Introduction: Kuhn Still Matters

Yafeng Shan

Hong Kong University of Science and Technology, Hong Kong

https://orcid.org/0000-0001-7736-1822

Abstract

Despite his enormous influence on the philosophy of science, Kuhn seems to have been unfairly treated by philosophers. His work was often oversimplified, misinterpreted, and quickly dismissed. The legacy of Kuhn for contemporary philosophy of science seems to be unfortunately thin. This book revisits his legacy for the history and philosophy of science and reflects on the prospect of the Kuhnian philosophy of science. It explores Kuhnian or neo-Kuhnian approaches to central issues in twenty-first philosophy of science. It also rereads Kuhn's published and unpublished work and reassesses its philosophical significance and historical context.

Key Words

Kuhn; philosophy of science; history of science

1. Kuhn and Twentieth-First Century Philosophy of Science

Despite his enormous influence on the philosophy of science, it has been highly controversial whether Thomas Kuhn was a philosopher of science. Even if his *The Structure of Scientific Revolutions* (*SSR*) has been a must read for any introductory philosophy of science course, its nature has been persistently debated: is it a book on the history of science or philosophy of science? Kuhn seems to have been unfairly treated by philosophers. His work was often oversimplified, misinterpreted, and quickly dismissed. As some (e.g. Bird 2002; Shan 2020b) point out, the legacy of Kuhn for contemporary philosophy of science appears to be unfortunately thin. For example, of all 1321 talks presented in the biennial conferences of the International Society for the History of Philosophy of Science since 2000, there are only 18 talks about Kuhn. And there was no symposium on Kuhn in these conferences at all over the past two decades.[1]

That being said, in the past few years, there was a revival of interest in Kuhn's work. Many of his unpublished work have been edited and studied (e.g. Pinto de Oliveira 2017; Melogno 2019; 2023; Kuhn 2021; 2022). The development of Kuhn's intellectual path has also been scrutinised (e.g. Mayoral 2017; 2022; Wray 2021; Melogno 2022; Melogno and Giri 2023). Moreover, there have been attempts to explore Kuhnian or neo-Kuhnian approaches to scientific development (e.g. Ankeny and Leonelli 2016; Politi 2017; 2018; Shan 2020a; 2020b). Such a trend well confirms my contention that 'Kuhn's philosophy is not dead, and should not be dead' (Shan 2020b, 403). At least for the history and philosophy of science, Kuhn still matters.

[1] In comparison, there are 60 talks about Carnap and there are symposia dedicated to Carnap, Popper, Lakatos, and Feyerabend.

In commemoration of the 100th anniversary of the birth of Kuhn and the 60th anniversary of the publication of *SSR*, this volume reassesses his legacy for the history and philosophy of science and reflects on the prospect of the Kuhnian philosophy of science. An obvious way to explore the implications of Kuhn's work for contemporary history and philosophy of science is to develop and assess Kuhnian or neo-Kuhnian approaches to central issues. Another way of exploring and assessing the significance of Kuhn's work for twentieth-first century philosophy of science is to reread Kuhn's published and unpublished work and reexamine its philosophical significance and historical context.[2] Accordingly, the volume is divided into two parts. Part I explores what we (philosophers and historians of science) can still learn from Kuhn today. Part II focusses on how Kuhn and his work can be reread.

2. Exploring Kuhnian Legacy

Kuhn's *SSR* is often viewed as an important contribution to the shift from logical empiricism to post-empiricism in the philosophy of science of the twentieth century. However, there are alternative interpretations of the significance of *SSR*. For example, Joseph Rouse (1987) proposes that Kuhn's implicitly argues that philosophers of science ought to shift their attention from scientific knowledge to scientific practice, while Ronald Giere (1985) suggests that the significance of Kuhn's work is to initiate a naturalistic approach to the philosophy of science. In Chapter 2, Rouse revisits these two interpretations of Kuhn's legacy. He argues that both a practice turn and a naturalistic turn occurred in twentieth-first philosophy of science. Rouse carefully examines the relations of Kuhn's work to contemporary philosophy of scientific practice and naturalistic philosophy of science and concludes that the new trends, despite their Kuhnian roots, move well beyond what was anticipated by Kuhn.

Not only does it inspire and inform the practice and naturalistic turns in general philosophy of science, but Kuhn's work is also stimulating in social epistemology of science. In Chapter 3, Vincenzo Politi examines the implications of Kuhn's work for social epistemology of science. He analyses the similarities and differences between Kuhn's philosophy of science and two popular approaches to social epistemology (namely, formal methods and qualitative research methods). Politi argues that there are two important lessons that contemporary social epistemologists may learn from Kuhn: first, the interaction between different approaches to social epistemology should be encouraged; second, contemporary social epistemology should reflect on some general philosophical framework underlying their methods rather than merely focus on technical issues.

Kuhn's legacy for contemporary philosophy of science is more than a general methodological inspiration. It can also be highly suggestive in some specific issues in general philosophy of science. In Chapter 4, David Corfield explores the potential relevance of Kuhn's work to the history of mathematics. In particular, he focusses on the applicability of Kuhn's concept of scientific revolution to the development of modern mathematics. Corfield argues that revolutions in mathematics display some key features of Kuhnian revolutions in the sense that there are some transformations in the history of mathematics 'in which some part of the flux of experience sorts itself out differently and displays patterns that were not visible before' (Kuhn 2000, 17). That said, he highlights that revolutions in mathematics are slower-paced and better structured than Kuhn might allow. With two case studies, Corfield argues

[2] For a similar view, see Politi and Shan (2023).

that Michael Friedman's post-Kuhnian framework (2001) provides a better account of major transformations in the history of mathematics.

In Chapter 5, Jouni-Matti Kuukkanen scrutinises Kuhn's view on scientific progress in his Foerster lecture 'Does Knowledge Grow?' in 1976. Based by Kuhn's idea that knowledge grows, Kuukkanen develops an epistemological-functional account of scientific progress: science progresses when knowing-how accumulates in the sense that a scientific community has developed an ability to solve more problems and becomes instrumentally more able. In addition, he offers a novel distinction between knowledge-how and knowing-how: knowledge-how is an ability to do something, while knowing-how is the manifestation of this ability. Kuukkanen argues that his Kuhnian account of scientific progress is distinctive by integrating the epistemic approach (Bird 2007; 2022) and the functional approach (Shan 2019; 2022) and assuming a monistic concept of knowledge (i.e. knowledge is just knowledge-how).

In Chapter 6, Matteo De Benedetto and Michele Luchetti develop a novel neo-Kuhnian account of theory choice. They begin with an analysis of Kuhn's three important philosophical theses, namely, the plurality of worlds thesis, the no universal algorithm thesis, and the niche construction analogy. Then De Benedetto and Luchetti offer a unified reconstruction of the conceptual relationships between these theses by resorting to Kuhn's idea of a feedback loop. They argue that the dynamic interactions between scientists, epistemic values, and scientific theories capture the diachronic feature of theory choice in scientific practice.

Moreover, Kuhn's legacy can be explored in the ways which Kuhn himself did not have a chance to do or even contemplate. In Chapter 7, Donald Gillies scrutinises the role of mathematics in the Copernican revolution, which was mentioned but not sufficiently examined in Kuhn's *The Copernican Revolution*. He argues that mathematics played different roles in the two phases of the revolution. In the first phase (comprising the work of Copernicus, Tycho Brace, and Kepler), revolutionary changes in astronomy did not require substantial changes in mathematics. In the second phase (mainly resulting through the work of Galileo, Descartes, Huygens, and Newton), the new mathematics was necessary for the new mechanics. Gillies concludes that the development of co-ordinate geometry and the calculus constituted a revolution in mathematics, which was part of the Copernican revolution.

In Chapter 8, M. A. Mujeeb Khan takes the concept of normal science as a useful heuristic to study the development of medicine in the non-Western world. In particular, he argues that normal science serves as a powerful tool to facilitate interpretive nuance in the examination of premodern, non-Western traditions in science and medicine by allowing for a careful analysis of local contexts and the exploration of larger sociocultural contexts without being compromised as the case in linear narratives of tradition. Khan maintains that such an examination will ultimately contribute to a reevaluation of how science is conceptualised.

3. Rereading Kuhn

SSR is an obvious starting point for anyone who is going to reread Kuhn. In Chapter 9, Alexander Bird critically examines the three interpretations of Kuhn's philosophy of science as it is found in *SSR*: the Kantian interpretation, the Wittgensteinian interpretation, and the

naturalistic interpretation. He argues for the naturalistic interpretation. Bird maintains that it not only provides a richer and more inclusive account of the cognitive changes involved in a scientific revolution, but also can be reconciled with the Kantian interpretation by underpinning and extending the idea of a phenomenal world.

Clearly, rereading Kuhn does not only mean a rereading of Kuhn's work, but also it can be done by revisit the significance of Kuhn's work in the history of philosophy. In Chapter 10, Vasso Kindi analyses the reception of Kuhn's work among mainstream analytic philosophers. She shows that despite its profound impact on different disciplines, Kuhn's work was brushed off or largely overlooked by analytic philosophers. Kindi also shows that Kuhn's work nevertheless made a significance impact on various philosophical issues. Finally, she provides an explanation of the neglect of Kuhn's work among philosophers: philosophers misunderstood and failed to appreciate the revolutionary character of Kuhn's work.

In addition, a careful re-interpretation of some Kuhn's concepts and arguments can be fruitful. In Chapter 11, Paulo Pirozelli examines Kuhn's account of kind concepts. He suggests that Kuhn distinguishes two types of kind concept: taxonomic type of kinds and singletons type of kinds. The former refers to those kind concepts which are acquired through ostension and organised into hierarchical structures, while the latter the ones which are learned through law-like generalisations. Pirozelli critically assesses these two types of kind concept and argues that Kuhn's account of kind concepts is shaped by some mistaken assumptions derived from his extensionalist approach to meaning. Based on inferentialism (Brandom 1994; 2021), he proposes an alternative account of kind concepts, which maintains that the meaning of a kind concept is determined by its inferential role in language. Pirozelli argues that this inferentialist account can be applied to make sense of key themes of Kuhn's philosophy.

In Chapter 12, Francesco Nappo discusses the role of analogy in scientific revolutions. Illustrated by a case study of J. Clark Maxwell's work on electromagnetism, he argues that many analogies have given rise to new exemplars in a scientific revolution. Nappo further argues that the success of new exemplars possessing an analogical origin suggests that they are comparable with old ones. He concludes that this poses a serious challenge to Kuhn's incommensurability thesis.

In Chapter 13, Hanne Andersen revisits Kuhn's arguments concerning the role of convergent and divergent thought in science education. She argues that Kuhn's emphasis on convergent thought resonates well with both empirical and theoretical work in education, cognitive science, and philosophy. However, Andersen also indicates that Kuhn's analysis of science education, especially of divergent thought, is sketchy, intuitive, and somehow undermined by recent empirical studies. She argues that Kuhn's analysis was rooted in a particular historical context and current science education requires both convergent and divergent thought in a more balanced way.

In Chapter 14, Daniele Cozzoli reexamines the Kuhn-Popper debate by focussing on its political dimension. He argues that different post-war cultural climates in the USA and Europe (especially the UK) nurtured different approaches to the philosophy of science. Cozzoli concludes that some crucial differences between Kuhn and Popper (and his associates, such as Lakatos) can be better understood within in this particular historical context.

Last but not least, the study of Kuhn's unpublished work is another promising way to shed new light on the Kuhn scholarship. In Chapter 15, Juan V. Mayoral offers a detailed analysis of Kuhn's Foerster Lecture, which was unpublished before. He also makes a historical introduction to the context of the lecture and a summary of Kuhn's intellectual path. Moreover, Mayoral provides his edited transcription of the text of the lecture (see Appendix).

4. Prospects

As we can see from the chapters of this volume, the focus of the Kuhn scholarship has been gradually shifting from the analysis, interpretation, and reconstruction of Kuhn's ideas in *SSR* (e.g. incommensurability) to the examination of Kuhn's unpublished work and the exploration and development of new approaches inspired by Kuhn's work. In particular, new directions in the Kuhn scholarship have been explored and motivated with the recent archival work on Kuhn's unpublished manuscripts. Yet there is still much more to do.

References

Ankeny, Rachel A., and Sabina Leonelli. 2016. 'Repertoires: A Post-Kuhnian Perspective on Scientific Change and Collaborative Research'. *Studies in History and Philosophy of Science Part A* 60: 18–28.

Bird, Alexander. 2002. 'Kuhn's Wrong Turning'. *Studies in History and Philosophy of Science* 33 (3): 443–63.

———. 2007. 'What Is Scientific Progress?' *Noûs* 41 (1): 64–89. https://doi.org/10.1111/j.1468-0068.2007.00638.x.

———. 2022. 'The Epistemic Approach: Scientific Progress as the Accumulation of Knowledge'. In *New Philosophical Perspectives on Scientific Progress*, edited by Yafeng Shan, 13–26. New York and London: Routledge.

Brandom, Robert. 1994. *Making It Explicit: Reasoning, Representing, and Discursive Commitment*. Cambridge, MA: Harvard University Press.

———. 2021. *Articulating Reasons*. Cambridge, MA: Harvard University Press.

Friedman, Michael. 2001. *Dynamics of Reason*. Chicago and London: The University of Chicago Press.

Giere, Ronald N. 1985. 'Philosophy of Science Naturalized'. *Philosophy of Science* 52: 331–56.

Kuhn, Thomas Samuel. 2000. 'What Are Scientific Revolutions?' In *The Road since Structure*, edited by James Conant and John Haugeland. Chicago and London: The University of Chicago Press.

———. 2021. *The Quest for Physical Theory: Problems in the Methodology of Scientific Research*. Edited by George A. Reisch. Boston, MA: The MIT Libraries.

———. 2022. *The Last Writings of Thomas S. Kuhn*. Edited by Bojana Mladenovic. Chicago and London: University of Chicago Press.

Mayoral, Juan Vicente. 2017. *Thomas S. Kuhn: La Búsqueda de La Estructura*. Zaragoza: Prensas de la Universidad de Zaragoza.

———. 2022. 'Kuhn's Reconstruction of Structure: The Theoretical Background'. In *Perspectives on Kuhn: Contemporary Approaches to the Philosophy of Thomas Kuhn*, edited by Pablo Melogno, Hernán Miguel, and Leandro Giri, 53–81. Cham: Springer.

Melogno, Pablo. 2019. 'The Discovery-Justification Distinction and the New Historiography of Science: On Thomas Kuhn's Thalheimer Lectures'. *HOPOS: The Journal of the International Society for the History of Philosophy of Science* 9 (1): 152–78.

———. 2022. 'From Externalism to Internalism: The Historiographical Development of Thomas Kuhn'. *Foundations of Science* 27: 371–85.

———. 2023. 'Kuhn's "The Natures of Conceptual Change": The Search for a Theory of Meaning and the Birth of Taxonomies (1980–1994)'. *International Stuides in the Philosophy of Science* 36(2): 87–103.

Melogno, Pablo, and Leandro Giri. 2023. 'Towards a Genealogy of Thomas Kuhn's Semantics'. *Perspectives on Science* 31(4): 385–404.

Pinto de Oliveira, J. C. 2017. 'Thomas Kuhn, the Image of Science and the Image of Art: The First Manuscript of Structure'. *Perspectives on Science* 25 (6): 746–65.

Politi, Vincenzo. 2017. 'Specialisation, Interdisciplinarity, and Incommensurability'. *International Studies in the Philosophy of Science* 31 (3): 301–17.

———. 2018. 'Scientific Revolutions, Specialization and the Discovery of the Structure of DNA: Toward a New Picture of the Development of the Sciences'. *Synthese* 195: 2267–93.

Politi, Vincenzo, and Yafeng Shan. 2023. 'Beyond Structure: New Frontiers of the Philosophy of Thomas Kuhn'. *International Studies in the Philosophy of Science* 36 (2): 81–86. https://doi.org/10.1080/02698595.2023.2264158.

Rouse, Joseph. 1987. *Knowledge and Power*. Ithaca, NY: Cornell University Press.

Shan, Yafeng. 2019. 'A New Functional Approach to Scientific Progress'. *Philosophy of Science* 86 (4): 739–58. https://doi.org/10.1086/704980.

———. 2020a. *Doing Integrated History and Philosophy of Science: A Case Study of the Origin of Genetics*. 1st ed. Boston Studies in the Philosophy and History of Science. Cham: Springer. https://doi.org/10.1007/978-3-030-50617-9.

———. 2020b. 'Kuhn's "Wrong Turning" and Legacy Today'. *Synthese* 197 (1): 381–406. https://doi.org/10.1007/s11229-018-1740-9.

———. 2022. 'The Functional Approach: Scientific Progress as Increased Usefulness'. In *New Philosophical Perspectives on Scientific Progress*, edited by Yafeng Shan, 46–61. New York: Routledge. https://doi.org/10.4324/9781003165859-5.

Wray, K. Brad. 2021. *Kuhn's Intellectual Path*. Cambridge: Cambridge University Press.