

Introduction
The Road Ahead in Kuhn Scholarship
K. Brad Wray

One might wonder if there is anything new to say about Thomas Kuhn and his views on science. Scholarship on Kuhn, though, has changed dramatically in the last twenty years. This is so for a number of reasons. Let me briefly mention three of them.

First, scholars studying Kuhn and his views are no longer focusing narrowly on Kuhn's *Structure of Scientific Revolutions* (SSR). Though this is undoubtedly Kuhn's most influential and most-read contribution to scholarship, it was not his final word on the topics discussed in the book. Scholars have been giving careful consideration to the papers in *The Road since Structure* (RSS), a collection of papers by Kuhn, written between the 1970s and the 1990s, published in 2000, four years after he died. These papers constitute Kuhn's final position on the philosophical topics about which he wrote, at least until his final unfinished book manuscript, *The Plurality of Worlds* (PW), is published. Already in the 1970s Kuhn was complaining that philosophers were still only addressing SSR. He was dismayed that scholars failed to account for what he had written since 1962. In many publications where Kuhn's work is discussed, especially those directed at a more general audience, the focus still tends to be exclusively on SSR (see, e.g., Morris 2018). Now, though, it is common to discuss Kuhn's mature views, at least among more serious scholars. The papers published in RSS provide clarification of Kuhn's earlier account, as well as modifications in his thinking, thus allowing us to develop a more historically sensitive account of Kuhn's views.

Second, many scholars, including a number of contributors to this volume, have been drawing on the vast unpublished resources at the Thomas S. Kuhn Archives, in the Special Collections Library at the Massachusetts Institute of Technology (TSK Archives-MC240). The twenty-six or so boxes Kuhn left to MIT upon his retirement include draft presentations, lecture notes from courses he gave throughout his career, correspondence with scholarly colleagues, fan mail, early

notebooks, and much more (see Wray 2018b). Indeed, there is now an active informal network among those who have conducted research at MIT, where notes are shared, and attention is drawn to hitherto neglected documents that have helped us develop a richer and more complete picture of Thomas Kuhn, the person and scholar. George Reisch and Paul Hoyningen-Huene, in particular, have been especially important in bringing these resources to light (see, e.g., Hoyningen-Huene 2015; Reisch 2016; also Reisch 2019a).

Third, with the fiftieth anniversary of the publication of SSR in 2012, there were quite a number of conferences held. This led to the publication of a number of volumes reflecting on Kuhn's impact in philosophy and history of science (see, e.g., Blum, Gavroglu, Joas, and Renn 2016; Devlin and Bokulich 2015; Kindi and Arabatzis 2012; and Richards and Daston 2016). These volumes included contributions from both leaders in the field who had worked or studied with Kuhn (see, e.g., Heilbron 2016), as well as those who worked in the years when Kuhn's influence was ubiquitous and at its peak (see, e.g., Bloor 2016).

These three developments have contributed significantly to our collective understanding of Kuhn and his theories of scientific change and scientific knowledge.

Kuhn's position in the philosophy of science can be difficult to gauge at times. For every enthusiastic scholar who appreciates the insight Kuhn provides, there is another who insists that he had an adverse effect on our understanding of science and that his impact is exaggerated. But by objective measures, Kuhn's impact is undeniable. In an extensive bibliometric study, Wray and Bornmann found that Kuhn was responsible for two of the seven citation peaks in philosophy of science between 1900 and 1970. Wray and Bornmann examined a huge data set of citations in key philosophy of science journals in an effort to identify citation peaks, the years in which highly cited sources in philosophy of science were published. One peak occurred in 1962, the year when SSR was first published, and another occurred in 1970, the year the second edition with its Postscript (SSR-2) was published (see Wray and Bornmann 2015). In fact, normalizing the citation curve for the whole period, SSR is responsible for the two highest citation peaks in the period from 1900 to 1970. Importantly, Wray and Bornmann limited their search of citations to key journals in the philosophy of science: *Erkenntnis*, *Philosophy of Science*, *British Journal for the Philosophy of Science*, and *Studies in History and Philosophy of Science*. So these peaks are not a consequence of the vast number of citations that Kuhn's SSR receives from scholars in other fields.

Kuhn's influence outside of philosophy of science is also astounding, especially in the social sciences. In 2016, Elliott Green reported that Kuhn's book *SSR* was the most-cited book in the social sciences (see Green 2016), even more cited than Michel Foucault's *Discipline and Punish*, and *The History of Sexuality*, and Karl Marx's *Das Kapital*. Eugene Garfield found that Kuhn was the forty-fourth most-cited author in the *Arts and Humanities Citation Index* for 1977 and 1978 (see Garfield 1979–80, 240). In a more recent study of most-cited authors of books in the humanities, looking at citations from 2007, Kuhn ranked thirty-fifth (see THE 2009). So it is beyond dispute that Kuhn has had a profound and wide-ranging impact on scholarship.

A title like *Interpreting Kuhn* invites a wide range of responses. In fact, the contributors to this volume have explored a range of aspects of Kuhn's philosophy of science. The various contributions are collected into three parts. Part I is concerned with foundational issues in Kuhn scholarship. The essays in this part explore Kuhn's fundamental assumptions, his metaphysical assumptions, and his relationship to Kant, as well as influences on Kuhn, both conceptual and contextual. Part II is focused on key Kuhnian concepts. Much of the appeal of *SSR* was due to the engaging concepts and metaphors that Kuhn developed and employed in his analyses. Some of them, for example, incommensurability, have given rise to lively scholarly debates and a vast body of scholarly literature. Others, like normal science and scientific revolutions, have become central terms in our understanding of science, even if there is still no consensus on what these terms denote. Part III contains essays exploring various themes that run through Kuhn's work. This part includes reflections on the Copernican Revolution in astronomy since the publication of Kuhn's *The Copernican Revolution: Planetary Astronomy in the Development of Western Thought* (CR), as well as reflections on the nature of scientific discovery and the theory-ladenness of scientific observation. There are also essays on the evolutionary dimensions in Kuhn's philosophy, as well as theoretical monism, themes that rose out of Kuhn's work in philosophy of science.

I want to highlight some of the specific themes discussed in the various contributions.

Part I is devoted to foundational issues. Paul Hoyningen-Huene analyzes the metaphysics underlying Kuhn's view. Hoyningen-Huene argues that Kuhn's work should be understood as part of a larger project, extending at least as far back as Copernicus, and developed further by Kant, which aims to emphasize the subject-sided contributions to our understanding of the world. In a related vein, Lydia Patton explores Kantian themes in

Kuhn's work. She argues that though both Kuhn and Kant were concerned with the question of the status of science, scientific communities figure centrally in Kuhn's analysis, but not Kant's analysis. George Reisch examines Kuhn's relationship to both James B. Conant, his mentor at Harvard, and the Cold War culture in America. J. C. Pinto de Oliveira examines the influence of art on Kuhn's thinking when he was writing SSR. As he shows, earlier manuscript versions of *Structure* contained comparisons between art and science, many of which were not retained in the final manuscript.

Part II is concerned with key Kuhnian concepts: normal science, incommensurability, and scientific revolutions. William Goodwin provides a much-needed comprehensive analysis of normal science, that is, the process Kuhn described as mopping-up. Normal science has tended to be in the shadow of the far more exciting concept, scientific revolution, despite the fact that Kuhn believed that most scientists, most of the time, are engaged in normal science. William Devlin provides a useful analysis of incommensurability, a concept that turns out to be multifaceted, though not quite as multifaceted as the paradigm concept. Devlin argues that all forms of incommensurability that figure in Kuhn's work are incompatible with the correspondence theory of truth. And Eric Scerri provides an analysis of the notion of a Kuhnian revolution, through a detailed examination of an episode in the history of chemistry, when chemists came to classify chemical elements by their atomic number, rather than their atomic weight. Scerri considers the extent to which this change in chemistry constitutes a revolution in the sense articulated in SSR and in the sense articulated in Kuhn's later works, where Kuhn invokes the notion of a lexical change.

One might wonder why there is no contribution in this volume dedicated to the paradigm concept. The paradigm concept has been written about and analyzed extensively, and Kuhn distanced himself from the concept in the early to mid-1970s (see Wray 2011, chapter 3). Thereafter, Kuhn would refer to the concrete scientific achievements that set a scientific field on the developmental cycle, which he describes in SSR, as exemplars. And exemplars were distinguished from both (i) theories and (ii) disciplinary matrices, two notions that he indiscriminately referred to in SSR as paradigms as well. Kuhn acknowledged that he overused the term "paradigm." In the 1970s, when he published *Essential Tension* (ET), he remarked that "challenged to explain the absence of an index, I regularly point out that its most frequently consulted entry would be: 'paradigm, 1-172, passim'" (294). Although Kuhn came to regret his rather undisciplined use of paradigm, he retained a sense of humor about it. When he was

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asked about how he came up with the term in an interview in the 1990s, he remarked that “*paradigm* was a perfectly good word, until I messed it up” (see RSS, 298). Still, the paradigm concept is discussed in a number of the contributions to this volume.

Part III is devoted to Kuhnian themes and explorations of Kuhn’s relevance to contemporary scholarship. Peter Barker provides a provocative analysis of the Copernican Revolution in light of the decades of scholarship since the publication of Kuhn’s first book, *CR*. He also reconsiders the notion of a Copernican Revolution in astronomy. Vasso Kindi examines the relationship between theory-ladenness and perception in Kuhn’s work, tracing the significance of Gestalt psychology to Kuhn’s thinking about science. In particular, Kindi emphasizes the importance of the duck-rabbit figure to Kuhn in his efforts to explicate the notion of a scientific revolution. Tom Nickles provides an analysis of the logic and structure of discovery in science, a theme that was quite important to Kuhn. Nickles draws attention to a tension in Kuhn’s work. In making discovery a normal part of normal science, he seems to leave unexplained the origins of the sorts of radical discoveries that cause revolutionary changes of theory. Jouni-Matti Kuukkanen examines the role of truth in Kuhn’s account of science, with special attention to its relationship to the evolutionary dimensions in Kuhn’s writings. Returning to a theme discussed by Devlin, Kuukkanen argues that Kuhn’s account of science can be adequately served by a pragmatic notion of truth. Finally, K. Brad Wray examines the apparent threat posed to Kuhn’s theoretical monism by recent developments in philosophy of science that emphasize the value and role of pluralism. Special attention is given to Hasok Chang’s influential work on pluralism.

These essays will provide valuable insights into Kuhn’s views and should prove useful not only to scholars in philosophy, but in other fields as well.