
- **The Problem of Conceptual Change in Science**
  A CLOSER LOOK AT THOMAS KUHN

- **Whither "Paradigm" and its manifold uses?** (Recall **Lecture IV**)

  "I shall henceforth refer to as 'paradigms' a term that relates closely to 'normal science.' By choosing it, I mean to suggest that some accepted examples of actual scientific practice---examples which include law, theory, application, and instrumentation together—provide model from which spring particular **coherent traditions of scientific research.**" **–***SSR*10

  "[A] paradigm is an accepted model or pattern…" (23)

  "History suggests that the road to a firm research consensus is extraordinarily arduous." (15)

  "Paradigms gain their status because they are more successful than their competitors in solving a few problems that the **group of practitioners has come to recognize as acute[1]…To be more successful is not, however, to be either completely successful with a single problem or notably successful with a large number."** (23)

  "[P]roblems of paradigm articulation are **simultaneously theoretical and experimental…**" (33)

  "A paradigm can…even insulate the community from those socially important problems that are not reducible to the puzzle form, because they cannot be stated in terms of the conceptual and instrumental tools that the paradigm supplies." (37)

  -Network-semantic holism (family resemblance[2]) (45)

- 'young' science

[1] The 'anomaly'
[2] His 'chair' example is straight late Wittgensteinian. Yet recall Musgrove's objections! Is Kuhns' notion of paradigm sufficiently nuanced not to imply such 'limits of language -> limits of world' skepticism?

"[However] there can be a sort of scientific research without paradigms, or at least without any so unequivocal and so binding as the ones named above. Acquisition of a paradigm and of the more esoteric type of research it permits is a sign of maturity in the development of any given scientific field." (11)

- Symptoms of Crisis for sciences in their infancy:

-Books and other published material refer less to works of colleagues, and more to "nature"[3]

-Fact-collecting crafts ('Natural histories') "No natural history can be interpreted in the absence of at least some implicit body of intertwined theoretical and methodological belief that permits selection, evaluation, criticism.[4]" (16-17)

"Today in the sciences, books are usually either texts or retrospective reflections…The scientist who writes one is more likely to find his professional reputation impaired than enhanced…In dynamics [the study of the causes of motion] research became similarly esoteric [as contemporary physics] in the later Middle Ages,…recaptur[ing] general intelligibility only briefly during the early 17th century when a new paradigm replaced the old one that had guided medieval research." (20)

Note 1: Is this question-begging on the part of Kuhn? Popper, for instance, in his essay "the Myth of the Framework" questions the 'external'/'internal' issue in a manner that alternate explanations can be offered (diminishing returns of corroboration.)

- **Mature science**

"Few people who are not actually practitioners of a mature science realize how much mop-up work…a paradigm leaves to be done…**No part of the aim of normal science is to call forth new sorts of phenomena; indeed those that will not fit the box are often not seen at all[5]…normal-scientific research is directed to the articulation of those phenomena and theories that the paradigm already supplies.[6]" (24)**

-Theories make 'contact' with nature in a very indirect fashion. In the "mature mathematical sciences[7]" such contact-points are usually the 'exemplars' which

[3] Which obviously, in an empirically question-begging sense, presupposes some kind of 'privileged access.'
[4] Which Kuhn of course takes as primary evidence for the notion of paradigm.
[5] Recall Musgrove and Fine's distinctions of "seeing-that," "seeing-as," "seeing." The former obviously presuppose a conceptual framework, whether learned or to a certain extent natural or 'innate' (under normal circumstances of development and acculturation.)
[6] Recall **Lecture IV**: Paradigms 'block' novelty
[7] Implicit equivocation with 'mature' and 'mathematical' on the part of Kuhn? Can a science reach 'maturity' and develop theories of explanatory scope that are essentially qualitative?

served as the 'anomalies' in the previous paradigm. (Re: **three kinds of 'fact'-gathering, 27-28**: resolving 'fact' in greater detail by the lights of the paradigm, validating a fact, "empirical work undertaken to articulate the paradigm theory, resolving some of its residual ambiguities and permitting the solution of problems to which it had only previously drawn attention" [often involve the sub-class of experiments fixing more precisely values of fundamental constants.]

Note2: Consider Longino's four types of criticism…do any of her latter (conceptual) three enter into such processes of 'fact'-gathering? If you think so, would you then argue that paradigms (whatever they are) are less opaque to external criticism?

- **Theoretical work**: Applications (puzzle-solving) "[J]ournals do contain a great many theoretical discussions of problems that, to the non-scientist, must seem almost identical. **These are the manipulations of the theory undertaken, not because the predictions in which they result are intrinsically valuable, but because they can be confronted directly with experiment."** (30) "Yet given the presumptive generality of Newton's Laws, the number of these applications was not great, and Newton developed almost no others[8]." (31)

- Anticipating value-talk:

"Though many scientists talk easily and well about particular individual hypotheses that underlies a concrete piece of individual research, they are little better than laymen at characterizing the established bases of their field, its legitimate problems and methods…**paradigms guide research by direct modeling as well as through abstracted rules…[r]ules should therefore become important and the characteristic unconcern about them should vanish wherever paradigms or models are felt to be insecure. That is…exactly what does occur."** (47)

- **Anomaly Emergence:**

"The characteristics include…previous awareness of anomaly, gradual and simultaneous emergence of both observational and conceptual recognition, and the consequent change of paradigm categories and procedures often accompanied by resistance. **There is even evidence that these same characteristics are built into the nature of the perceptual process itself."**[9]

[8] Re: Nancy Cartwrignt *How the Laws of Physics Lie* (1983)
[9] Alison Gopnik's early work on schema acquisition in infancy

LAUDAN: PROGRESS AND ITS PROBLEMS

- **Sought to condition implied relativism in Kuhn's enterprise (amalgamating Lakatos)**

EMPIRICAL PROBLEMS[10]

"If it is true that theory complexes, and only theory complexes, can confront experience, then *the successful prediction of an experimental outcome leaves us in as much doubt about how to distribute credit, as an unsuccessful prediction leaves us unclear about where to locate blame." (41)*

CONCEPTUAL PROBLEMS

"The elimination of incompatibilities between a theory and the relevant methodology constitutes one of the most impressive ways in which a theory can improve its cognitive standing." (59)

[10] Re: Popper