S. Kuhn's master work, *The Structure of Scientific Revolutions*. Numerous events and publications were organized in recognition of that anniversary. Though primarily based on a conference held in Athens in 2008, the present volume forms part of an impressive surge in Kuhn-related activity that was timed to coincide with the anniversary. The volume opens with an introduction by the editors, Vasso Kindi and Theodore Arabatzis. This is followed by ten chapters, divided into three parts. I will follow the sequence of these chapters in my comments on the book.

In revisiting *Structure*, Kindi and Arabatizis seek to "reassess, fifty years after its first publication, its value, impact and current relevance" (p. 1). Their aim is not merely to reassess *Structure*, but to "take a fresh look at" the book in a way that reflects current scholarship rather than the "immediate concerns scholars had at the time of the book's publication" (p. 3). So, for example, various essays in the volume draw upon recent work in the history of the philosophy of science and cognitive psychology, and reflect the current focus on scientific practice as well as a tendency toward naturalism. On the whole, the essays present a sympathetic reading of *Structure* that stands in marked contrast to some of the negative reaction occasioned by Kuhn's work at earlier stages in the history of its reception.

Structure opens with Kuhn's remarkably prescient claim that history might bring about a "decisive transformation in the image of science by which we are now possessed" (*SSR*, p. 1). But it has not always been apparent what target Kuhn had in his sights. Was he aiming at the positivists, or, perhaps Popper? In his paper, Gurol Irzik considers this question in detail. He argues that "Kuhn's critical forays are directed more to the textbook image of science than to logical positivism (or to Popperian falsificationism for that matter)" (p. 16). Despite the fact that Kuhn is often given credit for having undermined empiricist philosophies of science such as positivism and falsificationism, his engagement with the details of these positions in *Structure* is rather superficial and indirect. Though Irzik takes Kuhn's treatment especially of positivism to suffer from "argumentative and other weaknesses", he holds that there are a number of "tactics of association and amalgamation Kuhn skilfully employed" (p. 29). For example, although Kuhn explicitly targets the textbook image of science, he sometimes writes in a way that suggests a close connection between logical positivism and the textbook image. According to Irzik, such tactics enabled Kuhn to carry out an attack on positivism without having to engage with the position in detail.

The seminal concept of *Structure* is the concept of paradigm. As soon became clear, however, the term 'paradigm' occurred with a number of different senses throughout the text of

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Structure. In the 'Postscript 1969' and other papers, Kuhn sought to refine the notion by distinguishing between exemplars and disciplinary matrix. In his contribution to the volume, James Marcum chronicles the process whereby Kuhn refined the central concept of *Structure*. Marcum's discussion is mainly expository. It will be useful for those unfamiliar with this aspect of Kuhn's work. But most of the material that he covers will be familiar to those who have undertaken a detailed study of Kuhn. What is new, though, is material that Marcum draws from archival sources at MIT, in particular lecture notes from lectures at Swarthmore in 1967. In one of these lectures, Kuhn employs the notion of a professional matrix which is a preliminary version of the notion of a disciplinary matrix.

In their contribution to the volume, Rupert Read and Wes Sharrock claim that Kuhn's "founding insight" relates to the contrast between natural sciences and social sciences (p. 64). They base this on remarks that Kuhn makes in the preface to *Structure* about how his experience of disagreement among working social scientists led him to see the importance of paradigms in the natural sciences. Read and Sharrock point to parallels between Kuhn's approach and Peter Winch's roughly contemporaneous work in the philosophy of social science. They place particular emphasis on similarities between Kuhn's and Winch's understandings of the contextual nature of rationality. The parallel that they draw between Kuhn and Winch is in large part guided by the Wittgensteinian reading of Kuhn that they favour. On such a reading, Kuhn emerges as more interested in questions about the practice of actual working scientists than in overblown epistemological and metaphysical matters. But, while their reading is not without merit, their treatment of rationality would benefit from engagement with substantive accounts of epistemic warrant, such as Larry Laudan's normative naturalism or work in the reliabilist tradition.

Wittgensteinian aspects of Kuhn's work are also central to Vasso Kindi's reading of Kuhn. Kindi starts out with a discussion of Kuhn's later negative assessment of his own original ideas about paradigms. Drawing on Wittgenstein, Kindi attempts to show that Kuhn's original treatment of paradigms has greater coherence than he himself later held to be the case. In the fifth chapter of *Structure*, entitled 'The Priority of Paradigms', Kuhn employs Wittgenstein's discussion of games and family resemblance as a basis for his own claim that scientists may base their work on paradigms (in the exemplar sense of 'paradigm') in the absence of an articulated set of rules. As a corrective to Kuhn, Kindi suggests that exemplars should not be set in such sharp contrast with rules. She writes that: "rules need examples/exemplars in order to be properly followed; practice with exemplars sets rules which, as they are followed, form traditions" (p. 105). On Kindi's reading of Kuhn, the exemplar and disciplinary matrix sense of 'paradigm' are brought closer together.

In his chapter, Thomas Nickles raises a number of questions with respect to the notion of an exemplar and the relation between normal science and revolution. On the one hand, if exemplars are fixed and unchanging, then there is no scope for modification of exemplars within ongoing normal science. On the other hand, if exemplars are allowed to be subject to modification, then the distinction between normal science and revolution becomes blurred. Nickles' primary objective is to provide a critical analysis of Kuhn's notion of exemplar within the context of the distinction between normal and revolutionary science. However, as part of this discussion, he is led to make some very insightful remarks about the relation between Kuhn's idea of fertility and traditional confirmation theory. The fact that scientists might choose to work in a paradigm because it holds promise for future research rather than because it has a high degree of confirmation indicates that there is something genuinely novel in Kuhn's insistence on the importance of fertility in scientific theory-choice.

In the final chapter of *Structure*, a Darwinian element enters Kuhn's account of science, as he characterizes scientific progress as evolution from "primitive beginnings" rather than progress toward the truth (*SSR*, p. 170). Jouni-Matti Kuukkanen considers not only this aspect of Kuhn, but especially further evolutionary elements that emerge in Kuhn's later work. In his later work, Kuhn came to emphasize that the sciences become increasingly specialized and that new specializations open up in a process that is akin to speciation. Kuhn's notion of incommensurability plays a role within such speciation by enabling a disciplinary isolation of new areas of specialization. Such isolation is what enables the new disciplinary specializations to progress. Thus, so far from being an impediment to the progress of science, Kuukkanen sees this as 'Kuhn's "middle way" between those who assume that there is one all-encompassing rational standard and those who think that, in the absence of an ahistorical and permanent standard of rationality, social factors determine everything in science' (p. 143).

The eighteenth century revolution in chemistry provided Kuhn with one of his main examples in *Structure*. In his chapter, Hasok Chang investigates incommensurability between phlogistic and oxygen-based chemistry. Chang argues that, though there were semantic differences between phlogiston and oxygen chemistry, there is little evidence of any substantive semantic incommensurability between the theories. Nevertheless, there was incommensurability at the methodological level. There were differences in problem-field and epistemic values, as well as in the presuppositions of scientific practice, between phlogistic and oxygen chemists. In Chang's view, it is the methodological aspects of incommensurability rather than the semantic aspects which can be found to have played a role in the chemical revolution. Though he does not state the claim in unequivocal terms, he does suggest that this methodological aspect of incommensurability is a more significant feature of scientific practice than is the semantic aspect of incommensurability. Speaking for myself, I have always found the semantic form of incommensurability to be of greater philosophical interest than the methodological form, primarily because of its involvement with issues in the theory of meaning and reference. But I suspect that Chang may be right to suggest that methodological incommensurability has greater relevance to the actual practice of science.

In her contribution, Hanne Andersen presents an overview of the development of Kuhn's ideas about conceptual change. Kuhn's initial ideas turned on the role of exemplars in science education. Later he emphasized the role of family resemblance in concept acquisition in a way which has parallels with work on graded structures in cognitive science. Still later, Kuhn came to focus on the idea of a taxonomic structure in which what he called "the no-overlap principle" played a vital role. Andersen draws on archival material in order to provide a sketch of some of the further developments of his ideas on conceptual change on which Kuhn was working at the end of his career. In the final section of her paper, Andersen explores a problem which arises for Kuhn's account of concepts from the fact that scientists working in the same area may not share exactly the same conceptual structures. While it has sometimes seemed that Kuhn's approach to science had failed to generate an active Kuhnian research programme, in at least the area of conceptual change in science Andersen's paper makes clear that Kuhn-inspired research is very much alive.

In his chapter, Alexander Bird focuses on the naturalistic aspects of Kuhn's approach in *Structure*, as well as the relationship between Kuhn's ideas and the sociology of science. Bird notes that there are two strands to Kuhn's naturalism. The first relates to the fact that Kuhn draws heavily on the history of science to make philosophical points, rather than to simply illustrate such points. The second relates to Kuhn's willingness to draw upon psychological research, for example in relation to the theory-dependence of observation. Kuhn laid emphasis on social aspects of science, which was then taken as inspiration for the development of sociological accounts of science. But, Bird notes, "if

Kuhn's theory is to be correct, the drivers of scientific change must be largely internal to science itself" (p. 211). Thus, Kuhn's account of science is internalist, in contrast with the externalism of some of his followers in the sociology of science, such as the advocates of the strong programme.

In the last chapter of the book, Alan Richardson brings Kuhnian ideas to bear on the study of the history of philosophy. The study of an important figure in the history of philosophy often treats the figure in isolation from the surrounding cultural context and may even focus on limited areas of their philosophical work while ignoring their contributions in other areas such as mathematics and natural science. Richardson remarks that courses in the history of philosophy "often tip from the unhistorical into the antihistorical, when, for example, the excisions are made not on the understanding of what was philosophy at the time of the work being read but on what is now understood to be philosophy" (p. 235). But, if the history of philosophy were to take a Kuhnian turn, Richardson suggests, this would lead to an improvement. It would be less individualistic, since it would focus less narrowly on key figures or on limited aspects of their work. Greater attention would be paid to the broader intellectual and cultural contexts in which philosophical ideas develop. And a whole new range of questions might open up, such as questions about the nature of philosophical education and the nature of the philosopher as such. Such a Kuhnian transformation of our study of the history of philosophy could "yield a richer, more satisfying set of philosophical projects for the twenty-first century" (p. 248). I have no doubt that this may be true. But I can also imagine how a philosopher who favours a less historical approach to the history of philosophy might respond to this suggestion. Such a philosopher may say that the ahistorical approach to key philosophical figures leads to a productive engagement with earlier thinkers by bringing them into dialogue with us about contemporary philosophical issues. This may well be an ahistorical approach to the history of philosophy. But it has proven to be a highly effective means of advancing philosophical research.

All in all, the volume makes a valuable contribution to contemporary Kuhn scholarship. It contains a number of papers that are likely to serve as important resources for future work on Kuhn. It offers a generally sympathetic treatment of Kuhn, which indicates the kinds of directions in which contemporary philosophers are developing central Kuhnian themes. Indeed, if I have any reservation about the volume, it is that the essays are perhaps overly sympathetic to Kuhn. I could not help but be reminded of Kuhn's own remarks in relation to Popper that science only really gets going once critical discussion has been abandoned. To some extent, I have the impression that this volume seeks to move beyond the negative reaction which Kuhn's work once elicited by getting down to normal research within an unquestioned Kuhnian framework. Of course, this is to overstate the point somewhat, since a number of the essays raise problems for Kuhn and none of the authors endorse Kuhn's views in an entirely uncritical manner. Moreover, I have no doubt that recent Kuhn scholarship of the kind found in this volume reflects a more mature and refined understanding of Kuhn than that which lay behind some of the earlier reactions to his work. Still, I am not prepared to ignore the critical objections of an earlier generation of commentators on Kuhn. I do not mean by this to detract in any way from the quality of the individual contributions to this volume or from the fine work of its editors. But it seems to me that the inclusion of dissonant voices would have strengthened the collection and provided a more balanced treatment of Kuhn.