The Demise of the Incommensurability Thesis

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The year 1962 saw the first proposal in print of the thesis of the incommensurability of scientific theories. In that year, Paul Feyerabend’s paper, “Explanation, Reduction and Empiricism”, and Thomas Kuhn’s book, *The Structure of Scientific Revolutions*, were both published for the first time. In “Explanation, Reduction and Empiricism”, Feyerabend employed the notion of incommensurability in the context of his critical analysis of the logical empiricist account of inter-theoretic reduction. In *Structure*, Kuhn ascribed a key role to incommensurability in the revolutionary transition between the theoretical frameworks that he called “paradigms”. The two authors did not employ the term in precisely the same manner. But, for both authors, incommensurability was a relation that one scientific theory might bear to another.

 The claim that theories or paradigms may be incommensurable met with considerable resistance. Some took incommensurability to involve a wholesale change of meaning in the transition between theories. Such extreme semantic shift seemed to undermine the rationality of theory-choice owing to problems of inter-theoretic comparison and communication. To the extent that meaning variance entails discontinuity of reference, it was seen as a threat to a realist view of scientific progress as increase in knowledge about a shared domain of entities. Incommensurability was also taken to have consequences of a methodological nature. Standards of scientific theory appraisal were held not to be fixed or universal. Instead, standards depend upon and vary with theory or paradigm in relativistic fashion. Given such apparent implications, philosophers sought to defend the rational and progressive character of science against the challenge posed by the thesis of incommensurability.

 I do not propose to revisit this earlier debate in detail here. Instead, I take my cue from the question posed by Moti Mizrahi: what is the argument for incommensurability? In fact, a number of different arguments were presented for incommensurability at various stages in the development of the idea. All were subjected to serious criticism. Despite this, the idea of incommensurability has proven to be remarkably resilient. Indeed, some authors write as if incommensurability were a phenomenon discovered by Feyerabend and Kuhn. As opposed to such authors, I hold that no cases of incommensurability have been established to exist. But, as we shall see, the matter turns on the delicate question of what is taken to count as a case of incommensurability.

 In section 1, I will sketch three different ways in which the claim of incommensurability was presented. In section 2, I will indicate the main lines of critical response directed against the claim. In section 3, I will turn to the question of whether incommensurability is a phenomenon that has been shown to exist. In section 4, I will consider the issue of what is required for there to be a case of incommensurability. In section 5, I will reflect briefly on the discussion.

1. Feyerabend and Kuhn on incommensurability

My aim in this section is to show that different arguments were given for incommensurability at different stages. I will not spell out the arguments in detail, and I will not provide an exhaustive analysis of the detailed developments of the idea. Instead, I will look at representative formulations of the idea by the two principal advocates of incommensurability. I will first consider Feyerabend’s initial proposal of the idea in “Explanation, Reduction and Empiricism”. Then I will consider Kuhn’s original treatment of the issue in *Structure*, as well as his later taxonomic version of the idea.

 In the interest of clarity, it is worth distinguishing between two forms of the incommensurability thesis.[[1]](#endnote-1) According to the *semantic* form of the thesis, theories are incommensurable due to the semantic variation of the terms used by the theories. According to the *methodological* form of the thesis, theories are incommensurable due to an absence of shared standards of theory appraisal. For the most part, Feyerabend restricted his discussion to semantic incommensurability.[[2]](#endnote-2) Kuhn’s initial treatment of incommensurability involved both forms of incommensurability, though he later restricted it to semantic incommensurability. In this section and the following one, I will discuss both forms of incommensurability. However, in sections 3 and 4, I will restrict discussion to semantic incommensurability.

 As mentioned at the outset, Feyerabend first employed the term “incommensurability” in the context of his discussion of the logical empiricist account of reduction. He sought to show that a formal account of reduction is impossible due to semantic variation between theories. He began by rejecting the empiricist idea of an independently meaningful observation language in which observational terms receive their meaning either from experience or from circumstances of use (1981a, 49-53). He adopts instead a realistic interpretation of theories on which observational terms receive their meaning from the theory which employs the terms. He then uses the example of the impetus theory to show that there are terms whose meaning depends upon the laws of a theory in such a way that they cannot be defined in the context of an opposing theory which is incompatible with those laws (1981a, 67-8).[[3]](#endnote-3) From this as well as the realistic interpretation of theories, he concludes that in the transition between such theories, the meaning of all of the terminology employed by the theories is subject to semantic variation. As a result of such semantic variation, “incommensurable theories may not possess any comparable consequences, observational or otherwise” (1981a, 93). He employs the term “incommensurable” to describe the relationship between the concepts of theories that is due to the inability to define the concepts of one theory on the basis of the other (1981a, 76).

 In *Structure*, Kuhn proposed a model of scientific change based on analysis of cases drawn from the history of science. On this model, science is divided into periods of paradigm-based “normal science”, which is broken at intervals by revolutionary displacement of paradigm. For Kuhn, the primary locus of incommensurability is the paradigm debate that takes place between defenders of the reigning paradigm and advocates of the new contender for the status of paradigm. For a number of reasons, the parties to the debate “fail to make complete contact with each other’s viewpoints” (2012, 147). The proponents of competing paradigms do not agree on the set of scientific problems that are to be solved. Moreover, they do not possess shared standards for satisfactory problem-solution. In addition, “communication across the revolutionary divide is inevitably partial” (2012, 148). Such partial communication failure is due to semantic differences brought about by variation in conceptual apparatus across paradigms. Kuhn even suggests that scientists in competing paradigms “practice their trades in different worlds” (2012, 149). Paradigms exercise a deep influence on perception. As a result, there may be differences in the way that scientists in different paradigms perceive the world. These multiple factors “collectively” give rise to the incommensurability of competing paradigms. Given their incommensurability, the choice between competing paradigms is not “the sort of battle that can be resolved by proofs” (2012, 147).

 The two accounts of incommensurability that I have just reviewed reflect the opening statements of the idea by its two principal advocates. In subsequent response to criticism, Feyerabend introduced minor modifications but did not fundamentally alter his view of the matter (see, e.g., 1981b, 1982c). By contrast, Kuhn continued to refine and develop his version of the idea throughout the remainder of his career. To illustrate, I will now sketch the taxonomic version of incommensurability which formed part of Kuhn’s mature thinking about the topic.

 In work after *Structure*, Kuhn came increasingly to focus on the semantic form of incommensurability.[[4]](#endnote-4) He took this to be connected with change of taxonomy. According to Kuhn, a central feature of revolutionary scientific change is change in the taxonomic systems which theories use to classify the items to which they apply.[[5]](#endnote-5) Change of taxonomy may involve the redistribution of members among previously existing categories and modification of classificatory criteria, as well as the introduction of entirely new categories (cf. Kuhn 2000a, 29-30). Such taxonomic change has an impact at the semantic level. Where vocabulary is retained, taxonomic change may induce change in the meaning of the preserved terms, which may include variation of reference. Where new categories are proposed, new terms may be introduced which differ semantically from previously employed terms. Kuhn takes the taxonomic scheme of a theory to be represented by a structured vocabulary of natural kind terms which he calls a “lexicon” (2000b, 52-3). He argues that terms from one lexicon may be unable to be translated into another due to a restriction on relations between natural kinds. The restriction derives from a “no-overlap principle”, according to which members of one natural kind may only be members of another if one kind is contained in the other (2000c, 92; 2000g, 232). A term cannot be translated from one lexicon into another if its extension includes items belonging to distinct kinds within the rival taxonomy, since that would violate the no-overlap principle.

 As may be seen from this brief survey, the claim of incommensurability does not constitute a precise or stable target. There are a number of variants of the idea, and it has undergone modification. Nevertheless, the idea has been subjected to searching critique. I will now briefly indicate the most salient lines of criticism which have been raised against it.

1. The main objections to incommensurability

The aim of this section is to provide an overview of the main objections that were presented against incommensurability. I will start with the semantic form of incommensurability before turning to the methodological form of the doctrine.

The main critical concern with semantic incommensurability stems from the apparent inability to compare the content of incommensurable theories. If the terms of incommensurable theories have no meaning in common, or if the language of one may not be translated into the language of the other, then no assertion of one theory may assert or deny an assertion made by the other. But if the content of theories may not be compared, it would be impossible to conduct a comparative assessment of the theories with respect to a shared body of evidence. Given this, it is not clear how it would be possible to choose between such theories on a rational basis. Indeed, it is entirely unclear why there should be any need to choose between such theories in the first place.

 In fact, the thought that semantically variant theories are incomparable for content trades on a crucial ambiguity between sense and reference. As noted by Israel Scheffler (1967), comparison of content requires sameness of reference rather than sameness of sense. Two assertions whose constituent terms refer to the same things may enter into agreement or disagreement whether or not their terms have the same sense. This means that incomparability of content does not follow from the variation of meaning between theories. Only if the variation of meaning gives rise to failure of co-reference does incomparability follow. Nor is the point restricted to terms which have identical extensions. All that is required for theories to be able to enter into conflict is overlap or intersection of the extensions of their terms (cf. Martin, 1971).[[6]](#endnote-6) Related remarks also apply with respect to realist concerns about progress: provided that there is shared or overlapping reference between the terms employed by successive theories, there may be progress in the sense that there is an increase in knowledge about a common domain of entities.

 Apart from the issue of content comparison, the semantic incommensurability thesis also raises the prospect of communication breakdown between scientists in the context of theory-choice. Kuhn originally claimed that there is partial communication failure between proponents of competing paradigms during the revolutionary phase of a science (2012, 148). However, he came to recognize that semantic variation need not entail failure of communication (2000b, 37). The semantic variation that gives rise to incommensurability is restricted to the special vocabulary of competing paradigms. Inability to translate between semantically variant vocabularies is localized failure of translation within the context of a shared background language, including scientific terms that the theories share. Scientists from competing paradigms are able to draw upon the extensive resources of the background language as well as the terms shared by the theories in order to communicate with each other. They may understand each other despite semantic differences between the special vocabularies of the paradigms in which they work. In addition, translation and understanding are not the same thing. Translation involves the identification of expressions of one language that are semantically equivalent to expressions of another language. Understanding an assertion involves grasping the meaning of the assertion. While an expression of one language may fail to be translatable into another, it does not follow that there must be failure to communicate. A bilingual speaker of two languages may understand an expression from one language that cannot be translated into the other. Similarly, a scientist may understand what is meant by the terms of an opposing theory even though the terms are not translatable into the vocabulary of their own theory.[[7]](#endnote-7)

 We may now turn to the methodological version of incommensurability. In *Structure*, Kuhn took incommensurability to be in part due to lack of shared standards between paradigms. Paradigms address different problem-sets and employ different standards of problem-solving adequacy. As a result, there are no shared standards of appraisal on the basis of which to comparatively evaluate competing paradigms. It would seem to follow that there may be no rational basis for the choice between paradigms, since there are no shared standards on which such a choice might be based. This aspect of the incommensurability thesis encountered strong resistance. Philosophers of science pointed to a range of methodological factors that might serve as an objective basis for comparative appraisal of paradigms.[[8]](#endnote-8)

 In response to such criticism, Kuhn claimed that he had not intended to deny the existence of stable criteria of theory-appraisal. In “Objectivity, Value Judgment and Theory Choice”, he set out a list of criteria (viz. accuracy, consistency, breadth, simplicity, fruitfulness) to which scientists appeal in the comparative appraisal of competing theories or paradigms.[[9]](#endnote-9) The criteria function as values which guide theory-choice rather than as rules which dictate such choice. But while stable criteria of theory-appraisal exist, Kuhn argued that they do not constitute an algorithm of theory-choice. Individually, the criteria may be understood in different ways. Collectively, the criteria may conflict in application to competing theories (e.g. one theory may be more accurate while another is simpler). Moreover, the criteria do not admit of a fixed rank-order, though Kuhn does allow that accuracy tends to be the “most nearly decisive” factor (1977, 323).

Kuhn’s view that a non-algorithmic set of theory-neutral criteria may provide a rational basis for scientific theory-choice has proven to be less controversial than his earlier apparent denial of shared inter-paradigmatic standards.[[10]](#endnote-10) Despite this, one shortcoming with Kuhn’s view is that he was unable to provide a satisfactory account of the normative basis for the criteria of theory choice. Some philosophers have thought that the basis must be *a priori*. Others (myself included) favour the development of a naturalistic account of the epistemic warrant of the norms of scientific method.[[11]](#endnote-11)

These last remarks conclude my discussion of the methodological version of the incommensurability thesis in the present context. For the remainder of this paper, I will restrict discussion specifically to the semantic version of the incommensurability thesis. My reasons for narrowing the focus of the discussion in this way are twofold. First, the primary use of the term “incommensurability” relates to the semantic form of the doctrine. This is certainly the case with respect to Feyerabend, who with one exception restricts his use of the term to semantic variance between theories. As for Kuhn, we have just seen that in his own work on the topic he came to focus exclusively on semantic incommensurability, having renounced the methodological version of the thesis. Second, in the remainder of this paper, my aim is to bring the question of the relationship between incommensurability and the incomparability of the content of theories into sharper focus. I regard this question to be the sole issue that remains to be resolved in relation to the incommensurability thesis.

1. On the so-called “phenomenon” of incommensurability

Despite serious objections being levelled against the thesis of incommensurability, the doctrine continues to enjoy a modicum of support. Indeed, some authors appear to hold that incommensurability is a phenomenon the existence of which has been established. The purpose of this section is to raise doubts about the claim that there is a phenomenon of incommensurability.

 In asking what the argument is for incommensurability, Moti Mizrahi notes the use made by Eric Oberheim and Paul Hoyningen-Huene of the language of discovery when they write about incommensurability. In their *Stanford Encyclopedia of Philosophy* entry on the topic, they report Kuhn as having claimed that “he discovered incommensurability as a graduate student in the mid to late 1940s while struggling with what appeared to be nonsensical passages in Aristotelian physics” (2013, section 2.2.1). He later left theoretical physics to “pursue this strange phenomenon”. Mizrahi comments that: ‘Using the “discovery” language in talking about Kuhn’s incommensurability thesis gives the impression that incommensurability is a fact about scientific change (revolutionary change, in particular)’ (2015, 362). This leads Mizrahi to wonder whether there are any compelling grounds for holding that incommensurability has been established as a fact.

 In addition to the passage cited by Mizrahi, Hoyningen-Huene and Oberheim refer to incommensurability as a phenomenon in another context. In a comment on a paper of mine about the relation between semantic incommensurability and scientific realism, they write as follows:

For Feyerabend and Kuhn, incommensurability is not *based* upon anti-realist metaphysics, but rather it resulted from analysis of the historical phenomenon of incommensurability, which in turn *resulted* in doubts about realism, and increased the plausibility of some sort of neo-Kantian metaphysics. Again, the argument can be construed as an inference to the best explanation: given the phenomenon of incommensurability as apparent in the historical record, its best explanation consists in the assumption of a neo-Kantian metaphysics. (2009, 208)

Hoyningen-Huene and Oberheim see a close connection between incommensurability and the anti-realism they ascribe to Feyerabend and Kuhn. Accordingly, they take the use of realist assumptions about reference in arguing against incommensurability to beg the question. In the passage just quoted, they describe incommensurability as a “historical phenomenon” which is “apparent in the historical record”. In their view, Feyerabend and Kuhn arrive at an anti-realist metaphysical view on the basis of an inference from the historical phenomenon of incommensurability to the best explanation of that phenomenon.

 I regard this account of the relation between incommensurability and anti-realism as dubious.[[12]](#endnote-12) But that is not the point at issue here. What is at issue is whether it makes sense to speak as if there is a phenomenon of incommensurability. Feyerabend and Kuhn employ the term “incommensurability”. They apply it to a range of different cases. They make claims about change of meaning and conceptual apparatus in theory-change. Does it follow that there is a phenomenon of incommensurability?

 In the case of Feyerabend’s original discussion, there are three distinct components of the claim of incommensurability. One component is the realistic interpretation of theory, according to which observational terms receive their meaning from the theory in which they are employed. The second is the claim that the term “impetus” is unable to be defined in the context of a theory which rejects laws on the basis of which the term is defined. The third is the claim that as a result of the first two points, the consequences of meaning variant theories are incomparable.

 It is not immediately clear which, if any, of these three components of the claim of incommensurability might be regarded as picking out a phenomenon. The realistic interpretation of theories is a controversial philosophical claim about the nature of observational meaning that does not enjoy universal assent. The claim that the term “impetus” is unable to be defined in the context of a competing theory may seem to report a phenomenon. But this too is unclear. Feyerabend presents a detailed argument for the indefinability of “impetus” which turns on non-trivial considerations that may well be found contentious. A similar remark applies to the claim about incomparability. As we have seen, the claim that meaning variant theories have no comparable consequences has been denied on the basis of the distinction between sense and reference. In sum, it is at the very least not obvious why Feyerabend’s original discussion of incommensurability should be taken as reporting the discovery of a phenomenon.

 The situation may be different with Kuhn. Oberheim and Hoyningen-Huene draw attention to Kuhn’s description of his encounter with Aristotle’s physics which led him to the idea of incommensurability. At first, Kuhn found Aristotle’s text deeply puzzling. Aristotle was an influential figure in the history of physics. And yet, as Kuhn read him, he “appeared not only ignorant of mechanics, but a dreadfully bad physical scientist as well” (2000a, 16). But as Kuhn continued to struggle with the text, all at once it made sense: “Suddenly the fragments in my head sorted themselves out in a new way, and fell into place together” (2000a, 16). To understand Aristotle, Kuhn had to acquire the Aristotelian conceptual apparatus rather than apply the Newtonian conceptual framework with which he began.[[13]](#endnote-13)

 What Kuhn describes certainly appears to be a recognizable phenomenon. One is presented with a text or perhaps a spoken utterance which one does not at first understand. It subsequently turns out that the initial failure to understand the text or utterance is due to the fact that it contains words which do not have the meanings that one took them to have. The failure to understand is due to misinterpretation of the meaning conveyed by these words. But once the words are appropriately interpreted in terms of the author’s or speaker’s actual meaning, it becomes possible to understand the text or utterance.

 Let us grant that such episodes of comprehension following initial failure to understand constitute a recognizable phenomenon.[[14]](#endnote-14) But it is simply not clear that the actual phenomenon itself is best described as a case of incommensurability. The phenomenon is the act of comprehension following the initial failure to understand. The notion of incommensurability is appealed to as an explanation of one such episode. Kuhn’s explanation of why he initially failed to understand Aristotle is that he had not originally understood the meaning of Aristotle’s terms. Instead, he brought his own Newtonian conceptual apparatus to bear on Aristotle’s text when he first read it. That is why the text made no sense to him. He only came to understand the text once he acquired the Aristotelian concepts and interpreted the terms in the text with the meanings attached to them by Aristotle. The phenomenon is thus the act of comprehension following the initial failure to understand the text of Aristotle. The explanation of the phenomenon proposed by Kuhn is that it was due to the fact that he brought an incommensurable conceptual apparatus to bear on the text: only once appropriate conceptual apparatus was in place could the text be understood. In short, it seems to me to be a mistake to think of Kuhn’s encounter with Aristotle as discovery of the phenomenon of incommensurability rather than the experience of understanding an initially incomprehensible text.

 Given what I have said in relation to Feyerabend and Kuhn, I suggest that there are substantial grounds to doubt that there is a phenomenon of incommensurability whose existence has been established. As we shall see in the next section, we must think in more detail about just what is required in order for there to be a case of incommensurability.

1. Incomparability of content and untranslatability

I have just argued against the view that there is a phenomenon of incommensurability that was discovered by Feyerabend and Kuhn. But there is a further question that remains to be addressed. What exactly is required in order for there to be a recognized case of incommensurability?

 As we saw in section 1, Feyerabend and Kuhn make a number of different claims in relation to incommensurability. Given the range of different claims that they make, it may be difficult to retrieve from their discussion a single precise criterion on the basis of which to identify cases of incommensurability. However, a claim that has occupied centre stage in the literature (and my own writing) on the topic is the claim that the content of incommensurable theories is unable to be compared. If one is impressed by the referential response to incommensurability (as I am), then one will expect there to be no or very few actual cases of incommensurability, assuming the relevant criterion to be the incomparability of content.

 The idea that incomparability of content is the key to incommensurability is not agreed to by all parties to the dispute. In their previously cited commentary, Hoyningen-Huene and Oberheim object to my emphasis on content comparison:

…neither Feyerabend nor Kuhn suggested that incommensurability precludes (rational) content comparison. In fact, both unequivocally and explicitly stated that incommensurable theories can be rationally compared on the basis of their empirical predictions. The threat that incommensurability poses to realism is *not* based on the impossibility of comparing the content of theories, and consequently Sankey’s strategy to defuse it by showing that incommensurable theories can be compared with regard to content is off target. (2009, 205)

In this passage, Hoyningen-Huene and Oberheim treat the ideas of rational content comparison and comparison of content as interchangeable. This runs together two things that should be kept distinct. It runs the idea of content comparison together with the idea of having a rational basis for a choice between theories. But never mind that. The important point for present purposes is that Hoyningen-Huene and Oberheim resist the claim that incommensurability entails the incomparability of the content of theories.

 In the case of Feyerabend, the connection between incommensurability and incomparability of content is one that he made explicitly on a number of occasions. We have already seen his comment that incommensurable theories have no “comparable consequences, observational or otherwise” (1981a, 93). The point emerges very clearly in an exchange with Dudley Shapere. Feyerabend quotes Shapere as saying that “sentences which do not have common meaning can neither contradict, nor not contradict, one another” (1981c, 115). Feyerabend agrees. He then suggests that in order for theories to be able to criticize each other there must be “methods which do not depend on the comparison of statements with identical constituents” (1981c, 115). The exchange with Shapere makes it clear that in Feyerabend’s view the assertions of incommensurable theories are unable to enter into logical relations such as contradiction with each other. Feyerabend sometimes put the point in terms of the “absence of deductive relations” between theories (1982, 68). In contrasting his own view with Kuhn’s, Feyerabend characterizes incommensurability in his sense as the “deductive disjointness” of two theories in the same domain (1982, 67-8). Incommensurable theories might be compared, he said, but “comparison by *content*, or *verisimilitude* was of course out” (1982, 68).

 As we have already seen, the claim that semantically variant theories are incomparable for content is subject to an objection based on the sense-reference distinction that was originally presented by Scheffler. From the supposed fact that the terms of incommensurable theories differ in meaning, it does not follow that the content of such theories is unable to be compared. If the theories are applied to the same domain of entities, then, to the extent that the terms refer to anything, the terms will either co-refer or else overlap with respect to extension. Because of co-reference and extensional overlap, the two theories are able to enter into logical relations with respect to content. More specifically, claims made by one theory may agree or disagree with claims made by the other theory. As a result, the theories may be compared with respect to what they say about the world. Where the theories disagree with respect to a specific state of affairs the disagreement may be adjudicated by empirical means. For example, if the theories disagree with respect to an empirical prediction, it may be possible to conduct a crucial test to decide the matter.

 Given the role of reference in content comparison, it seems clear that incomparability of content is unable to serve as a criterion on the basis of which to establish the existence of cases of incommensurability. But perhaps there is another possibility. Let us now consider Kuhn’s views in search of an alternative.

 At a number of places, Kuhn writes as if theories may not be compared due to semantic difference between the language in which they are expressed (e.g. 2000d, 162; 2000f, 204). And yet he often insists that incommensurability and incomparability are not the same. Here is one such passage:

Most readers of my text have supposed that when I spoke of theories as incommensurable, I meant that they could not be compared. But “incommensurability” is a term borrowed from mathematics, and it there has no such implication. The hypotenuse of an isosceles right triangle is incommensurable with its side, but the two can be compared to any required degree of precision. What is lacking is not comparability, but a unit of length in terms of which both can be measured directly and exactly. In applying the term “incommensurability” to theories, I had intended only to insist that there is no common language within which both could be fully expressed and which could therefore be used in a point-by-point comparison between them. (2000e, 189)

In this passage, Kuhn denies that incommensurability entails incomparability. But it is not entirely clear whether the incomparability in question is incomparability of content. This is because he goes on to assert that “there is no common language” in which a “point-by-point comparison” may be made between the theories. This assertion may be read as the claim that it is not possible to directly compare the contents of the theories with respect to specific points of agreement and disagreement due to the lack of a common language in which both may be expressed.

 Despite unclarity about the relationship between point-by-point comparison and lack of a common language, it seems clear that on the whole Kuhn’s intention was not to deny that the content of incommensurable theories may be compared. Indeed, the position that Kuhn endorsed in the latter part of his career allows significant scope for content comparison. Kuhn holds that translation failure between incommensurable theories is a localized inability to translate exactly between inter-defined sub-sets of the terms used by theories. The theories share a significant amount of vocabulary within which it is possible for comparison to be made: “the terms that preserve their meanings across a theory change provide a sufficient basis for the discussion of differences and for comparisons relevant to theory choice” (2000b, 36). Outside the area in which vocabulary is shared, comparison may be undertaken on the basis of reference. Kuhn allows that the reference of expressions of a theory may be identified even though the expressions are unable to be translated into the theory with which it is to be compared. (2000b, 40; 2000e, 190).

 In light of Kuhn’s denial of content incomparability, let us consider a further possible criterion for incommensurability. For Kuhn, what appears to be diagnostic for incommensurability is the inability to translate from the special vocabulary of one theory into the special vocabulary of another theory. Perhaps such inability to translate between the special languages of theories holds the key to incommensurability.

 The trouble with this proposal is that nothing substantive would remain of the claim of incommensurability. It may very well be the case that it is impossible to translate from one narrowly circumscribed set of terms into another such set of terms given such severe restrictions on the semantic resources to be employed in the attempt to translate. But what follows? Given that the content of untranslatable theories may be compared, incommensurability so construed constitutes no impediment to rational choice between theories. Given that scientists are able to understand what is said by theories whose terms are untranslatable into their own, no insuperable obstacle stands in the way of full communication between the “proponents of competing paradigms”. Given that the terms of mutually untranslatable theories may nonetheless refer to a shared domain of entities, it is entirely possible for science to progress in the sense that later theories yield an increase in knowledge about the same entities that earlier theories referred to. In sum, if untranslatability is the criterion for incommensurability, what remains of the claim has been so weakened that even if there are actual cases of incommensurability in the history of science they are of little or no interest. If mere inability to translate is the criterion for incommensurability, one wonders what all the fuss was about.

1. Conclusion

I began working on the problem of incommensurability in the early 1980’s. At the time, it was still a live issue. The debate was well-advanced. But the issue was not yet fully resolved. Incommensurability was seen as a threat to the rationality of theory-choice as well as to a realist view of the progress of science. Drawing on recent work in the philosophy of language, philosophers of science were working out the details of the referential response to incommensurability by developing a suitable account of reference for conceptual change in science. In addition, the question of translation was a topic of interest because the possibility of wholesale failure of translation seemed to give rise to a radical form of conceptual relativism due to alternative conceptual schemes.

 Returning to the topic from the perspective of the contemporary scene in the philosophy of science is like visiting a battlefield from a forgotten war. The positions of the warring sides may still be made out. But the battlefield is grown over with grass. One may find evidence of the fighting that once took place, perhaps bullet marks or shell holes. But the fighting ceased long ago. The battle is a thing of the past.

The problem of incommensurability is no longer a live issue. The present paper has taken the form of a *post-mortem* examination of a once hotly debated but now largely forgotten problem from an earlier period in the philosophy of science. Does anything remain of this dead issue? The thesis of incommensurability had a specific place at a specific point in the history of the philosophy of science. The heyday of incommensurability was the time of the great debates about theory-change that followed the initial publication of *Structure*. If there is a residual trace of the problem of incommensurability, it is perhaps in the sense that the idea that there is conceptual change in science now seems commonplace. But the much-feared consequences, such as incomparability, communication breakdown and irrationality now all seem to have been greatly overblown.

There is, of course, vigorous ongoing debate with respect to the prospects of a scientific realist philosophy of science. There is, as well, significant interest in the related question of the nature and scope of scientific progress. At an earlier stage in discussion of the incommensurability thesis, the suggestion that there may be wholesale discontinuity of reference in the transition between semantically variant theories gave rise to doubts about a realist view of progress as build-up of truth about a shared domain of entities. But, with the demise of the incommensurability thesis, the debate about scientific realism is free to proceed in a manner that is unencumbered by the semantic concerns about wholesale referential discontinuity that were prompted by the incommensurability thesis.

References

Feyerabend, Paul. 1981. *Realism, Rationalism and Scientific Method: Philosophical Papers, Volume 1*. Cambridge: Cambridge University Press.

Feyerabend, Paul. 1981a. “Explanation, Reduction and Empiricism.” In Feyerabend 1981: 44-96.

Feyerabend, Paul. 1981b. “On the ‘Meaning’ of Scientific Terms” In Feyerabend 1981: 97-103.

Feyerabend, Paul. 1981c. “Reply to criticism: Comments on Smart, Sellars and Putnam.” In Feyerabend 1981: 104-31.

Feyerabend, Paul. 1982. *Science in a Free Society*. London: Verso.

Feyerabend, Paul. 2010. *Against Method* (4th ed.). London: Verso.

Hoyningen-Huene, Paul. 2015. “Kuhn’s Development Before and After *Structure*.” In *Kuhn’s Structure of Scientific Revolutions – 50 Years On*, edited by William J. Devlin and Alisa Bokulich. Springer International Publishing Switzerland.

Hoyningen-Huene, Paul and Eric Oberheim. 2009. “Reference, Ontological Replacement and Neo-Kantianism: A Reply to Sankey.” *Studies in History and Philosophy of Science* 40: 203-9.

Hoyningen-Huene, Paul and Howard Sankey, eds. 2001. *Incommensurability and Related Matters*. Dordrecht: Kluwer Academic Publishers.

Kuhn, Thomas S. 1977. “Objectivity, Value Judgment and Theory Choice.” In *The Essential Tension*, 320-39. Chicago: University of Chicago Press.

Kuhn, Thomas S. 2000. *The Road Since STRUCTURE*, edited by James Conant and John Haugeland. Chicago: University of Chicago Press.

Kuhn, Thomas S. 2000a. “What Are Scientific Revolutions?” In Kuhn 2000: 13-32.

Kuhn, Thomas S. 2000b. “Commensurability, Comparability, Communicability.” In Kuhn 2000: 33-57.

Kuhn, Thomas S. 2000c. “The Road Since *Structure*.” In Kuhn 2000: 90-104.

Kuhn, Thomas S. 2000d. “Reflections on my Critics.” In Kuhn 2000: 123-75.

Kuhn, Thomas S. 2000e. “Theory Change as Structure Change: Comments on the Sneed Formalism.” In Kuhn 2000: 176-95.

Kuhn, Thomas S. 2000f. “Metaphor in Science.” In Kuhn 2000: 196-207.

Kuhn, Thomas S. 2000g. “Afterwords.” In Kuhn 2000: 224-52.

Kuhn, Thomas S. 2012. *The Structure of Scientific Revolutions* (4th ed.). Chicago: University of Chicago Press.

Lakatos, Imre. 1970. “Falsification and the Methodology of Scientific Research Programmes.” In *Criticism and the Growth of Knowledge*, edited by Imre Lakatos and Alan E. Musgrave, 91-196. Cambridge: Cambridge University Press.

Laudan, Larry. 1977. *Progress and its Problems*. Berkeley: University of California Press.

Laudan, Larry. 1984. *Science and Values*. Berkeley: University of California Press.

Laudan, Larry. 1987. “Progress or Rationality? Prospects for a Normative Naturalism.” *American Philosophical Quarterly* 24: 19-31.

Laudan, Larry. 1996. *Beyond Positivism and Relativism*. Boulder: Westview Press.

Martin, Michael. 1971. “Referential Variance and Scientific Objectivity.” *British Journal for the Philosophy of Science* 22: 17-26.

Mizrahi, Moti. 2015. “Kuhn’s Incommensurability Thesis: What’s The Argument?” *Social Epistemology* 29: 361-78.

Nola, Robert, and Howard Sankey. 2007. *Theories of Scientific Method: An Introduction*. Stocksfield: Acumen.

Oberheim, Eric and Paul Hoyningen-Huene. 2013. “The Incommensurability of Scientific Theories.” *Stanford Encyclopedia of Philosophy* (2015 edition), edited by E. N. Zalta, URL = http://plato.stanford.edu/entries/incommensurability/

Sankey, Howard. 1991. “Incommensurability, Translation and Understanding.” *The Philosophical Quarterly* 41: 414-26.

Sankey, Howard. 1993. “Kuhn’s Changing Concept of Incommensurability.” *British Journal for the Philosophy of Science* 44: 775-91.

Sankey, Howard. 1994. *The Incommensurability Thesis*. Aldershot: Avebury.

Sankey, Howard. 1998. “Taxonomic Incommensurability.” *International Studies in Philosophy of Science* 12: 7-16.

Sankey, Howard. 2000. “Methodological Pluralism, Normative Naturalism and the Realist Aim of Science.” In *After Popper, Kuhn and Feyerabend: Recent Issues in Theories of Scientific Method*, edited by Robert Nola and Howard Sankey, 211-29. Dordrecht: Kluwer Academic Publishers.

Sankey, Howard. 2009a. “Scientific Realism and the Semantic Incommensurability Thesis.” *Studies in History and Philosophy of Science* 40: 196-202.

Sankey, Howard. 2009b. “A Curious Disagreement: Response to Hoyningen-Huene and Oberheim.” *Studies in History and Philosophy of Science* 40: 210-12.

Scheffler, Israel. 1967. *Science and Subjectivity*. Indianapolis: Bobbs-Merrill.

Shapere, Dudley. 1984. *Reason and the Search for Knowledge*. Dordrecht: Reidel.

Worrall, John. 1999. “Two Cheers for Naturalised Philosophy of Science.” *Science & Education* 8: 339-61.

1. Notes

 The distinction was introduced in Hoyningen-Huene and Sankey (2001, ix). [↑](#endnote-ref-1)
2. The one exception is Feyerabend’s discussion in *Against Method* of the transition from the archaic world-view to that of the pre-Socratics in Greek antiquity (2010, chapter 16). [↑](#endnote-ref-2)
3. More specifically, Feyerabend argues that the concept of impetus is unable to be defined on the basis of the “theoretical primitives” of Newtonian physics (1981a, 65-7). Moreover, an empirical hypothesis that impetus co-occurs with momentum is also incompatible with Newtonian physics (1981a, 67). [↑](#endnote-ref-3)
4. For analysis of these developments, see my (1993) and (1998). For a glimpse of the final phase of Kuhn’s thought found in unpublished material, see Hoyningen-Huene (2015). [↑](#endnote-ref-4)
5. One of Kuhn’s main examples is the transition from Ptolemaic to Copernican astronomy: “Before it occurred, the sun and moon were planets, the earth was not. After it, the earth was a planet, like Mars and Jupiter; the sun was a star; and the moon was a new sort of body, a satellite” (2000a, 15). [↑](#endnote-ref-5)
6. In the literature on the referential response to semantic incommensurability the issue of reference determination looms large. The question of the extent to which reference varies with theory change turns crucially on whether reference is determined by description or causal relation or some combination of the two. I set this topic to one side in the present discussion. But see my (1994) for an overview of the relevant literature. [↑](#endnote-ref-6)
7. For detailed discussion of this issue, see my (1991). [↑](#endnote-ref-7)
8. For some of the most influential treatments of this topic, see Lakatos (1970), Laudan (1977; 1984), Scheffler (1967) and Shapere (1984). [↑](#endnote-ref-8)
9. For further discussion of the shared criteria, see the “Postscript – 1969” which Kuhn added to the second and later editions of *Structure* (2012, 184-6). [↑](#endnote-ref-9)
10. Less controversial, but not *un*controversial: Laudan points out that Kuhn’s view about the role of values in theory-choice accords a pervasive role to subjective factors (1996, 14). [↑](#endnote-ref-10)
11. On Kuhn’s failure to develop an adequate basis for the epistemic values, see Nola and Sankey (2007, 285-98). On the question of whether the normative basis of methodological rules is *a priori* or empirical, see Laudan’s proposal of normative naturalism (1987) and Worrall’s minimal *a priorism* (1999). For my attempt to set Laudan’s normative naturalist meta-methodology within a scientific realist framework, see Sankey (2000). [↑](#endnote-ref-11)
12. Among other things, I am not persuaded that the neo-Kantian interpretation favoured by Hoyningen-Huene and Oberheim is the correct interpretation of Feyerabend and Kuhn. In the present discussion, I am largely setting aside the question of the relationship between incommensurability and anti-realism proposed by Hoyningen-Huene and Oberheim. This was a major focus of our earlier exchange. In addition to the previously cited paper by Hoyningen-Huene and Oberheim (2009), see Sankey (2009a; 2009b). [↑](#endnote-ref-12)
13. In effect, Kuhn’s initial failure to understand Aristotle was due to his interpreting Aristotelian terms in a Newtonian sense. This might seem to constitute a counterexample to the claim of incommensurability, since the Aristotelian terms are translated into Newtonian vocabulary. But the translation was incorrect, as Kuhn realized when he came to understand the Aristotelian text. It is important to bear in mind that the translation failure that Kuhn takes to be involved in incommensurability is failure of exact translation. Mistranslation is not a counterexample to the claim that exact translation is impossible. [↑](#endnote-ref-13)
14. As described, the phenomenon appears to be a quite common one, occurring frequently in social interaction, and is by no means restricted to scientific revolution. [↑](#endnote-ref-14)