Some Reflections on Experimental Incommensurability:

Comment on Lena Soler

1. Experimental Incommensurability

Lena Soler discusses a purportedly new form of incommensurability, which she refers to as ‘machinic literal incommensurability’. She also employs the expression ‘experimental incommensurability’ to refer to roughly the same thing. As the former is a bit of a mouthful, I will opt for the latter expression.[[1]](#footnote-1)

Experimental incommensurability relates to variation in equipment and associated experimental practices across different laboratory contexts. It arises because no common measure exists between different instruments and practices associated with these different instruments. Such an absence of common measure between different instruments and practices is supposed to constitute a new and distinct form of incommensurability. It contrasts with the standard semantic form of incommensurability which arises due to semantic variation between the vocabulary utilized by theories. It also contrasts with methodological forms of incommensurability which arise due to variation in the methodological norms employed for the evaluation of alternative scientific theories. Experimental incommensurability arises due to variation of equipment and experimental practice between experimental settings. It has nothing to do with the meaning or reference of scientific terms, nor has it anything to do with the norms of scientific theory appraisal.

Lena Soler argues that experimental incommensurability involves methodological incommensurability and may even be a form of such incommensurability (see her discussion of Pickering in section 6). As such, it does not constitute a new form of incommensurability. I think this is right. But I will attempt to broaden this result by showing that it is not a new form of incommensurability in addition to *either* semantic or methodological incommensurability. But, before arguing for this claim, I will deal with several other issues first.

2. Incommensurability and Experiment

Before turning to the content of Soler’s paper, I would like to make two brief remarks about the relationship between the idea of experimental incommensurability and the more traditional discussion of incommensurability.

It is of some interest to note that Kuhn made passing reference to the possibility of incommensurability relating to experimental apparatus in his original discussion in *The Structure of Scientific Revolutions*:

Since new paradigms are born from old ones, they ordinarily incorporate much of the vocabulary and apparatus, both conceptual and manipulative, that the traditional paradigm had previously employed. But they seldom employ these borrowed elements in quite the traditional way. Within the new paradigm, old terms, concepts, and experiments fall into new relationships one with the other. (Kuhn, 1996, p. 149)

I would not wish to cite this passage as evidence that Kuhn anticipated the idea of experimental incommensurability. Nor would I wish to cite it as evidence that experimental incommensurability is not a new form of incommensurability, since it formed part of Kuhn’s original notion of incommensurability. But I think it is evidence that, in his original way of thinking about the topic, Kuhn was sympathetic to the idea that difference in the use of experimental apparatus might be one basis for incommensurability.

Second, it is important to note that the idea of experimental incommensurability arises in the context of a specific development in recent history and philosophy of science. The traditional discussions of semantic and methodological incommensurability were situated in an earlier problematic. They took place in the context of the problem of scientific theory comparison, where philosophers were concerned to defend the rationality and progressiveness of scientific theory change and choice from various relativist and irrationalist challenges. By contrast, the idea of experimental incommensurability has arisen within the context of the ‘new experimentalism’, which is proposed as a corrective to the traditional focus on scientific theories, theory appraisal and the relation between theory and reality. As a result, the location of experimental incommensurability tends to be scientific instrumentation and experimental practice, rather than evaluation or comparison of alternative scientific theories.

Thus, experimental incommensurability would arise in the first instance as a problem for the comparison of scientific instrumentation, experimental results and laboratory practice. But, since theories may be grounded in such instruments, results and practices, experimental incommensurability has the potential to give rise to an incommensurability between alternative theories as well.

3. Condition C: Catastrophic Connotations

Soler introduces two “minimal requirements” which must be satisfied for “legitimate use of the term ‘incommensurability’” (p. 5). The first is the Absence of Common Measure condition. The second is Condition C: the catastrophic connotations condition. I regard the first condition as relatively unproblematic (though I will discuss a related issue in the next section). But Condition C is a retrograde step which is to be resisted.

According to Condition C, in order for use of the term ‘incommensurability’ to be “legitimate”, use of the term must give rise to what Soler describes as “catastrophic connotations”. This is because the term ‘incommensurability’ has “a strong emotional potential” (p. 5):

... what is the effect of the word ‘incommensurability’ on the group of people who reflect on the nature of science...? Beyond individual fluctuations we can say, globally, that the term very largely induces strong, if not violent reactions. These reactions can be negative or positive. But whatever their quality may be, the term ‘incommensurability’ is not neutral. (Soler, p. 6)

Soler explains that the reason why use of the term elicits strong reactions is that it implies that “something essential is questioned about science” (p. 5). Those whose reactions are negative find incommensurability to be “damaging” (p. 5) or “dangerous” (p. 6). Those whose reactions are positive find it to be “liberating” (p. 6). All parties agree that “something essential [about science] is at stake” (p. 6).

It is first to be noted that controversy has surrounded the idea of incommensurability almost since it came on the scene in the philosophy of science. Soler is therefore right that as a matter of the *reception* of the idea, incommensurability has been the subject of strong reactions. Nevertheless, the proposal to treat “catastrophic connotations” as a criterion for the application of the term is an ill-conceived proposal.

The “catastrophic connotations” of the idea of incommensurability are not the same as the idea itself. It is no part of the content of the claim of incommensurability that incommensurability has catastrophic consequences. This is so whether one is thinking in terms of semantic or methodological forms of incommensurability. To say that two theories or experimental practices are incommensurable is to say that they are incomparable either by means of shared semantic content or by means of shared methodological standards. While it may be controversial to say that theories or experimental practices are incomparable in these ways, it is no part of the claim of incommensurability that such incomparability must itself be considered to be controversial. That is something that depends on the way in which the claim of the incomparability of theories or practices is received by philosophers of science. Thus, the controversial character of the claim is something in addition to the claim itself, which depends on how the claim is received.

Soler appears to concede this point at the start of section 2.3 where she allows that the “damaging consequences” of incommensurability “are not intrinsic features of the scientific configurations under study” (p. 7). But this is only an apparent concession. For, as we have seen above, Soler treats Condition C as a criterion for the application of the term ‘incommensurability’, since she says that it is a “requirement” for the “legitimate use of the term” (p. 5). This means that if a particular application of the term fails to have “catastrophic connotations”, it fails in that instance to denote a genuine case of incommensurability. That is, because Condition C is a criterion for the application of the term ‘incommensurability’, Condition C erroneously makes the “catastrophic connotations” part of the very content of the idea of incommensurability.

Failure to distinguish response to the claim of incommensurability from the content of that claim does little to improve the clarity of the discussion. But, as I will now argue, the situation is worse than this. It leads to the unwelcome result that paradigm cases of claims of incommensurability may fail to count as instances of the incommensurability thesis.

I will illustrate the point with reference to Kuhn’s later taxonomic version of the incommensurability thesis. In his later work, Kuhn proposed a refined version of the semantic incommensurability thesis, according to which incommensurability consists of failure of intertranslatability of localized subsets of interdefined terms within the lexicons of alternative theories (see Kuhn, 2000, Ch.2). Because such local incommensurability is restricted to subsets of terms, there is significant scope for the direct comparison of the empirical predictions of theories because these may be expressed in vocabulary that is shared between the theories. Kuhn is careful to distinguish between translation and communication, insisting that local incommensurability presents no obstacles for communication or understanding between scientists. And, as I have shown in my paper, ‘Taxonomic Incommensurability’ (Sankey, 1998), the localized incommensurability thesis represents no threat whatsoever to a scientific realist account of scientific progress.

In short, Kuhn’s final taxonomic incommensurability thesis represents no threat whatsoever to the rationality or progressiveness of science. Its “emotional potential” of both a negative and positive character has therefore been downgraded. Its “catastrophic connotations” have been removed. But, so far from saying that such taxonomic incommensurability fails to qualify as a species of incommensurability, as Soler must do, what follows is that the taxonomic incommensurability thesis is a weakened version of the incommensurability thesis from which much of the interest has disappeared.

4. The Problem of Rivalry

As noted at the start of the previous section, I regard Soler’s Absence of Common Measure Condition as relatively unproblematic. The condition is well-motivated given the meaning of the word ‘incommensurability’. For there to be no common measure is part of what it means to be incommensurable.

But problems emerge when one probes further into the relationship between incommensurable alternatives. In section 5, Soler claims that “we must include the *requirement of rivalry* as a *necessary condition* of the experimental incommensurability verdicts” (p. 18). Soler further expands the point as follows:

When we say that two scientific practices compete, we assume, at the most fundamental level, that they are mutually exclusive in principle and hence that both should not be maintained in fact. This goes with the demand to choose either one or the other, or alternatively, to find a way to reconcile them ... If we ... ask what kind of assumption lies behind the idea that two scientific practices are mutually exclusive, and cannot both be maintained, we find the commitment that the two researches under comparison should not be in conflict *because they study the same reality*: for example, the physical world for two competing physics ... Let us talk about a rivalry related to the identity of the targeted object. (p. 18)

In this passage, and throughout much of section 5, Soler’s aim is to show that a condition of rivalry must also be imposed on claims of experimental incommensurability. In order for the claim of incommensurability to get a grip, it must be the case that the purportedly incommensurable practices are in fact in a relation of rivalry.

The requirement of rivalry has a sound rationale that has been widely endorsed in the semantic incommensurability literature. It reflects the fact that the problem of incommensurability arises in relation to choice between competing alternatives. The usual context for discussion of both semantic and methodological forms of incommensurability has been that of scientific theory-choice, in which scientists must choose between two or more competing theories, for example, in the context of a scientific revolution. In the case of experimental incommensurability, the context is presumably one in which a choice is to be made between alternative experimental practices or scientific instrumentation.

But to treat rivalry simply as a requirement obscures a significant fact about the issue of rivalry. The notion of rivalry originally entered discussion of the topic of incommensurability as the basis for an objection to the idea of incommensurability, rather than as a requirement on the relation of incommensurability. Authors such as Dudley Shapere (1966) and Israel Scheffler (1967, especially p. 82) objected that it was entirely unclear how theories with no meaning in common, without common observations or shared evaluative standards, and which might even be about different Kuhnian “worlds”, could ever enter into a relation of rivalry in the first place. The problem was particularly acute in relation to the issue of semantic incommensurability. For if terms of incommensurable theories share no meaning in common, then it is not possible for assertions of one theory to either assert or deny assertions of a theory with which it is incommensurable (Shapere, 1966, p. 57; cf. Feyerabend, 1981, p. 115).

The proposal to treat rivalry as a requirement for incommensurability fails to address the problem of how a relation of rivalry can even arise between incommensurable alternatives. In the passage cited above, Soler does mention that incommensurable alternatives are “mutually exclusive” and notes that there must be an “identity of the targeted object”. But, in the context of the issue of semantic incommensurability, it remains unclear how assertions stated in semantically variant terminology might be “mutually exclusive”, since the absence of shared meaning entails that they are unable to enter into a relation of conflict. And being about the same “targeted object” does not entail rivalry, since assertions about the same thing do not necessarily enter into disagreement.

These problems have never been entirely resolved by proponents of the thesis of incommensurability. And it is not without interest to remind ourselves of these problems in the context of the purportedly new experimental form of incommensurability. For how exactly are different sets of instruments, or different experimental practices, meant to enter into a relation of rivalry with one another? To merely insist upon rivalry as a requirement for experimental incommensurability will not take us very far. For what remains to be explained is how different sets of instruments or practices might enter into a relation of rivalry in the first place.

What I suggest is that the only handle we have on the relevant notion of rivalry involves the notion of disagreement. The condition of rivalry will obtain when assertions about instruments or practices enter into conflict. This is the only form of rivalry of which we have any clear understanding. Given this, I suggest that the problem of experimental incommensurability reduces to the problem of semantic incommensurability. Until such time as we have reason to believe in semantic incommensurability, we have no reason to take talk of experimental incommensurability seriously. I will attempt to reinforce this claim in the next section.

5. A New Form of Incommensurability?

I turn now to the question of whether experimental incommensurability is a form of incommensurability distinct from either semantic or methodological forms of incommensurability. For the sake of argument, let us assume that the idea of experimental incommensurability is sufficiently clear that it makes sense to assume that there may be distinct experimental practices grounded in different instrumentation. Given the differences between the instruments employed, there might be no way to directly compare the results derived from experiments using these instruments. I take it that this is the sort of situation in which experimental incommensurability is supposed to arise.

Now, if experimental incommensurability is a distinct form of incommensurability, then it ought to arise even in the absence of semantic and methodological forms of incommensurability. That is, it should be possible for alternative theories, practices or instruments to be machine incommensurable even if they are semantically or methodologically commensurable.

But if this is so, then it is not clear that any real problem of commensurability arises. If vocabulary and concepts are shared, then there is no problem with comparison of content, since theories, practices and experimental results can be compared using a common language. And if the norms of scientific research are also shared, there can be no methodological obstacle to the comparative appraisal of theories, practices or equipment.

Let me try to make this point clear by means of a simple example. Consider a simple instrument, the ruler, or measuring-stick. Rulers are used to measure length. Different systems of measurement are used in different parts of the world. Some of us employ the imperial system of feet and inches, while others use the metric system. Rulers can be based on either system of measurement. There is therefore a sense in which those who use an imperial ruler use a different instrument of measurement from those who use a metric ruler.

Since those who use the imperial ruler to measure length will arrive at a different numerical result from those who use a metric ruler, the question arises of whether any common measure exists between the two instruments. In a quite literal sense, the question arises of whether the two measuring instruments are commensurable.

One might seek to establish a common measure between the two instruments by employing each of the rulers to measure the units of measurement on the other ruler. If we proceed in this way, we would find, for example, that an inch equals 25.4 millimetres, and that a millimetre equals .039 of an inch. We could then set up a conversion from one system into the other, so that measurements produced using one ruler could be converted to measurements that would be obtained using the other kind of ruler. If such conversion is possible, then it is possible to compare measurements obtained using one kind of ruler with measurements obtained using the other kind of ruler.

But suppose it is impossible to convert from one system of measurement into the other. Then it might be said that the imperial and metric rulers were incommensurable. But such incommensurability would be incommensurability in the standard, semantic sense of inability to compare due to failure of translation.

The only other possible source of incommensurability would be if there were no common procedures of measurement. Suppose that users of the imperial ruler only allow direct visual inspection of the ruler, whereas the users of the metric ruler only permit tactile inspection of the ruler. Then there would be no common procedure of measurement. But if there is no common procedure of measurement, then the incommensurability that arises would be methodological incommensurability due to lack of common methodological norms or standards.

At least in the case of this simple example, there is no apparent basis for postulating the existence of a third, experimental form of incommensurability, over and above the standard semantic and methodological forms of incommensurability. The ball therefore lies in the court of those who think that there is a further, distinct form of incommensurability that needs to be introduced.

Howard Sankey

University of Melbourne

**References**

Feyerabend, Paul (1981), ‘Reply to Criticism: Comments on Smart, Sellars and Putnam’ in *Realism, Rationalism and Scientific Method: Philosophical Papers, Volume 1*, Cambridge University Press, Cambridge, pp. 104-131

Kuhn, T.S. (1996), *The Structure of Scientific Revolutions*, 3rd Edition, University of Chicago Press, Chicago

Kuhn, T.S. (2000), *The Road Since STRUCTURE*, J. Conant and J. Haugeland (eds), University of Chicago Press, Chicago

Sankey, Howard (1998), ‘Taxonomic Incommensurability’, *International Studies in the Philosophy of Science* 12, 7-16

Scheffler, Israel (1967), *Science and Subjectivity*, Bobbs-Merrill, Indianapolis

Shapere, Dudley (1966), ‘Meaning and Scientific Change’, in R. G. Colodny (ed.) *Mind and Cosmos*, University of Pittsburgh Press, Pittsburgh, pp. 41-85

1. The difference between ‘machinic literal’ and ‘experimental’ forms of incommensurability is a subtle one. Soler says that the latter is more general (p. 2). Presumably, the former involves instrumentation, while the latter relates to experiment in general. The difference need not concern us here. [↑](#footnote-ref-1)