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The Notion of Incommensurability

In a paper published in 2012, I argued that Kuhn made the intellectual space for the creation of sociology of scientific knowledge and all that followed. I suggested, however, that pretty well all Kuhn's (e.g., 1962) ideas had been anticipated. At the request of the editors of this volume I will begin by repeating some of those arguments. Thus, as is now well-known, many of the ideas in '*Structure ...*' were anticipated in Ludwik Fleck's (1935), *Genesis and Development of a Scientific Fact*. Less well known is that the idea of paradigm change, which is not found in Fleck, was anticipated. Consider the following passage:

To illustrate what is meant by saying that the social relations between men and ideas which men's action embody are really the same thing considered from different points of view, I want now to consider the general nature of what happens when the ideas current in a society change: when new ideas come into the language and old ideas go out of it. In speaking of 'new ideas' I shall make a distinction. Imagine a biochemist making certain observations and experiments as a result of which he discovers a new germ which is responsible for a certain disease. In one sense we might say that the name he gives this new germ expresses a new idea, but I prefer to say in this context that he has made a discovery within the existing framework of ideas. I am assuming that the germ theory of disease is already well established in the scientific language he speaks. Now compare with this discovery the impact made by the first formulation of that theory, the first introduction of the concept of germ into the language of medicine. This was a much more radically new departure, involving not merely a new factual discovery within an existing way of looking at things, but a completely new way of looking at the whole problem of the causation of diseases, the adoption of new diagnostic techniques, the asking of new kinds of questions about illnesses, and so on. In short it involved the adoption of new ways of doing things by people involved, in one way or another, in medical practice. An account of the way in which social relations in the medical profession had been influenced by this new concept would conclude an account of what that concept was. Conversely, the concept itself is unintelligible apart from its relation to general medical practice. A doctor who (i) claimed to accept the germ theory of disease, (ii) claimed to aim at reducing the incidence of disease, and (iii) completely ignored the necessity of isolating infectious patients, would be behaving in a self-contradictory and unintelligible manner.

This passage can be found in a book published four years before '*Structure ...*' written by the Wittgensteinian philosopher Peter Winch (1958: 121–122). For me, it was Winch who provided the set of ideas that led me to read Wittgenstein's (1953) *Philosophical Investigations* and provided the template for me to understand it. What this meant was that when I stumbled across a hardback copy of '*Structure ...*' in a bookshop and, intrigued by the title, took it home and read it,

I saw it as the application of the Wittgensteinian idea of ‘form-of-life’ to science. And, of course, it is well known that David Bloor, who probably wrote the first paper (1973) that belongs to the sociology of scientific knowledge, spent a large proportion of his academic life trying to convince philosophers that Wittgenstein was as much a sociologist as a philosopher and that his ideas could be used as the backbone of the sociology of scientific knowledge (books published in 1976 and 1983). As far as British sociology of knowledge is concerned, I think it was Wittgenstein, and for me especially Winch, rather than Kuhn, who provided the intellectual meat.

This, I want to argue, does not reduce Kuhn’s importance as much as it might because without his book we might well not have noticed what all those existing ideas were pointing to. For me personally, without Kuhn I might not have noticed what that passage in Winch, who I had been reading with great thoroughness, signified. I might not have noticed that Winch had already invented what amounted to normal and revolutionary science. Without Kuhn, no-one might have thought it worthwhile to translate Ludwik Fleck’s book into English (it happened in 1979) because no-one could have noticed the mention of Fleck in the preface to ‘Structure ...’ and no-one could have noticed the extent to which ‘Structure’s’ ideas had been anticipated. Kuhn, I argued then, and want to say again, made the space for the sociology of scientific knowledge even if the ideas that were drawn on when it was put into practice came from somewhere else and that, furthermore, those other ideas were stronger because of the way they integrated concepts and practice (see the Winch quote), whereas Kuhn was later tempted to start disassembling paradigms into their component parts – a terrible mistake.

All that said, there is brilliance and originality in Kuhn and it is certainly found in the idea of incommensurability; incommensurability has the best claim of all the ideas to be his alone and it is his most important idea. We have almost forgotten that before Kuhn talked of incommensurability and paradigm revolution, the crystal of science seemed perfect and impenetrable. Before Kuhn, science was thought of as driven by its internal logic supported by a universal language and uniform practices. There could not be a sociology of scientific knowledge because science was an automaton with humans merely in attendance. The only possibility was, as Laudan (1983) insisted, a sociology of error – explanations of what caused Nature’s attendants to do their job carelessly. The idea that different scientists could take the same logic and the same data and legitimately synthesize two different pictures of the world was itself a revolution in thought and it was that revolution that smashed the crystal into fragments and allowed the sociology of knowledge to reassemble them in many different ways.

I think that incommensurability has been shamefully neglected, perhaps because it has been thought to have been finessed by Galison's (e.g.1997) trading zone idea. But the observation that groups on different sides of a conceptual divide can work together does not do away with the basic idea of incommensurability nor its problems. The revelation was that different groups can quite reasonably see the world in different ways in spite of their common experimental and logical environment. The consequences are everywhere from the repeated failures of interdisciplinary projects, to arXiv's tortured policing of its boundaries, to vaccine revolts and the row over global warming.

Incommensurability, then, is all around us. It is useful to invoke a fractal model. Incommensurability happens at a whole variety of levels each one of which reflects the structure of the one above and below. Kuhn had scientific revolutions in mind – the change from a Newtonian universe to an Einsteinian universe – but the same kind of thing happens at every level. Expressed in the way incommensurability impacts on practical life, the basic thing is this: we learn to see the world through socialization – mainly linguistic socialization (Collins and Evans, 2007), and scientific socialization varies from place to place. It is sometimes impossible and always very hard to find a summary description of the differences and thus resolve them. This is because it is impossible, or very hard, to capture what comes to be understood through immersion in an oral culture without being immersed. What comes to be understood is tacit. Since oral cultures come in varieties of sizes embedded within one-another, so does incommensurability. Incommensurability is sometimes writ large and sometimes writ small.

I want to suggest that the logical version of incommensurability – analogous with the relationship of the length of the side and diagonal of a square – as just the strongest and most colorful version of the idea. But sometimes tacit knowledge can be explicated. I classify tacit knowledge according to its degree and method of explicability reserving only one class out of three to be inexplicable in the foreseeable future (Collins, 2010). Sometimes it turns out to be possible to find a way of translating the vocabularies once everyone gets together long enough to discover the problems and put in enough work. But, and this is crucial, that these difficulties can sometimes be resolved does not mean that they are not part of the problem to which Kuhn drew attention. Prior to the point when the need for translation has been noticed and the painful process of translation is completed, there is effective incommensurability and in terms of its effects it might just as well be the real, quasi-logical, thing. The boundaries of practice-language groups (Collins, 2011) remain the boundaries of knowledges whether they are penetrable or not.

For example, when philosopher, Martin Kusch, and sociologist, Harry Collins, were writing *The Shape of Actions* (1998) we spent months using the word 'action' in different ways without realizing it – simply puzzled and frustrated by the fact that we could not sort out the foundation of the book. Luckily, once we spotted what was going on we could inter-translate the philosophers meaning of action and the sociologist's. There was no side-and-diagonal-of-a-square incommensurability; it was more like the side and circumference. Nevertheless, until we realized what was going on we were in a situation of complete puzzlement that we would never have noticed, leave alone resolved, if we had not been pushed together for hours in front of the same whiteboard.

Scientists have a variety of practical means for resolving these problems. For genuine interdisciplinarity to come about it is necessary for the different groups to spend years talking to each other, some of the time learning each other's non-translatable languages and some of the time spotting where common vocabularies mask diverse meanings. We now know that to talk meaningfully, even when translation is not possible, it is not necessary to master another's practices only acquire the interactional expertise necessary to talk meaningfully – that is, learn the practice-languages (Collins and Evans, 2007, Collins, 2011). Easier is the ambassadorial model where, not the whole group, but a member of a group learns the practice language of the others and can then act as an authentic representative of the other group. There is the boundary object, or trading zone, model, where different meanings may be invested in the same object but it can still be used as a medium of intellectual exchange, and there is the boundary language model, where new pidgins and creoles are invented to span a border (though I have never actually encountered such a thing in my practice or fieldwork). There is also the multi-disciplinary, as opposed to interdisciplinary, model where a manager learns the various practice languages and co-ordinates the outcomes from what are otherwise self-contained communities and there is the consultancy model, where one group simply commissions a piece of work from another, knowing nothing of the methods or concepts that go into producing it.

Non-logical versions of incommensurability are extraordinarily important. One variant, which is especially important to the relationship between experts and the public, is driven by the difference between the published and electronically promulgated literature, on the one hand, and the understanding of that literature in the relevant oral cultures on the other. There are members of the general public reading the primary source literature or the internet who have no idea that what they are reading is counted as worthless in the oral culture of the mainstream science. It is quite

impossible to judge these things from the appearance of the publications while the arguments on the Internet look utterly convincing (Collins and Evans, 2007). It is the scientific argument on the Internet that was used by South African President, Thabo Mbeki to justify not distributing anti-retroviral drugs to his people but the scientific arguments were long dead in the oral community. It is the Internet that drives other vaccine revolts, such as that over MMR, not the mainstream literature. Even in science proper, there are scientists in field 'A', basing their research on published results emerging from field 'B', which everyone immersed in B's oral culture knows are wrong; that this happens is matter-of-fact knowledge among physical scientists. At the scale of whole sciences, the physics pre-print server arXiv grapples with incommensurability every day as it tries to find a way to police its boundaries, defining some scientists and their sciences in, and some out. All the protagonists are highly qualified and often highly published, though those outside the oral culture are often published only in fringe journals (Collins 2012b).

Trevor Pinch and I wrote (1982) a Kuhn-inspired book on the incommensurable relationship between parapsychology and mainstream science showing how the very same set of detailed observations of child spoon-benders could be read two opposite ways. Today I can try to discuss parapsychology with more or less any senior physicist and will be met with a certainty that its practitioners are fools or charlatans or both. They are not, they just see the world a different way and Kuhn led Pinch and I to see this. As we put it, Kuhn invented a new way of not being able to do (or see, or speak of) two different things at the same time.

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