The Relativistic Legacy of Kuhn and Feyerabend

Abstract: Relativism in the philosophy of science is widely associated with the work of Thomas Kuhn and Paul Feyerabend. Kuhn and Feyerabend espoused views about conceptual change and variation of scientific method that have apparent relativistic implications. Both held that scientific theories or paradigms may be incommensurable due to semantic variation. Two ways that truth may be relative because of semantic incommensurability will be distinguished. Davidson's criticism of the idea of an untranslatable language will be discussed, as well as a response to incommensurability based on the causal theory of reference of Kripke and Putnam. A form of relativism with respect to epistemic rationality may also be derived from the claims of Kuhn and Feyerabend about methodological variation. Kuhn's initial suggestions about paradigm-dependent standards and absence of extra-paradigmatic standards give rise to a view on which rationality is relative to paradigm. Kuhn's later view that there is a stable set of shared scientific values is less prone to relativistic interpretation. Feyerabend's claim that "anything goes" suggests an extreme form of relativism, but should be understood instead as the view that all rules of method may be violated in some circumstances. The latter brings Feyerabend's view into line with Kuhn's later view.

1. Introduction

Thomas S. Kuhn (1922-1996) and Paul K. Feyerabend (1924-1994) were central figures in the historical turn that took place in the philosophy of science in the latter half of the twentieth century. In a break with positivist orthodoxy, advocates of the historical approach sought to understand the sciences in terms of the developmental processes which underlie scientific change. With growing recognition of the extent to which science is subject to change, the suggestion that the sciences may be approached in relativistic terms came increasingly to the fore. In no small part, the work of Feyerabend and Kuhn was responsible for this trend.

The importance of the history of science emerges clearly in Kuhn's famous book, *The Structure of Scientific Revolutions*. (First published in 1962, reference will here be made to the 4th edition of *Structure* published in 2012.) Kuhn sought to bring about a shift in our "image of science" by analysing the processes of scientific change revealed by the historical study of the sciences (2012, p. 1). He proposed a model of scientific change, on which consensus on paradigm emerges from disunified beginnings. A paradigm is a set of theoretical

beliefs and exemplary scientific achievements that form the basis for an enduring tradition of research in a field of science. Scientists work within a paradigm during "normal science". They devote themselves to solving "puzzles" which arise in applying the paradigm to the world. Normal scientific practice is occasionally confronted by crisis-inducing "anomalies" which raise doubts about the reigning paradigm. Alternative candidates for paradigm are proposed. Debate ensues between advocates of the current paradigm and proponents of the paradigm candidates. Paradigm debate is characterized by lack of complete communication due to the incommensurability of the paradigm and its competitors (2012, pp. 147-9). As a result, the choice between the paradigm and candidates for paradigm is unable to be resolved in a fully rational manner. On those occasions where the original paradigm is rejected in favour of one of the candidates for paradigm, a scientific revolution occurs. Following a revolution, normal science resumes under the auspices of the new paradigm which has taken over as the basis for research in the field.

Unlike Kuhn, Feyerabend did not propose a model of scientific theory-change. Like Kuhn, Feyerabend argued that incommensurability plays a role in scientific change. He argued against the logical empiricist idea that scientific change involves reduction of the laws of an earlier scientific theory to the laws of a later theory. The reason that such reductive relations do not obtain is due to semantic differences between the vocabulary employed by the theories, which Feyerabend described as a form of incommensurability. Apart from such semantic considerations, Feyerabend also made controversial suggestions in relation to scientific method. In his best-known book, *Against Method*, Feyerabend argued that all rules of scientific method have been violated at some point in the history of science. His point was not simply the descriptive one that in actual practice a scientist may fail to employ the rules of method. The point had normative force, as well. In many such cases scientists are in fact

justified in violating the rules of method. Feyerabend formulated his view about the violability of the rules of method in terms of the position of "epistemological anarchism", which he famously expressed with the slogan "anything goes".

The idea that theories or paradigms may be incommensurable for semantic reasons is found in both authors. In section 2, I will discuss the considerations that give rise to the claim that theories or paradigms may be incommensurable in a semantic sense, as well as the implications of such incommensurability with respect to relativism about truth. Apart from semantic considerations, Kuhn and Feyerabend endorsed views about the methodology of science that have potential relativistic implications. For Kuhn, incommensurability involves variation of standards between paradigms, which may lead to the relativity of epistemic rationality to paradigm. For Feyerabend, there are no universally binding standards applicable throughout the history of the sciences. As with Kuhn, the rejection of a universal methodology for science suggests a relativistic view of epistemic rationality. I will discuss the relativistic implications of methodological variation in section 3. In section 4, I will indicate how relativistic themes from Kuhn and Feyerabend have influenced subsequent work.

2. Semantic incommensurability

In *Structure*, Kuhn uses the term 'incommensurability' to characterize methodological, perceptual and semantic differences between paradigms. In work after *Structure*, Kuhn restricted use of the term to semantic relations between theories or paradigms. By contrast with Kuhn, Feyerabend consistently employed the term to describe semantic relationships between theories. In this section, I will focus on semantic incommensurability and its relativistic implications with respect to truth.

In *Structure*, debate between supporters of an established paradigm and proponents of a paradigm candidate is characterized by partial failure of communication (cf. 2012, p. 148). This is due to difference in conceptual apparatus between the paradigms, which results in semantic variation between the vocabulary that the paradigms employ. Kuhn placed special emphasis on changes in classification which take place in the transition between paradigms (e.g. 2012, p. 199). After a revolution, entities which were previously assigned to the same class may be assigned to different classes. Entities previously in different classes may be assigned to the same class. Because of such classificatory change, terms which are retained throughout the transition undergo change of meaning, which may affect both their sense and their reference. New terminology may also be introduced which differs in meaning from terminology employed by the previous paradigm.

In describing the semantic shift that takes place during change of paradigm, Kuhn spoke increasingly in terms of translation. At first, he drew a parallel between semantic incommensurability and Quine's indeterminacy of translation (cf. 1970, pp. 268 ff.). However, he later realized the parallel was incomplete. Rather than translation being indeterminate, Kuhn argued for failure of exact translation between the vocabulary employed by theories. As his thinking evolved, he came to downplay failure of communication. He recognized that speakers of mutually untranslatable languages may learn each other's language and thereby understand each other. In his mature view, incommensurability is a local phenomenon (see, e.g., 2000, pp. 36 ff.). It consists in the inability to exactly translate between sets of holistically interdefined terms within the special vocabulary of competing theories. Because the translation failure is localized, it takes place against a background of semantically stable vocabulary that is shared between the theories. This semantic common ground provides a basis for comparison of at least some of the content of the theories.

While Kuhn employed the notion of incommensurability in describing relations between paradigms, Feyerabend's use of the notion emerged in the course of his critical analysis of the logical empiricist account of inter-theory reduction. Logical empiricists understood reduction as a deductive relationship in which the laws of an earlier theory are subsumed under the laws of the later theory that replaces it. Feyerabend pointed out that such a deductive account of reduction implies that a condition of meaning invariance must apply to the vocabulary of successive theories. For if the vocabulary employed by the theories did not possess the same meaning, the laws of the reduced theory could not be logical consequences of the laws of the reducing theory.

Against the empiricist account of reduction, Feyerabend argued that the condition of meaning invariance is violated in actual science due to conceptual change that occurs in the transition between theories. He rejected the empiricist idea of a theory-neutral observation language, arguing that neither experience nor pragmatic conditions of use fix the meaning of observational vocabulary (1981a, pp. 21-9). Instead, the meaning of observational vocabulary depends on the theory that applies to the relevant domain of observable phenomena. Because of this, the meaning of observational terms may vary with change in the theory that explains the observable phenomena to which the terms apply (1981a, p. 31). As for theoretical terms, Feyerabend argued that their meaning depends upon the theoretical context in which they are employed. As a result, it may be impossible to define the terms of one theory in the context of another theory (1981b, pp. 66-7). The dependence of meaning on theoretical context entails that there may be meaning variance in the transition between theories. Given meaning variance, the deductive consequences of the theories form disjoint classes, so that the logical relations required for deductive subsumption fail to obtain.

Feyerabend concludes that "incommensurable theories may not possess any comparable consequences, observational or otherwise" (1981b, p. 93).

The semantic notion of incommensurability is not as such an inherently relativistic notion. However, it can be used to support a variety of relativistic views. In the next section, I will indicate how semantic incommensurability may combine with variation of methodological standards to produce a form of epistemic relativism. For now, I shall restrict myself to relativism with respect to truth. The semantic variation between successive paradigms or theories which takes place, according to Kuhn and Feyerabend, provides a basis for relativism about truth. I will first describe a weak form of relativism about truth before sketching a stronger form of the view.

Semantic variation may give rise to the inability to translate from the vocabulary of one theory into the vocabulary of another theory with which it is incommensurable. If translation fails between theories, a true proposition asserted using the vocabulary of one theory may be unable to be expressed using the vocabulary of the other theory owing to the failure of translation. The inability to express a true assertion of one theory in the vocabulary of another theory yields a sense in which truth is relative to theory. Truth is relative to theory in the sense that a true proposition that may be asserted using the vocabulary of one theory is not able to be formulated in terms of the vocabulary of the other theory. Thus, the ability to express a specific true proposition becomes relative to theory. Such relativism does not make truth relative to theory in the sense that a proposition may be true in one theory while its negation is true in the context of another theory. Rather, truth is relative in the weaker sense that a truth assertible in one theory is not able to be expressed in the other theory. It is the ability to express truth, rather than truth itself, that is relative to theory. Such a form of relativism differs from what is usually meant when truth is said to be relative. But by

avoiding the claim that one and the same proposition is true in one context and false in the other, it avoids the traditional objection of incoherence that is usually levelled against relativism about truth. (For the incoherence objection, see Siegel 1987, chapter one.)

I will now describe a stronger form of relativism about truth that makes use of the notion of semantic incommensurability. In characterizing the profound effects of scientific revolution, Kuhn sometimes spoke as if the world varies with paradigm: e.g. "when paradigms change, the world itself changes with them" (2012, p. 111); "the proponents of competing paradigms practice their trades in different worlds" (2012, p. 149). Such remarks may be read as hyperbole. Kuhn was merely employing the world-change metaphor to emphasize the dramatic impact of paradigm change. But some commentators interpret remarks such as these in anti-realist terms. For example, Paul Hoyningen-Huene has proposed a neo-Kantian interpretation of Kuhn on which the phenomenal world of the scientist varies with paradigm, though the world-in-itself remains fixed (1993, pp. 32-5). Such a neo-Kantian interpretation of Kuhn has ontological implications which may serve as the basis for a relativistic conception of truth. Paradigms are not competing theories about the same phenomenal world. Incommensurable paradigms are located within their own distinct phenomenal worlds. The entities to which the terms used by scientists refer vary with paradigm because phenomenal world varies with paradigm. This allows for a more substantive sense in which truth is relative. For the states of affairs that make propositions true vary with phenomenal world. As such, a proposition that is true relative to the phenomenal world of one paradigm may be false relative to the phenomenal world of another. Truth is relative to phenomenal world. The prospects for this form of relativism about truth will depend on whether the neo-Kantian position itself is ultimately defensible,

something which those of a realist persuasion are inclined to doubt. (For discussion of truth in a Kuhnian phenomenal world, see Devlin 2015.)

I will now briefly present two important lines of criticism that emerged in response to the semantic incommensurability thesis. The first is the translational response due primarily to Donald Davidson. The second is the referential response associated with the causal theory of reference of Saul Kripke and Hilary Putnam.

In his famous paper, 'On the Very Idea of a Conceptual Scheme' (1984), Davidson sought to undermine the conceptual relativist idea that there may be alternative legitimate conceptual schemes. One of his main targets is the idea that different conceptual systems may be incommensurable, and, thereby fail to be inter-translatable. Davidson questions whether the idea even makes sense. In the first place, it is not clear what might constitute evidence for the existence of an untranslatable language. Failure to translate purportedly linguistic material might be taken as evidence that the material is not in fact linguistic rather than as evidence that it is a language that is unable to be translated. If an attempt is made to establish the untranslatability of a language by providing an example of an untranslatable term of the language, the very fact of providing the example of the untranslatable term in the language into which it purportedly cannot be translated belies the claim of untranslatability. Even the assumption that one might understand terms in an untranslatable language suggests translation is possible after all, since one has been able to arrive at an understanding of the allegedly untranslatable terms. (For a closely related argument, see Putnam 1981, pp. 114-9.)

Davidson subjects the idea of an untranslatable language to serious criticism. But it is possible to weaken the force of his objections. Especially if one understands semantic incommensurability as a local phenomenon, it may be possible to address the concerns about

evidence of untranslatability. If translation failure is restricted to a narrowly circumscribed set of interdefined terms within the special vocabulary of a theory, such translation failure occurs within the context of a background natural language as well as surrounding scientific vocabulary. As such, there is no need to determine whether a completely untranslatable language is indeed linguistic, since the failure of translation is between special vocabularies within a language (see Sankey 1990). It is also possible to remove the problem of how to understand an untranslatable language without being able to translate it. Both Kuhn and Feyerabend distinguish learning a new language from translation into one's own language (Kuhn 2000, pp. 43-7; Feyerabend 1987, p. 266). Given the distinction, failure to translate does not entail failure to understand what is said in vocabulary that is untranslatable into the terms of one's own theory (see Sankey 1991).

The referential response emerged in Israel Scheffler's book, *Science and Subjectivity* (1967). Scheffler employed Frege's distinction between sense and reference to argue that meaning variant theories may be comparable for content provided that the terms used by the theories have the same reference. Kuhn and Feyerabend did not, however, restrict the claim of meaning variance to variation of sense. They held that there is variation in reference as well. In this context, the claim by Kripke (1980) and Putnam (1975) that reference is determined by causal relation between speaker and reality rather than by description took on relevance to the problem of incommensurability. For, if the reference of a theoretical term is fixed upon the original introduction of a term by a scientist, reference may remain stable throughout subsequent change of theory. If reference remains stable in theory-change, then terms of a later theory may refer to the same things as terms of earlier theories. Such shared reference would provide semantic common ground based on which the content of competing or successive theories may be compared. But, as the subsequent literature has

demonstrated, it is not possible to enforce complete stability of reference across theory-change, since descriptive elements play a role in reference-determination for theoretical terms and post-introductory use may alter reference (e.g., Devitt 1979; Fine 1975; Nola 1980).

3. Methodological Variation

Traditional theorists of scientific method sought to identify a scientific method employed throughout the sciences. By contrast, advocates of the historical approach to the philosophy of science emphasized variation in the methods employed in the sciences. Rejection of a single scientific method in favour of a variety of methods provides a further source for relativism in respect of the sciences.

In this section, I will consider the implications of Kuhn's and Feyerabend's methodological views with respect to relativism and the rationality of science. Though Kuhn initially took incommensurability to involve difference in methodological standards, he later restricted the notion of incommensurability to semantic relations between theories. Moreover, Feyerabend consistently limited his use of the notion to the semantic realm. For this reason, I will frame the discussion in terms of methodological variation rather than in terms of methodological incommensurability.

At one point in *Structure*, Kuhn refers to "commitments without which no man is a scientist" (2012, p. 42). These include a concern to understand the world in a precise manner using empirical means. But Kuhn makes no attempt in *Structure* to identify or articulate a single universal method for the sciences. Instead, he emphasizes standards that apply to scientific research within the context of a paradigm. The puzzle-solving activity of normal science is governed by methodological standards which are based on the established paradigm. The standards take the form of rules of puzzle-solving adequacy. Like the puzzles

themselves, the rules derive from the paradigm. The rules include the basic laws of the paradigm, procedures for the use of instrumentation and the conduct of experiment, as well as metaphysical commitments about the nature and structure of the world (2012, pp. 40-1). Because rules of puzzle-solving adequacy derive from the paradigm, they are subject to variation with change of paradigm.

The rules of puzzle-solving adequacy provide a basis for the evaluation of puzzle-solving activity within normal science. Precisely because of their paradigm-dependence, the rules can play no role in the choice between competing paradigms (2012, p. 94). In the absence of neutral standards for the comparative appraisal of paradigms, the question arises of how choice between paradigms may be made on a rational basis. The matter is further complicated by the point that Kuhn took observation to be theory-dependent, which means that no appeal may be made to a neutral domain of theory-independent empirical facts (2012, pp. 111-34). Bearing in mind the communication breakdown produced by semantic incommensurability, the choice must be made without appeal to neutral standards or facts, and without an understanding of the opposing view. Given this, it is hard to see how the decision to adopt one paradigm over another may be made on a rational basis. It is no wonder that Kuhn tended to describe the choice between paradigms in quasi-religious terms as a "conversion experience" (2012, p. 150).

The combination of paradigm-dependent standards with lack of a rational basis for paradigm choice is a recipe for relativism. For while there may be no rational ground for the adoption of a paradigm, the rules of puzzle-solving adequacy provide justification for normal scientific activity within the paradigm. In the context of an accepted paradigm, the rules constitute standards of rationality based on which beliefs and actions of scientists may be justified. Because the standards of rationality depend upon and vary with paradigm, the

rationality of scientists is relative to paradigm. Given the paradigm-dependence of standards and absence of a neutral basis for paradigm appraisal, Kuhn's account of the rationality of science in *Structure* was widely regarded as a relativist one. (For authoritative coverage, see Siegel 1987, Part II.)

To Kuhn's surprise, *Structure* encountered a somewhat hostile philosophical reception. Philosophers were critical of the relativism to which Kuhn's account of science appeared to lead. Seeking to defend the objectivity of science against Kuhn, philosophers emphasized the need for independent criteria of paradigm-appraisal. According to Israel Scheffler, Kuhn simply failed to distinguish between standards that are internal to a paradigm and "second-order criteria" that are external to paradigms and are employed to evaluate them (1967, pp. 84-5). Philosophers have made a range of attempts to identify independent criteria that might be used in the comparative appraisal of paradigms. One influential example is that of the progressiveness of research programmes which Imre Lakatos proposed as part of his own model of theory-change (Lakatos 1970). Another example is problem-solving effectiveness, which Larry Laudan introduced in the context of his account of scientific research traditions (Laudan 1977).

In response to the criticism, Kuhn undertook to clarify his position in a Postscript which appeared in the second and later editions of *Structure* (see, especially, 2012, pp. 184-5), as well as in his paper 'Objectivity, Value Judgment and Theory Choice' (1977). Contrary to his apparent denial of extra-paradigmatic standards, Kuhn held that there are independent criteria of theory-choice. The criteria function as values which guide theory-choice, rather than as rules which dictate the choice. Kuhn lists as examples the values of accuracy, simplicity, consistency, breadth and fruitfulness. While choice of theory or paradigm is informed by a stable set of shared values, the guidance provided by the values allows for

divergent outcomes between scientists. Taken individually, the values are open to alternative interpretations. One and the same value may be understood differently and applied in different ways to the same cases. Taken collectively, there is scope for potential conflict between the values. Different theories may satisfy different values. One theory may display a higher level of accuracy, while a competitor is simpler or has greater breadth. The system of shared values may fail to uniquely pick out a specific theory from among a set of competing theories.

The position that emerges from Kuhn's clarification is not one that denies an objective basis for scientific theory-choice. The shared scientific values constitute objective criteria of theory appraisal (1977, pp. 336-8). But while the values have an objective status, appeal to the shared values may fail to deliver a unique outcome. As Kuhn expressed the point, there is no "algorithm of theory-choice" which leads all scientists to the same decision (2012, p. 198). Rather than deny the rationality of theory-choice, Kuhn's view is that scientists may disagree on a rational basis. Scientists may adopt opposing theories even though their choice of theory is rationally grounded in objective criteria of theory-appraisal.

Kuhn's idea that the criteria of theory-choice are values rather than rules is similar to the view of method defended by Feyerabend. In *Against Method*, Feyerabend argued that all rules of scientific method have been violated at some point in the history of science. His point was not just the descriptive point that the rules of method are violated in the actual practice of science. It was the normative point that on some occasions violation of the rules of method may be justified. In order for science to progress, there are circumstances in which it is necessary to violate a rule of method. In effect, Feyerabend's point is that all rules have exceptions. There are no rules which are binding in all circumstances. Feyerabend's

conception of violable rules closely parallels Kuhn's view that criteria of theory-choice are values that guide rather than rules that dictate choice.

In *Against Method*, Feyerabend provocatively claimed that there is only one methodological principle that may be supported in all circumstances. This is the principle "anything goes" (1975, p. 28). In line with this principle, Feyerabend described his theory of scientific method as "epistemological anarchism". Understandably, Feyerabend's view was widely taken to be an extreme form of relativism on which there are no methodological principles which apply to scientific inquiry. But, as later emerged, this was not what he intended (e.g. 1978, p. 188). The slogan "anything goes" was intended as a rhetorical response to a theorist of method who insists that there must be a single, universally binding method that applies throughout the sciences in all stages of the history of science. Given the violability of the rules of method, the only principle that may be supported for all circumstances in the history of science is "anything goes". But Feyerabend's point was not the extreme relativist claim that there are no methodological principles at all. It was an exaggerated way of expressing the point that all rules of scientific method may be justifiably violated in some circumstances.

4. Conclusion

More than half a century has passed since the original publication of *Structure* and more than four decades since that of *Against Method*. The work of Kuhn and Feyerabend prompted lively discussion of the nature of scientific theory-change and the rationality of scientific theory-choice. Alternative models of scientific theory-change were proposed. Theories of scientific rationality were developed which take account of variation of methodological

standards. An extensive literature explored the implications of the theory of reference with respect to semantic incommensurability and conceptual change.

Debate about wholesale scientific change has faded into the past. Contemporary philosophers of science tend to focus on detailed analysis of specific areas of the sciences rather than to make broad generalizations about the nature of theory-change intended to apply to all sciences throughout the history of science. But while the problem of scientific theory-change is a problem from an earlier phase in the history of the philosophy of science, some of the ideas of Kuhn and Feyerabend have become commonplace. Few would now maintain a strong thesis of incommensurability. But the idea that conceptual and semantic change occurs in the development of the sciences is widely accepted. Some may still hanker for a general theory of scientific method. But the thought that there may be variation of at least some of the methodological rules or procedures employed in the practice of science no longer appears overly controversial.

The relativistic challenge to the rationality of science spawned several divergent tendencies. In the philosophy of science, one tendency was to develop a theory of scientific method on the basis of which to resist the idea that rational theory acceptance is relative to shifting standards. An important example of this is the development by Larry Laudan of the theory of normative naturalism. According to normative naturalism, rules of scientific method may be empirically evaluated by historical investigation of the past use of such rules to achieve scientific aims (e.g. Laudan 1987). But not all who were influenced by Kuhn and Feyerabend sought to defeat relativism. The advocates of the strong programme in the sociology of science explicitly endorsed relativism. Indeed, it has recently been suggested by Bojana Mladenović that Kuhn dramatically changed his epistemological views late in his

career because he recognized that his original position was open to relativistic appropriation by the sociology of science which he opposed (2017, pp. 62-70).

The figures of Kuhn and Feyerabend continue to exert an influence on the philosophy of science. The dramatic impact of their most controversial claims has lessened with time. Their moderate claims have been incorporated into the mainstream of the philosophy of science while extravagant claims have dissolved.

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