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Paradigm

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In everyday usage, *paradigm* refers either to a model or an example to be followed or to an established system or way of doing things. The concept was introduced into the philosophy of science by Thomas [p. 786 ↓] Kuhn (1970) in his discussion of the nature of scientific progress.

As a reaction against philosophies of science that prescribed *the* appropriate scientific method, such as Popper's falsificationism, Kuhn (1970) focused on the practices of communities of scientists. He saw such communities as sharing a paradigm or "discipline matrix" consisting of their views of the nature of the reality they study (their ontology), including the components that make it up and how they are related; the techniques that are appropriate for investigating this reality (their epistemology); and accepted examples of past scientific achievements (exemplars) that provide both the foundation for further practice and models for students who wish to become members of the community. He suggested that a mature science is dominated by a single paradigm.

According to Kuhn (1970), most of the time, scientists engage in *normal science*, research that is dominated by "puzzle-solving" activities and is firmly based on the assumptions and rules of the paradigm. Normal science extends the knowledge that the paradigm provides by testing its predictions and further articulating and filling out its implications; it does not aim for unexpected novelty of fact or theory. In the course of normal science, the paradigm is not challenged or tested; failure to solve a puzzle will be seen as the failure of the scientist, not the paradigm.

Occasions arise when some puzzles cannot be solved, or gaps appear between what the paradigm would have anticipated and what is observed. These anomalies may be ignored initially, as commitment to a paradigm produces inherent resistance to their recognition. Kuhn (1970) argued that a paradigm is a prerequisite to perception itself, that what we see depends both on what we look at and also on what our previous visual-conceptual experience has taught us to see. Adherence to a paradigm is analogous to an act of faith, and to suggest that there is something wrong with it is likely to be interpreted as heresy.

Anomalies may lead to a crisis of confidence in the paradigm. There emerges a period of *extraordinary science*, accompanied by a proliferation of competing articulations, the

willingness to try anything, the expression of discontent, the recourse to philosophy, and debates over fundamentals. The situation is ripe for the emergence of a new paradigm and novel theories.

Kuhn (1970) has described the process of replacing the old paradigm with a new one as a *scientific revolution*. A new paradigm may be proposed to replace an existing one—a paradigm that can solve the new puzzles raised by the anomalies and can handle the puzzles that the previous paradigm had solved. However, such revolutions occur only slowly, usually taking a generation or longer. According to Kuhn, the process by which a scientist moves from working with the old paradigm to the new is analogous to a religious conversion; it involves not just adopting a fundamentally different way of viewing the world but also living in a different world. Once a new paradigm is established, a new phase of normal science will commence. In time, new anomalies will emerge and further revolutions will occur.

Kuhn (1970) argued that rival paradigms are incommensurable. This is because the concepts and propositions of theories produced by a community of scientists depend on the assumptions and beliefs in their paradigm for their particular meaning. As paradigms embody different and incompatible worldviews, it will be difficult for members of different scientific communities to communicate effectively, and it will be impossible to adjudicate between competing theories. There is no neutral language of observation, no common vocabulary, and no neutral ground from which to settle claims.

For Kuhn, scientific progress is not achieved by the accumulation of generalizations derived from observation (induction) or by the critical testing of new hypotheses (deduction/falsificationism)—it is achieved by scientific revolutions that change the way a scientific community views the world and defines and goes about solving puzzles (for reviews, see Blaikie, 1993, pp. 105–110; Riggs, 1992, pp. 22–59).

Kuhn's work has spawned a vast literature and has received detailed criticism by philosophers and historians of science, such as Lakatos and Laudan (for a review, see Riggs, 1992). It was used as a framework for understanding the crisis in sociology in the 1960s and 1970s (see, e.g., Friedrichs, 1970), when there were vigorous disputes between competing paradigms (see, e.g., Ritzer, 1980).

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