

Kuhn 1

LFIL02602 – Philosophy of
Science
Session 3

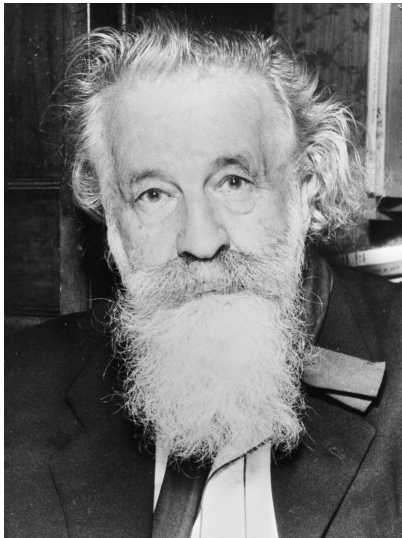
Thomas Kuhn (1922–1996)



Émile Meyerson (1859–1933)



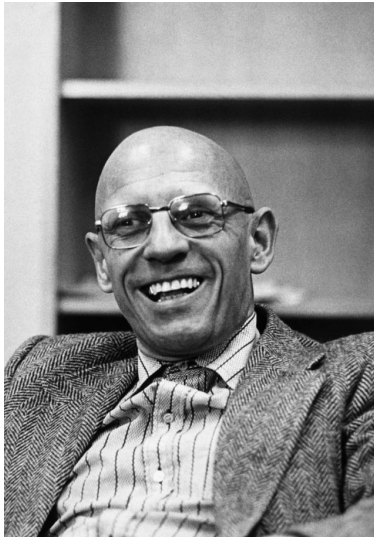
Gaston Bachelard (1884–1962)



Georges Canguilhem (1904–1995)



Michel Foucault (1926–1984)



Introduction

History, if viewed as a repository for more than anecdote or chronology, could produce a decisive transformation in the image of science by which we are now possessed. (1)

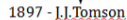
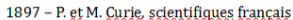
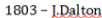
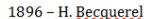
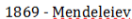
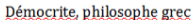


Introduction

That image has previously been drawn...from the study of finished scientific achievements as these are recorded in the classics and, more recently, in the textbooks from which each new scientific generation learns to practice its trade. Inevitably, however, the aim of such books is persuasive and pedagogic... (1)



1



Motivation: accumulation

Increasingly, a few of them [historians] suspect that these are simply the wrong sorts of questions to ask. Perhaps science does not develop by the accumulation of individual discoveries and inventions. (2)



Motivation: superstition

...growing difficulties in distinguishing the “scientific” component of past observation and belief from what their predecessors had readily labelled “error” and “superstition.” (2)



Before a Paradigm

Being able to take no common body of belief for granted, each writer on physical optics felt forced to build his field anew from its foundations. In doing so, his choice of supporting observation and experiment was relatively free, for there was no standard set of methods or of phenomena that every optical writer felt forced to employ and explain. (13)



Before a Paradigm

In the absence of a paradigm or some candidate for paradigm, all of the facts that could possibly pertain to the development of a given science are likely to seem equally relevant. As a result, early fact-gathering is a far more nearly random activity than the one that subsequent scientific development makes familiar. (15)



A Paradigm

Their achievement was sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity. Simultaneously, it was sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve. (10)



A Paradigm

Men whose research is based on shared paradigms are committed to the same rules and standards for scientific practice. That commitment and the apparent consensus it produces are prerequisites for normal science, i.e., for the genesis and continuation of a particular research tradition. (11)



A Paradigm

- Mathematical formulas, formalizable components of the science
- Qualitative laws of nature
- Definitions of central terms
- Beliefs in particular models of how the world works (what's heat? what's matter made out of?)
- Values (what makes a good theory?)
- Examples of “good” solutions to problems (like you find in textbooks)



Normal Science

- ① Determination of significant facts
 - Getting facts that the paradigm says are important to the nature of the universe
 - Using the theory to predict interesting facts or facts that we can test
- ② Matching facts with the theory
 - Getting facts that we can check against predictions made by the theory
 - Creating methods to remove approximations or idealizations, to match our observations more closely
- ③ Articulating the theory
 - Getting better values for important constants, or finding new mathematical relationships, or trying to extend the paradigm to nearby, related phenomena
 - Reformulating the theory to make it clearer



Puzzle-Solving

Perhaps the most striking feature of the normal research problems we have just encountered is how little they aim to produce major novelties, conceptual or phenomenal. (35)



Puzzle-Solving

Bringing a normal research problem to a conclusion is achieving the anticipated in a new way, and it requires the solution of all sorts of complex instrumental, conceptual, and mathematical puzzles. The man who succeeds procees himself an expert puzzle-solver, and the challenge of the puzzle is an important part of what usually drives him on. (36)



Novelty?

And the project whose outcome does not fall in that narrower range [of expected results] is usually just a research failure, one which reflects not on nature but on the scientist. (35)

