Kuhn as Kant Modernized

Reason, Relativism, and Reality

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Kuhn's picture is *Kantian* because the world we know and love is constituted in part by how we organize and conceptualize what happens.

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Kuhn says there are two kinds of science:

Normal science is "research firmly based upon one or more scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its future practice" (10).

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Normal science is organized around *paradigms*.

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A paradigm that is successful (for a time) has "attract[ed] an enduring group of adherents away from competing modes of scientific activity" and is "sufficiently open-ended to leave all sorts of problems for the … group of practitioners to solve" (10).

The life of a normal scientist

Normal science is primarily "puzzle-solving": solving problems that arise once a particular paradigm is selected.

- In Ptolemaic astronomy, finding the best arrangement of spheres and epicycles;
- In wave optics, determining the wavelengths of visible light;
- In Newtonian dynamics, the "n-body problem," or the motion of tops.

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Anomalies

Anomalies are ways that "nature has somehow violated the paradigm-induced expectations that govern normal science" (53).

- Phlogiston theory says burning "liberates" phlogiston that had been bonded with "ash." But then why do some things gain weight when burned?
- Roentgen's discovery of X-rays: "Though X-rays were not prohibited by established theory, they violated deeply entrenched expectations … Perhaps those rays … were implicated in behavior previously explained without reference to them" (59).

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Crisis

"[E]arly attacks upon the resistant problem will have followed the paradigm rules quite closely. But with continuing resistance, more and more of the attacks upon it will have involved some minor or not so minor articulations of the paradigm, no two of them quite alike, each partially successful, but none sufficiently so to be accepted as paradigm by the group" (83).

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The breakdown of a paradigm

"Through this proliferation of divergent articulations (more and more they will come to be described as *ad hoc* adjustments), the rules of normal science become increasingly blurred. Though there is still a paradigm, few practitioners prove to be entirely agreed about what it is. Even formerly standard solutions of solved problems are called in question" (83).

Revolution

"The resulting transition to a new paradigm is scientific revolution" (90), such as the transition to special relativity in the early part of the twentieth century.

The crisis is "terminated, not by deliberation and interpretation, but by a relatively sudden and unstructured event like the gestalt switch [e.g., the change from seeing an illustration as a rabbit to seeing it as a duck]. Scientists then often speak of the 'scales falling from the eyes' or of the 'lightning flash' that 'inundates' a previously obscure puzzle, enabling its components to be seen in a new way that for the first time permits its solution" (122).

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Normal science consists of solving puzzles that the dominant paradigm guarantees have answers, until an anomaly is discovered. Certain anomalies cause a crisis. Generally, crises bring about the development and adoption of a new paradigm.

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