

Chapter 5

The Socio-Historical Turn

5.1 Introduction

- Reminder: the context: positivism – unity of science, linear progress
- Main figures of the socio-historical turn in philosophy: Kuhn, Lakatos, Feyerabend, Latour
- Our goal: a middle ground between radical positivism and radical relativism

5.2 Thomas Kuhn and his vocabulary

Thomas Kuhn :

- Method: From logic to history : history, not logic, is more likely to teach us what science is about, as the first sentence of his “best seller” *The Structure of Scientific Revolutions* suggests:

“History, if viewed as more than a repository of chronology and anecdote, can produce a decisive transformation in the image of science of which we are now possessed.” (Kuhn 1963, 1)

- Main claim concerning scientific revolutions: reason and evidence play a limited role in the outcome of a scientific revolution so that we must abandon the traditional view of scientific progress as cumulative, with theories getting always closer to the truth

- Criticism leveled against Kuhn's view: Kuhn was criticized for making science irrational and subjective and for taking an instrumentalist stance on science

Vocabulary – Important notions to know:

Paradigm : worldview

Paradigms include methodological guidelines, standards of evidence, and are generally normative, i.e. guide theory development and application.

Normal science : science within a paradigm.

Scientists engaged in normal science figure out how to fit empirical phenomena into the conceptual framework provided by a paradigm (problem solving). Includes assimilating phenomena already accounted for by other theories as well as pushing the theory to discover new empirical phenomena and account for them.

Normal science is cumulative. The stack of solved problems increases. New knowledge is produced.

Anomaly : A persistent problem that evades solution within the context of a paradigm.

Crisis Science : A mode of scientific activity in which the currently acceptable paradigm accumulates anomalies that evade continued efforts by the community to solve within the context of a paradigm. Scientists start working outside the bounds of a paradigm.

Scientific Revolutions : Those episodes that are non-cumulative developmental episodes in which an older paradigm is replaced in whole or in part by an incompatible new one. (definition from the text p.86)

5.3 Kuhn, *The Nature and Necessity of Scientific Revolutions*

Kuhn's thesis : Kuhn is deviating from the view that scientific knowledge is cumulative. He argues that experiment and logic alone are not sufficient to determine which paradigm is better than another in the midst of crisis science.

Analogy between political and scientific revolutions :

1. A segment of the (scientific) community believes that the existing institutions(theories) cannot meet the demands of the environment that they have partially created.
2. This failing creates a crisis prelude to revolution.
3. The significance of a revolution depends on one's perspective. Those who are working on domains which the anomaly does not touch are much less concerned.
4. Revolution involves change in ways existing institutions (paradigms) prohibit.
5. There is uncertainty during the revolution.
6. Groups organize to promote different strategies. Eventually there is polarization around competing institutions (paradigms).
7. Once polarization takes place, there is no supra-institutional (paradigm) framework for adjudicating disputes. Groups resort to persuasion.

Kuhn aims to support the analogy. What does it mean for theory choice?

Kuhn's main argument :

“[...] the choice is not and cannot be determined merely by evaluative procedures characteristic of normal science, for these depend in part upon a particular paradigm, and that paradigm is at issue” (p.88)

Paradigm choice is not a matter of logic and experiment alone essentially because the standards for evaluation of scientific argumentation are relative to a paradigm. Hence in order to argue for a paradigm, one must assume the paradigm. Hence arguments are bound to be circular.

The argument consists into two parts:

1. There is no continuity through scientific revolutions – they are true paradigm shifts.
2. Any paradigm shift involves a shift in evaluation standards.

Scientific Revolutions are ruptures : Kuhn argues that there is no cumulative progress outside of normal science

- Cumulative progress within normal science: the new phenomena are not conflicting with the current paradigm

Success of normal science due to “the ability of scientists regularly to select problems that can ve solved with conceptual and instrumental techniques close to those already in existence” (p.89-90)

- No cumulative progress through paradigm shift

In the case in which a new theory is accepted due to recognized anomalies, then *scientific progress cannot be cumulative*. Rather, there is a necessary rupture in history. Necessarily the new theory (the one that does account for the novel phenomena) will differ in empirical predictions from extant theories.

- From Einstein to Newton: Objection and response (91)

- Certain superficial kinds of continuity can be emphasized. One might restrict the range and meaning of prior theories such that within that range they generate true predictions.

Example: Newton’s theory is “derivable” from Einstein’s if certain limits are taken as true, i.e. the speed of light is infinite.

- This is objectionable because: (92)

1. It limits the application of theories to phenomena already observed, and this seems absurd.
2. it is patently anachronistic.
3. the limited laws of Einstein’s theory, though formally identical with Newton’s laws, are not “semantically” or ontologically identi-

5.3. KUHN, THE NATURE AND NECESSITY OF SCIENTIFIC REVOLUTIONS 53

cal to Newton's. I.e. "m" means something different in Newton's theory than Einstein's.

Kuhn can be understood here to be pointing out that though in certain circumstances Einstein's theory can generate the same predictions as Newton's theory, the ontology associated with the theories are very different.

—→ *So, Kuhn has argued that there is no cumulative progress through scientific revolutions. Scientific revolutions are a matter of true rupture – paradigm shift. It remains to show that a paradigm shift involves a shift in evaluation standards*

Paradigm shifts involves evaluation standard shifts – Kuhn turns to his main argument that logic and experiment cannot be sufficient for theory choice – (95)

- Paradigms include more than substance

“But paradigms differ in more than substance, for they are directed not only to nature, but also back upon the science that produced them.”

Paradigms, in addition to a new ontology, also bring along a new set of standards of solution, explanation, accuracy, etc.

Examples:

1. from the mechanical philosophy to force based physics (96 bottom)
2. Lavoisier
3. Maxwell

- Paradigms have a normative role:

The world is too complex to explore at random. Paradigms indicate what the world consists of, and how it behaves, and how to articulate a paradigm.

Discussion Questions :

- To what extent does the first part of the argument give support to the second part?
- Did Kuhn show that there are *no* paradigm-independent standards?