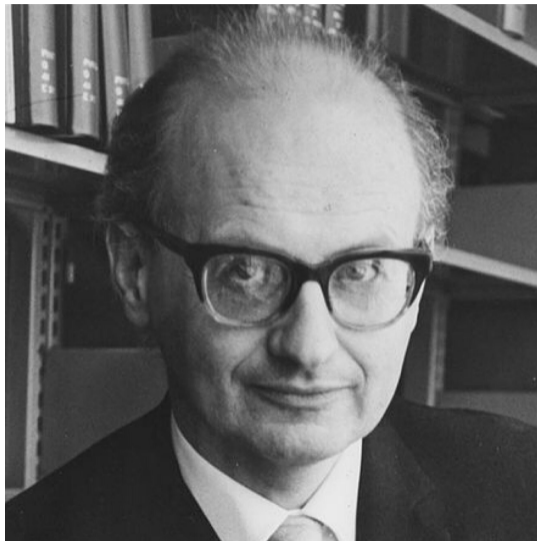


Lakatos and Hanson

LFILO2602 – Philosophy of Science
Session 2

Imre Lakatos (1922–1974)



Solving the Demarcation Problem



But what is 'experimental' reasoning? If we look at the vast seventeenth-century literature on witchcraft, it is full of reports of careful observations and sworn evidence - even of experiments. Glanvill, the house philosopher of the early Royal Society, regarded witchcraft as the paradigm of experimental reasoning. (2)



There is a very plausible explanation. Scientists want to make their theories respectable, deserving of the title 'science', that is, genuine knowledge. Now the most relevant knowledge in the seventeenth century, when science was born, concerned God, the Devil, Heaven and Hell. [...] Theological knowledge cannot be fallible: it must be beyond doubt. (2)



Why Not Falsificationism?

Is, then, Popper's falsifiability criterion the solution to the problem of demarcating science from pseudoscience? No. For Popper's criterion ignores the remarkable tenacity of scientific theories. Scientists have thick skins. They do not abandon a theory merely because facts contradict it. They normally either invent some rescue hypothesis to explain what they then call a mere anomaly or, if they cannot explain the anomaly, they ignore it, and direct their attention to other problems. (3-4)



Lakatos's Approach

- 1 “the typical descriptive unit of great scientific achievements is not an isolated hypothesis but rather a research programme.” (4)
- 2 Research programmes come with three parts:

These four laws constitute only the ‘hard core’ of the Newtonian programme. But this hard core is tenaciously protected from refutation by a vast ‘protective belt’ of auxiliary hypotheses. And, even more importantly, the research programme also has a ‘heuristic’, that is, a powerful problem-solving machinery, which, with the help of sophisticated mathematical techniques, digests anomalies and even turns them into positive evidence. (4)

Each of them, at any stage of its development, has unsolved problems and undigested anomalies. **All theories, in this sense, are born refuted and die refuted.** But are they equally good? Until now I have been describing what research programmes are like. But how can one distinguish a scientific or progressive programme from a pseudoscientific or degenerating one? (5)



Proressive Research Programmes

What really count are dramatic, unexpected, stunning predictions: a few of them are enough to tilt the balance; where theory lags behind the facts, we are dealing with miserable degenerating research programmes. (6)



Lakatos on Theory Change

One must treat budding programmes leniently: programmes may take decades before they get off the ground and become empirically progressive. Criticism is not a Popperian quick kill, by refutation. Important criticism is always constructive: there is no refutation without a better theory. (6)



N. R. Hanson (1924–1967)



Seeing is an experience. A retinal reaction is only a physical state—a photochemical excitation. Physiologists have not always appreciated the differences between experiences and physical states. People, not their eyes, see. (6)





Suppose that the only object to be seen is a certain lead cylinder. Both men see the same thing: namely this object—whatever it is. It is just here, however, that the difficulty arises, for while Tycho sees a mere pipe, Kepler will see a telescope, the instrument about which Galileo has written to him. (7)



Here the 'formula' re-enters: 'These are different *interpretations* of what all observers see in common. Retinal reactions...are virtually identical; so too are our visual sense-data, since our drawings of what we see will have the same content. There is no place in the seeing for these differences, so they must lie in the interpretations put on what we see.' (9)



This sounds as if I do two things, not one, when I see boxes and bicycles. Do I put different interpretations on fig. 1 when I see it now as a box from below, now as a cube from above? I am aware of no such thing. [...] Fig. 1 is simply seen now as a box from below, now as a cube from above; one does not first soak up an optical pattern and then clamp an interpretation on it. (9)





Is the physicist doing more than just seeing? No; he does nothing over and above what the layman does when he sees an X-ray tube. What are you doing over and above reading these words? Are you interpreting marks on a page? When would this ever be a natural way of speaking? (16)





The infant and the layman can see: they are not blind. But they cannot see what the physicist sees; they are blind to what he sees. We may not hear that the oboe is out of tune, though this will be painfully obvious to the trained musician. (Who, incidentally, will not hear the tones and *interpret* them as being out of tune, but will simply hear the oboe to be out of tune. We simply see what time it is; the surgeon simply sees a wound to be septic...) (17)



Theory-Ladeness of Observation

There is a sense, then, in which seeing is a 'theory-laden' undertaking. Observation of x is shaped by prior knowledge of x . Another influence on observation rests in the language or notation used to express what we know, and without which there would be little we could recognize as knowledge. (19)



Theory-Ladenness of Observation

Seeing an object x is to see that it may behave in the ways we know x 's do behave: if the object's behaviour does not accord with what we expect of x 's we may be blocked from seeing it as a straightforward x any longer. (22)



Theory-Ladenness of Observation

...observation in physics is not an encounter with unfamiliar and unconnected flashes, sounds, and bumps, but rather a calculated meeting with these as flashes, sounds and bumps of a particular kind. (24)

