KUHN'S CONTROVERSIAL LEGACY

VASSO KINDI

Abstract. In the paper I will, first, address certain apparent tensions in relation to Kuhn's legacy in the history of science. Kuhn was a historian before he became a philosopher of science. He had done and published historical work, he only had history graduate students, he imbued philosophy of science with historical considerations. And, yet, his widely acknowledged influence on the history of science came mostly through his philosophical work which is, nevertheless, brushed off by historians of science as making dated overarching and generalizing claims when their own attention has been increasingly focusing on the local and the particular. Secondly, I will discuss how Kuhn used history, the facts of the past, in his historical philosophy of science and will present a reading that takes his model of science as a Wittgensteinian object of comparison. Lastly, I will argue that Kuhn's philosophical work impacted developments in the historiography of science and the corresponding discipline.

Keywords: historiography of science; historical philosophy of science; paradigm; paradigm shift; controversial legacy.

Thomas S. Kuhn is known worldwide and several of the concepts he introduced in the small field of philosophy of science, e.g., "paradigm", or "paradigm shift", have acquired a ubiquitous use. Why, then, do I call Kuhn's legacy controversial? Because, despite his huge impact on various academic fields, and even on general culture, despite this undeniable influence, his work (with notable exceptions) has not been, for a long time, seriously studied or appreciated. This may be due to the fact that Kuhn's work has been severely criticized ever since *The Structure of Scientific Revolution* was published in 1962. Historians of science reject him, philosophers snub him, and science studies people overshoot him. He is an outcast. As a result, his vast influence has often not been credited to him and time and again passes unacknowledged.

One of the issues in the controversy concerns the status of Kuhn's *Structure*. Kuhn intended it as a philosophical book, but it was mostly received by philosophers as historiographical and by historians as philosophical. The philosopher

Vasso Kindi ✉
National and Kapodistrian University of Athens

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Michael Friedman, in his *Dynamics of Reason* for instance, speaks of "Kuhnian historiography" in relation to *Structure*, and calls Thomas Kuhn's "theory of the nature and character of scientific revolutions" "our best current historiography of science"[1]. Alexander Bird in his book *Thomas Kuhn* says that "Kuhn's *The Structure of Scientific Revolutions* is not primarily a philosophical text. Rather it is a work in what I call 'theoretical history'."[2] Jan Golinski thinks that Kuhn sketches "a very large-scale narrative of the development of science", which involves "a scheme of historical periodization"[3], Melogno and Courtoisie interpret Kuhn as engaging in "structural historiography"[4], while Gordon Graham compares Kuhn's approach to science to "philosophical history in the Hegelian style"[5]. If the philosophers of science thought that *Structure* was a historiographical work, the historians of science feared that the book was philosophical in that it imposed a rational order on historical events[6].

Another controversy concerns the so-called historical philosophy of science which, supposedly, Kuhn helped inaugurate, given that he combined in his work historical and philosophical considerations. Hence, the ensuing debates about the marriage of history and philosophy of science, or the efforts to forge an integrated history and philosophy of science. Kuhn himself, however, wanted the two disciplines, history and philosophy, to be kept apart. He said that he has "resisted attempts to amalgamate history and philosophy of science"[7], and that he is never a philosopher and a historian at the same time[8]. He even claimed that his model of science could be derived from first principles[9].

[1] M. Friedman, *Dynamics of Reason*, Stanford, CSLI Publications, 2001, p. 47.

[2] A. Bird, *Thomas Kuhn*, Chesham Bucks, Acumen, 2000, p. VIII.

[3] J. Golinski, "Thomas Kuhn and Interdisciplinary Conversation: Why Historians and Philosophers of Science Stopped Talking to One Another", in *Integrating Histpry and Philosophy. Problems and Prospects*, S. Mauskopf, T. Schmaltz (eds.), Dordrecht, Springer, 2012, pp. 13–28, p. 21.

[4] P. Melogno, A. Courtoisie, "Stepping into the 60s:Tomas Kuhn's intellectual turn towards the Philosophy of Science", in *Daimon. Revista Internacional de Filosofía*, 76, 2019, pp. 23–33.

[5] G. Graham, *The Shape of the Past*, Oxford, Oxford University Press, 1997, pp. 32–33, p. 127.

[6] T. Arabatzis ("The Structure of Scientific Revolutions and History and Philosophy of Science in Historical Perspective", in *Shifting Paradigms: Thomas S. Kuhn and the History of Science*, A. Blum, K. Gavroglu, Ch. Joas, J. Renn (eds.), 2016, pp. 191–201, p. 196. Edition Open Access, Max Planck Institute for the History of Science http://edition-open-access.de/proceedings/8/) also speaks of philosophical history and discusses the reservations historians of science had against Kuhn's "grand narrative". Cf. L. Daston, "History of Science without Structure", in *Kuhn's Structure of Scientific Revolutions at Fifty*, R. J. Richards, L. Daston (eds.), Chicago, University of Chicago Press, 2016, pp. 115–132, p. 117.

[7] T.S. Kuhn, "The Halt and the Blind: Philosophy and History of Science", in *British Journal of the Philosophy of Science*, 31, 1980, pp. 181–192, p. 183.

[8] T.S. Kuhn, *The Road since Structure*, J. Conant, J. Haugeland (eds), Chicago, University of Chicago Press, 2000 (abbreviated as RSS), p. 316.

[9] *Ibid*., p. 95. For a discussion of this issue, see V. Kindi, "The Relation of History of Science to Philosophy of Science", in *The Structure of Scientific Revolutions and Kuhn's Later Philosophical Work. Perspectives on Science*, 13: 4, 2005, pp. 495–530.

SSR has been found to be vague, inconsistent, incoherent, philosophically naïve, inaccurate, sloppy, not technical enough. It has been criticized for promoting irrationalism, for endorsing relativism, and for corroding the authority of science. Its concepts were thought to be unclear and polysemous and its argumentation loose. Kuhn himself was adulated as a revolutionary and castigated as a conservative. William Newton-Smith, on the other hand, thought he was a social-democrat. Feyerabend[10] called Kuhn a mystic, an irrationalist, and a witch doctor[11]. Gellner[12] said he was a timid conformist, but Searle[13] noted that he was considered to be a destroyer of reason and a subverter of the Western rationalist tradition. Recently Kuhn has been accused of killing truth[14] and for helping elect Donald Trump President of United States in 2016[15]. Notwithstanding the above and similar criticism, and the vast secondary literature it appeared in, Kuhn's work has not been carefully studied. Most of his critics were content to make do with a stereotype of Kuhn's model that had been formed from early on, since *Structure*'s publication, a stereotype that vindicated their objections. No wonder that Kuhn was complaining that his work was being misunderstood. Ian Hacking, however, thought that "Kuhn is too well known to need discussion"[16]. And Steve Fuller believed that "the book itself does not encourage deep reading"[17].

Yet, despite these disparaging characterizations and comments, *Structure* has decisively influenced a wide array of fields. In what follows, I will give a brief presentation of Kuhn's controversial legacy in fields such as history of science, philosophy of science, philosophy, science and feminist studies. In conclusion, I will argue that the controversial reception of Kuhn's work is the result of the revolution he brought about in science studies in general. Just like the revolutions that he described in science, his revolution in the philosophy of science reorganized various adjacent fields and gave rise to problems of communication and evaluation.

[10] P. Feyerabend, *Against Method*, 3rd ed., London, Verso, 1993, pp. 367–368.

[11] *Ibid*., p. 368.

[12] E. Gellner, "The Paradox in Paradigms", in *Review of Barry Barnes' T. S. Kuhn and Social Science. Times Literary Supplement*, 4125, 23 April 1982, pp. 451–452, p. 451.

[13] J.R. Searle, "Rationality and Realism, What Is at Stake?", in *Daedalus*, 122:4, 1993, pp. 55–83.

[14] D. Kordahl, "Did Thomas Kuhn Kill Truth?", in *The New Atlantis*, Spring 2018. https://www.thenewatlantis.com/publications/did-thomas-kuhn-kill-truth (Accessed Aug. 02, 2023).

[15] J. Horgan, "Did Thomas Kuhn Help Elect Donald Trump? Filmmaker Errol Morris Claims Kuhn's Critique of Science Paved the Way for a Post-Truth Presidency.", in *Scientific American* (5/25/2017). https://blogs.scientificamerican.com/cross-check/did-thomas-kuhn-help-elect-donald-trump/ (Accessed Aug. 02, 2023).

[16] I. Hacking, "Two Kinds of 'New Historicism' for Philosophers", in *New Literary History*, 21:2, 1990, pp. 343–364, p. 355.

[17] S. Fuller, *Thomas Kuhn. A Philosophical History for Our Times.*, Chicago, University of Chicago Press, 2000, p. 31.

IMPACT ON THE HISTORY OF SCIENCE

Kuhn's work has had a transformative effect on the historiography of science, but the historians in the field, who acknowledge his impact, claim that their discipline was transformed by moving away from Kuhn. So, they distance themselves from his legacy. As historians, they concentrate on particulars and they criticize Kuhn of imposing a general, one-fit-all model of scientific development and practice. But it was precisely Kuhn who drew attention to the fact that historians used to operate under the auspices of a general philosophical idea about science according to which science progresses cumulatively with scientists employing the presumed scientific method which involves the empirical testing of hypotheses. Kuhn challenged this homogenizing idea by laying emphasis on the differences that ensue from the different paradigms that are supposed, according to his model, to govern scientific practice. He, thus, liberated historians from the aforementioned philosophical burden. He did not substitute a new general philosophical model for the old one since his model was not intended as a prototype to be followed by all. In my view, Kuhn's model was meant as an object of comparison, in the way Wittgenstein understood the term, i.e., as a schema, or as a lens that is supposed to highlight diversity and, as such, it tallies with the historians' interest in particular historical episodes. Relatedly, Kuhn's suggestion that paradigms, in the sense of exemplars, rather than rules are responsible for the cohesion of scientific communities, encouraged research at the local level and interest in case studies and microhistories. Rules are supposed to be quite general, governing any practice that aspires to be scientific. Exemplars, on the other hand, are concrete, give rise to local practices that may concern very small communities.

In the so-called "received view of theories", science was understood as scientific knowledge, and more particularly, as scientific theories which were taken to be sets of statements. Accordingly, history of science concentrated on the history of scientific knowledge, i.e., internal history, as the only legitimate one, as opposed to external history which dealt with social, economic, political and broadly historical conditions. Although Kuhn tried to keep science insulated from external determinations and influences, he challenged the internal-external distinction by making hitherto external factors an integral part of science proper. For instance, he gave values and the scientists' preferences a crucial role in scientific development. The demise of the internal-external distinction, drew attention from science as logical construct and intellectual product, to science as practice. This new perspective on science led to studies of experiment, material culture, academic communities, institutions, education, professional societies, and scientific communication. Relatedly, rhetoric was considered again a fair topic of research while negotiations and controversies were legitimized as areas of study by Kuhn's showing that the choice of theories does not depend solely on logic and empirical evidence but also on means of persuasion. Rationality was not anymore confined to an algorithmic or to a mechanical application of rules.

The difficulties of communication, because of incommensurability, made translation studies relevant to science. Historians of science began to review communication not only between academics of the same discipline, but also across disciplines (since scientific development involves new divisions and the restructuring of fields) and across different kinds of communities. "Trading zones" and "contact zones", as well as knowledge dissemination and appropriation on a global scale, became areas of interest. This broadened perspective revisited disciplinary boundaries and questioned science's privileged status. Art, craft, technology, engineering, data science, theology, law, literature, humanities in general, all fell under the history of science's purview with borders blurred or even lifted.

The understanding of science as a practice, brought to the fore, not only the role of the scientific community, but also the role of the individual scientists. Biographies became once again of interest to historians of science, but not in the spirit of celebrating scientific genius. Rather, the interest this time lays in the micro-history of the particular cases and the contingency of events. Scientific development is not anymore seen as the inexorable progress towards the ultimate truth about the world, carried out my great individuals, most certainly men, but as the contingent outcome of historical circumstances and historical agency. Kuhn's work has contributed to this by arguing against the idea that science converges on some "full, objective, true account of nature"[18].

Kuhn's emphasis on incommensurability has contributed to two more developments in the history of science. First, to the interest in pursuing the history of concepts, since concepts, from the Kuhnian perspective, change in the course of time. They acquire a life in their journey through the various contexts of their use, and historians of science have taken up the task to recount it[19]. The second development in the field of the history of science that is connected to Kuhn's work is the denunciation of anachronism in historiography. If there are serious conceptual differences between historical periods, it would be distorting to use contemporary language to talk about the past. Ever since *Structure*, anachronism has become the primordial sin for historians and itself a research topic[20].

Historians of science celebrate all these developments, but very rarely do they credit Kuhn for paving the way that would make them possible[21].

[18] T.S. Kuhn, *The Structure of Scientific Revolutions*, 4th edition, Chicago, University of Chicago Press, 2012, p. 170 (abbreviated as SSR).

[19] See, for instance, T. Arabatzis, *Representing Electrons: A Biographical Approach to Theoretical Entities*, Chicago, University of Chicago Press, 2006.

[20] See, for instance, H. Chang, "Presentist History for Pluralist Science", in *Journal for General Philosophy of Science*, 52, 2021, pp. 97–114.

[21] For more on Kuhn's influence on the history of science, see V. Kindi (forthcoming 1) "Kuhn and the History of Science", in *Kuhn's The Structure of Scientific Revolutions at 60*, K. Brad Wray (ed.), Cambridge, Cambridge University Press.

IMPACT ON PHILOSOPHY OF SCIENCE

For about two decades after the publication of *Structure*, Kuhn's work, even if a target of criticism, had set several items on the agenda of philosophy of science, namely, revolutions and discontinuous progress, incommensurability and conceptual change, rationality and theory choice, relativism, and constructivism. Eventually, the interest subsided and philosophy of science moved away from Kuhn who is hardly ever mentioned in what has become the mainstream of the discipline. And yet, developments in philosophy of science owe much to what Kuhn's work brought to the field. Importantly, the turn to metaphysical issues, and more particularly to realism, can be seen as a response to the alleged idealist threat *The Structure of Scientific Revolutions* posed because of the theory ladenness of observation and paradigms governing research. Two realists in the 1980s, Richard Boyd and G.A. Hooker, whose work was influential in advancing the cause of realism in philosophy of science, have explicitly acknowledged the relation. Richard Boyd, in his 2002 entry on "Scientific Realism" in the *Stanford Encyclopedia of Philosophy* explicitly says that it would be "approximately historically correct to see the development of scientific realism as a response to [among others] the Neo-Kantian challenge… raised by Hanson (1958) and Kuhn (1970)"[22]. G.A. Hooker, on his part, in his book *A Realistic Theory of Science*, says that he wrote that essay "with this new approach [Feyerabend and Kuhn's] explicitly in mind".[23] Hooker aimed to both criticize and supplement this new approach. He believed that his naturalistic realism offered "the proper context from which to view the pronouncements of Feyerabend, Kuhn, and the like, the proper framework to reconstruct what seems insanely radical so that it makes perfectly sound sense"[24].

Kuhn also contributed indirectly to the rise of scientific realism. He was, justly or unjustly, credited to a large extent with the collapse of logical empiricism, and scientific realism was proposed as an alternative that would take its place since it would be free of empiricism's shortcomings.

The concept of incommensurability has influenced developments not only in the history of science, as we have seen, but also in philosophy of science. Kuhn's view that there are shifts of meaning across theories and historical periods that may result in different references of terms has motivated the effort to find ways to account for the stability of reference despite meaning change. The most prominent of these efforts has been the so-called "causal theory of reference" according to which the reference of scientific terms remains fixed, through our causal interaction

[22] R. Boyd, "Scientific Realism," in *Stanford Encyclopedia of Philosophy Archive*, Edward N. Zalta (ed.), 2002, URL = https://stanford.library.sydney.edu.au/archives/fall2008/entries/scientific-realism/. The references in the passage quoted are to N.R. Hanson's *Patterns of Discovery*, published in 1958 and to the second edition of T. S. Kuhn's *The Structure of Scientific Revolutions*, published in 1970.

[23] G.A. Hooker, *A Realistic Theory of Science*, Albany, SUNY, 1987, p. 10.

[24] *Ibid*., p. 107.

with the world, even though our beliefs about a particular reference may change with theories. The philosophers responsible for this theory are Saul Kripke and Hilary Putnam. Kripke wrote on proper names, and Putnam extended the theory to natural kind terms, found most often in science. Kripke was motivated in this topic by his interest in questions of modal logic, but Putnam was responding, to a large extent, to developments in the philosophy of science in the 1960s and 1970s, i.e., developments that were related to the threats of relativism and idealism that allegedly Kuhn's work posed. Several commentators have noted this fact. Theodore Arabatzis and I[25] have written on the causal theory of reference as meeting the historicist challenge while Helen Beebee and Nigel Sabbarton-Leary noted that Putnam's prime concern was to "defeat Kuhnian relativism" and "ward off the threat of Kuhnian incommensurability"[26].

Finally, another area in philosophy of science that owes its burgeoning to Kuhn's groundbreaking work is the ethics of science. The presence of values in the disciplinary matrix[27] and the emphasis Kuhn laid on the community of scientists, opened the way to the study of the ethics of science. Up until then, the absolute fact-value distinction and the presumption that science deals strictly with facts, precluded any discussion of value in relation to science[28]. What is more, the logical positivists used to argue that ethics is nonsensical. Ethical sentences were supposed to have only non-cognitive, emotive meaning. So, they were shunned from any philosophical consideration that pertained to science for the additional reason that science was always viewed as pure knowledge, unsullied by pragmatic, moral or, in general, non-cognitive concerns. Max Weber, for instance, has said that "to mix up prescriptive demands with scientific questions is the work of the Devil"[29], while Henri Poincaré stated that:

> Ethics and science have their own domains, which touch but do not interpenetrate. The one shows us to what goal we should aspire, the other, given the goal, teaches us how to attain it. So, they never conflict since they

[25] T. Arabatzis, V. Kindi, "The Problem of Conceptual Change in the Philosophy and History of Science", in *Handbook of Research on Conceptual Change*, Stella Vosniadou (ed.), London, Routledge, 2008/2013, pp. 345–373.

[26] H. Beebee, N. Sabbarton-Leary (eds.), *The Semantics and Metaphysics of Natural Kinds*, New York, Routledge, 2010, p. 13.

[27] Kuhn, in his "Postscript" to *The Structure of Scientific Revolutions*, first published in the second edition of the book in 1970, and then in all subsequent editions, tried to disambiguate the concept of *paradigm* and distinguished between *exemplar*, a concrete particular that functions as model, and *disciplinary matrix*, a framework that comprises different elements, such as metaphysical presuppositions, symbolic generalizations, experimental devices, etc., including values and exemplars.

[28] Cf. Robert Proctor, *Value-Free Science? Purity and Power in Modern Knowledge*, Cambridge, Harvard University Press, 1991.

[29] M. Weber, "Association of Social Policy, Vienna, 1909. Intervention in discussion on 'The productivity of national economy'", in *Max Weber: Collected Methodological Writings*, Hans Henrik Bruun, Sam Whimster (eds.), 2012, pp. 358–361, p. 358.

> never meet. There can be no more immoral science than there can be scientific morals.[30]

Kuhn included values, both epistemic and non-epistemic (i.e., moral and aesthetic) in the elements comprising a paradigm (or disciplinary matrix), and gave them a prominent role in the decision-making process regarding theory choice. Before Kuhn, the preferences and choices of scientists were considered to be external and irrelevant to science and relegated to the social sciences. Kuhn made them, together with values, an integral part of science proper. Now, the ethics of science is a much- valued domain of philosophical and science studies research[31].

IMPACT ON PHILOSOPHY

Philosophers of the analytic tradition did not take Kuhn seriously. As Steven Shapin has put it, "there was a residual sense [among philosophers] that Kuhn wasn't a proper philosopher at all"[32]. Rorty was of the same view: "Kuhn was constantly being treated … as at best a second-rate citizen of the philosophical community. Sometimes he was even treated as an intruder who had no business attempting to contribute to a discipline in which he was untrained."[33] Kuhn was held responsible for rekindling talk about relativism, which does not fare well with philosophers, and for associating irrationality with science. John Searle wrote that Kuhn, along with Rorty and the postmodernists, were thought to pose a threat to the Western Rationalist tradition, and observed that, unlike what happened in the Humanities at large, "a solid and self-confident professorial establishment committed to traditional intellectual values" did not allow analytic philosophy to be tainted by the Kuhnian (among others) ideas[34]. In my article, titled "Kuhn and Philosophy" (forthcoming 2) I give examples of philosophers, such as Bernard Williams and Thomas Nagel, who responded to Kuhn's work, but did not so much as mention Kuhn's name. Bernard Williams[35] developed his idea of the absolute conception of reality in response to Kuhn's supposedly relativistic and anti-realist views. He conceded to Kuhn, without naming him, that scientific progress may not be linear, but he held on to the idea that was contested by Kuhn, namely, that scientific theories eventually converge upon a final description of an independent external world. The absolute conception that was supposed to be provided by science, was

[30] H. Poincaré, *The Value of Science*, New York, Dover, 1958, p. 12.

[31] Kitcher and Cartwright (P. Kitcher, N. Cartwright, "Science and Ethics: Reclaiming Some Neglected Questions," in *Perspectives on Science*, 4:2, 1996, pp. 145–153) also credit Kuhn with encouraging the discussion of ethical issues pertaining to science in the field of philosophy of science.

[32] S. Shapin, "Paradigms Gone Wild", in *London Review of Books*, 45:7, March 2023.

[33] R. Rorty, *Philosophy and Social Hope*, Springer, 1999, p. 175.

[34] J.R. Searle, "Rationality and Realism, What Is at Stake?", p. 71.

[35] B. Williams, *Descartes. The Project of Pure Inquiry*, Harmondsworth, Penguin, 1978.

considered by Williams a presupposition for making sense of cultural phenomena including science. Thomas Nagel attributes to Kuhn facile relativism and recommends to ignore Kuhn's work along with other examples of "debased philosophy"[36]. Still, in developing his idea of the absolute conception, he concedes to Kuhn, again without mentioning his name the incommensurability of vocabularies. He says that concepts for one set of phenomena (e.g., physical) cannot be used for another (e.g., mental), and that the vocabulary of a rejected theory, when there is a revolution in science, is not appropriate to express new phenomena[37].

The discussion about conceptual schemes and their implications, which has centered around Donald Davidson's influential paper "On the Very Idea of a Conceptual Scheme" (1984), has also drawn on Kuhn's work. Kuhn used the term 'conceptual scheme' in his book *The Copernican Revolution* (1957), but did not pick it up again in *The Structure of Scientific Revolutions* where he preferred the term 'paradigm' which involved, not just concepts and statements, but also a practical dimension. Yet, Davidson, credited Kuhn, among others, with the scheme-content distinction and the relativism associated with conceptual schemes, ignoring completely the practical side of paradigms. This take on things was based on the stereotypical understanding of Kuhn's model, and does not really represent what Kuhn has actually said. For instance, Kuhn did not defend the view that there exists an undifferentiated content that awaits to be organized or divided by the scheme that language provides, as Davidson argued. Kuhn believed that knowledge of words and knowledge of nature "are acquired together, not really two sorts of knowledge at all, but two faces of the single coinage that a language provides"[38]. Neither did Kuhn think that sentences that were accepted as true come to be accepted as false, and vice versa, with the change of paradigm (or conceptual scheme). For Kuhn, unlike Davidson, what varies with language is not truth but effability, i.e., certain statements that used to be considered true or false in a certain framework, may not be candidates for taking these predicates in another[39].

Kuhn's work has influenced developments in philosophy in three other areas of research. The first is research on creativity and innovation, especially in relation to art. Stanley Cavell, who has written on aesthetics, has explicitly expressed his debt to Kuhn as regards radical change. Alluding to the connection between normal science and revolution in Kuhn's work, he said that "deep revolutionary changes can result from attempts to conserve a project"[40]. Other philosophers, such as

[36] T. Nagel, "Introduction", in *Other Minds: Critical Essays 1964 – 1994*, Oxford, Oxford University Press, 1995, pp. 3–10, p. 9.

[37] T. Nagel, *The View from Nowhere*, Oxford, Oxford University Press, 1986, p. 52.

[38] T.S. Kuhn, *The Road since Structure*, p. 31.

[39] *Ibid*., p. 99–104.

[40] S. Cavell, *The Claim of Reason*, New York, Oxford University Press, 1979, p. 120. For more on the relation between Cavell and Kuhn as regards novelty in art, see V. Kindi, "Novelty and Revolution in Art and Science: The influence of Kuhn on Cavell", in *Perspectives on Science*, 18:3, 2010, pp. 284–310.

Michael Fried, Arthur Danto, and Michael North have also drawn on Kuhn's work to discuss novelty in the arts[41]. The second area where developments have been inspired by Kuhn, is the historiography of philosophy. Catherine Wilson wrote that "Kuhn's book [SSR] probably accomplished nearly as much for the history of philosophy as it did for the history of science in the anglophone world."[42] The incommensurability of concepts made anachronism a problem not only in the history of science but also in the history of philosophy. The idea that there are perennial problems of philosophy expressed in different mutually translatable languages was challenged and historians of philosophy, such as Dan Garber[43] and Michael Frede[44], called for a more historical history of science, i.e., non-anachronistic. Lastly, the concept of incommensurability was a catalyst for debates in ethics and philosophy of law where different goods, values and rights are compared and balanced.

IMPACT ON THE SOCIAL AND FEMINIST STUDIES OF SCIENCE

The fields labeled "Sociology of Scientific Knowledge" (SSK), "Social Studies of Science" (SSS), "Science and Technology Studies" (STS), and "Science Studies" more generally, took shape and developed under the influence of Thomas Kuhn's and Feyerabend's works. Kuhn's emphasis on the crucial role of the scientific communities in the "internal" matters of science, i.e., in the production of knowledge, moved sociology of science away from the sociology of the scientists, the award system, citations, priority disputes, and quantitative models, to the sociology of knowledge, to anthropological, cultural, and feminist studies of science. Kuhn may have defended the insularity of the scientific community from external attempts to influence or manipulate it, but his emphasis on practice (institutions, values, etc.) brought factors that used to be considered external (e.g., the scientists' individual decisions and preferences) to bear upon epistemic matters. Kuhn's opposition to the view that the world is "out there", waiting to be depicted and described together with the highlighting of the contribution of human agency in understanding what the world is, enhanced constructivist ideas that were mostly

[41] I discuss these philosophers in relation to Kuhn in V. Kindi (forthcoming 2), "Kuhn and Philosophy", in *Rethinking Thomas Kuhn's Legacy*, Yafeng Shan (ed.), Cham, Springer, 2023.

[42] C. Wilson, "Is the History of Philosophy Good for Philosophy?", in *Analytic Philosophy and the History of Philosophy*, T. Sorell, G.A.J. Rogers (eds.), Oxford, Oxford University Press, 2005, p. 72.

[43] D. Garber, "What's Philosophical about the History of Philosophy?", in *Analytic Philosophy and the History of Philosophy*, T. Sorell, G.A.J. Rogers (eds.), Oxford, Oxford University Press, 2005, pp. 129–146.

[44] M. Frede, *The Historiography of Philosophy*, K. Ierodiakonou (ed.). Oxford, Oxford University Press, 2022.

endorsed and cultivated by sociologists of science. Science became one more kind of practice that is supposed to be studied purely descriptively with no evaluative or epistemological considerations involved[45]. The sociologists of science trace their research back to Kuhn's philosophy, they even defend it against critics, but Kuhn himself was very reluctant to accept these accolades. In fact, he made caustic remarks about this understanding of his work.

> I am among those who found the claims of the strong program absurd: an example of deconstruction gone mad. And the more qualified sociological and historical formulations that currently strive to replace it are, in my view, scarcely more satisfactory. These newer formulations freely acknowledge that observations of nature do play a role in scientific development. But they remain almost totally uninformative about that role – about the way, that is, that nature enters the negotiations that produce beliefs about it.[46]

Kuhn refers here to the Strong Programme associated mostly with the sociologists David Bloor and Barry Barnes, at the University of Edinburgh, who wanted to treat science as any other kind of knowledge. No privileged epistemic status for science. Beliefs in general, independently of whether they are true of false, independently of whether they come from physics, sociology, or ordinary life, are supposed to be treated equally or symmetrically. This means that that all beliefs would be explained in the same way, i.e., by using the same types of causes. The defenders of the Strong Programme were opposed to the idea that true beliefs should be accounted for in terms of their epistemic status while false ones attributed to empirical causes related to those who hold them. Kuhn in the above quotation, referring to the Strong Programme says that it is an example of "deconstruction gone mad". The Strong Programme, however, was constructivist in that it downplayed bare nature's contribution to knowledge, giving more weight to the role of negotiations and transactions among scientists. So, why does Kuhn speak of deconstruction? Most probably, because Kuhn associated doctrines defended in the science studies literature with the doctrine of deconstruction in the humanities that aimed to challenge ideas such as rationality, reality, or truth. Kuhn's mention of negotiations refers to approaches in the science studies literature that were concerned with how facts are made rather than discovered. Most prominent among these is Bruno Latour and Woolgar's laboratories studies. In their view, facts are produced when statements made by scientists get stabilized. "Scientific activity is not 'about nature', it is a fierce fight to *construct* reality. The *laboratory* is the workplace and the set of productive forces, which makes construction possible."[47]

[45] On the significance of description for the science studies researchers, see V. Kindi, "The *Structure*'s Legacy: Not from Philosophy to Description", in *Topoi* 32:1, 2012, pp. 81–89.

[46] T.S. Kuhn, *The Road since Structure*, p. 110.

[47] B. Latour, S. Woolgar, *Laboratory Life. The Construction of Scientific Facts*, Princeton, Princeton University Press, 1986/1979, p. 243.

Paul Feyerabend, in his "Preface" to the third edition of his book *Against Method* writes that the type of *in situ* anthropological research, undertaken by social scientists in laboratories, had a precedent with Kuhn:

> [R]esearchers no longer sit back and read the papers in a certain field; they are not content with silent visits to laboratories either - they walk right in, engage scientists in conversation and make things happen (Kuhn and his collaborators started the procedure in their interviews for the history of quantum mechanics).[48]

Nevertheless, Kuhn distanced himself from these developments despite the influence that his work had.

Kuhn's work also inspired developments in the feminist studies of science. Helen Longino acknowledges this influence, but also notes that Kuhn would be reluctant to condone this extension of his work.

> Kuhn's influence on feminist science studies and feminist theory of knowledge might well be understood as an example of the principle of unintended consequences. Kuhn's notion of theory-laden meaning and observation and revolutionary science were embraced by feminist thinkers who applied them in ways that seemed their natural and logical extensions. Judging from remarks in later essays such as "The Trouble with the Historical Philosophy of Science", Kuhn would have had serious reservations about these applications, as he had about many of those in science studies who took his views as a mandate to inquire into the social nature of scientific inquiry. Nevertheless, the power of his challenge to logical empiricist philosophy pf science provided a philosophical basis for a wide range of critical approaches to the sciences.[49]

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In the above summary review I have tried to show the tensions surrounding Kuhn's legacy. On the one hand we have the significant impact of his work and its appreciation and, on the other, its marginalization[50] and disapproval. We also have Kuhn's own reservations for the misappropriations and misinterpretations that his work encouraged.

[48] P. Feyerabend, *Against Method*, p. XI.

[49] H. Longino, "Does *The Structure of Scientific Revolution* Permit a Revolution in Science?", in *Thomas Kuhn*, Thomas Nickles (ed.), 2003, pp. 261–281, p. 261. Similar thoughts are expressed by Evelyn Fox Keller: "The work of Russell Hanson and Thomas S. Kuhn was of pivotal importance in opening up our understanding of scientific thought to a consideration of social, psycho-logical, and political influences." (E. Fox Keller, "Feminism and Science", in *Signs*, 7: 3, 1982, pp. 589–602, p. 592); "*Structure* provided a launching pad for the social studies of science; in so doing, it also provided – just a few years later – a place from which feminist analyses of science could begin." (E. Fox Keller, "Kuhn, Feminism, and Science?", in *Configurations*, 6:1, 1998, pp. 15–19, p. 17)

[50] In Kindi (fortcoming 2, "Kuhn and Philosophy"), I give evidence from publications in analytic philosophy which show that Kuhn's work is either ignored or pushed to the margins.

But why, despite his influence, has Kuhn been ignored or sidelined? From early on, Kuhn was thought to be promoting relativism and irrationalism in the pinnacle of knowledge, science. For this reason, he was taken to be a threat to sound philosophical thinking and to Western civilization. He was considered "philosopher manqué"[51], and has not really been studied. Most of the important scholars he corresponded with or wrote about him, did not actively engage with his work, save to criticize a caricature of his model. There were only a few notable exceptions. Richard Rorty, for one, appreciated Kuhn's work, but Kuhn himself did not think that the two of them were seeing eye to eye. Kuhn wrote in a letter to Rorty (Sept. 19, 1986, Kuhn MC 240, Box 22) that they share a problem that they approach from opposite sides[52], but Rorty wondered in his response why Kuhn does not consider him and Foucault "good Kuhnians"[53]. Another exception is the philosopher Georg von Wright[54] who succeeded Wittgenstein in his chair at Cambridge. He compared favorably Kuhn's paradigms to Wittgenstein's world pictures and drew Kuhn's attention to similarities between his [Kuhn's] work and remarks made by Wittgenstein in *On Certainty*, a book that was published long after *Structure* was out[55]. Another Wittgenstein scholar, Brian McGuinness[56] also compared Kuhn's paradigms to Wittgenstein's networks in the *Tractatus*.

Kuhn was, to a large extent, misunderstood. He attempted a revolution, in his sense of the term, having to face the consequences (e.g., misunderstandings, new divisions, new taxonomies, etc). He breached disciplinary boundaries and introduced new vocabulary. His critics, and often his advocates, tried to fit his work in the old mold and, naturally, found his work wanting. They criticized, not his actual model, but a caricature that had emerged[57]. Karl Marx, in his "The Eighteenth Brumaire of Louis Bonaparte" has said:

[51] A. Bird, "Kuhn's Wrong Turning", in *Studies in History and Philosophy of Science*, 33:3, 2002, pp. 443–463, p. 459.

[52] The problem Kuhn and Rorty shared is whether there is continuity or discontinuity with revolution. Rorty favored continuity with redescription, whereas Kuhn insisted on ruptures and radical changes.

[53] R. Rorty, "Letter from Richard Rorty to Thomas S. Kuhn", 28 October 1986, in *Thomas S. Kuhn Papers*, mc 240, box 22, folder 14.

[54] G.H. von Wright, "Wittgenstein on Certainty", in *Problems in the Theory of Knowledge*, G.H. von Wright, (ed.), The Hague, Nijhoff, 1972, pp. 47–60.

[55] *Structure* was first published in 1962 and Wittgenstein's *On Certainty* was first published in 1969. See J. Mayoral, "Kuhn's 'Does Knowledge Grow?': Second Thoughts on the Nature of Epistemic Progress.", in *Rethinking Thomas Kuhn's Legacy*, Yafeng Shan (ed.). Cham, Springer, 2023 (forthcoming).

[56] B. McGuinness, "Comments on Professor von Wright's 'Wittgenstein on Certainty'", in *Problems in the Theory of Knowledge*, G. H. von Wright, (ed.), The Hague, Nijhoff, 1972, pp. 61–65.

[57] For more on the caricature of Kuhn's model see V. Kindi, "The Kuhnian Straw Man", in *The Kuhnian Image of Science: Time for a Decisive Transformation?*, M. Mizrahi (ed.), London, Rowman & Littlefield, 2017, pp. 95–112.

> [T]he beginner who has learnt a new language always translates it back into his mother tongue, but he has assimilated the spirit of the new language and can produce freely in it only when he moves in it without remembering the old and forgets in it his ancestral tongue.[58]

Marx is saying that people can become fluent in a new language and progress if they forget their mother tongue. In Kuhn's case, his critics were stuck with their "mother tongue", i.e., the standard conception of science, and had difficulties picking up on the new model. Kuhn intended with his book "a decisive transformation in the image of science" (SSR 1) and the understanding of science as a complex practice. He succeeded in both. The revolution he effected, however, has not yet changed how his work is being received in analytic philosophy[59].

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[58] K. Marx, "The Eighteenth Brumaire of Louis Bonaparte", in *The Marx-Engels Reader*, R. Tucker (ed.), New York, Norton, 1978, pp. 594–617, p. 595.

[59] For this paper, I partly draw upon work that will be published in Kindi (forthcoming 1, "Kuhn and the History of Science", and forthcoming 2, "Kuhn and Philosophy").