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Objectivity, method, and truth

Through the lens of some positions and issues in classic philosophy of science

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(Some of the) classical questions of philosophy of science

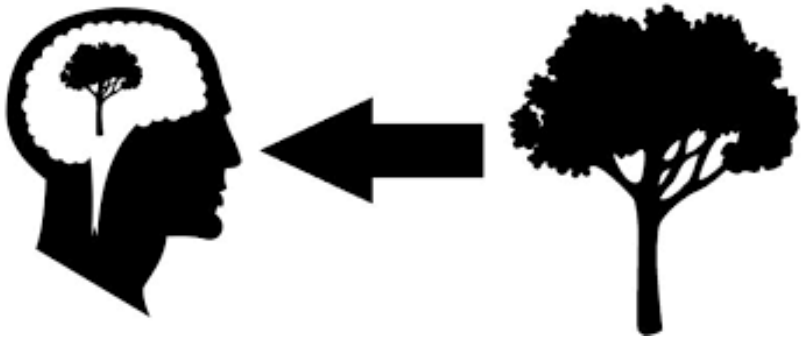
- What is ‘science’, or ‘a science’?
  - What is scientific method and why is it successful (to the extent it is)? Is there a unique, overarching ‘scientific method’?
- Does science (aim to) give us *truth/knowledge of reality*, or is it primarily a useful *tool for prediction and control*?
  - What does it mean for science to make progress?
- Is social and humanistic research *science* (like physics, chemistry, biology etc.)? If it isn’t, what is it, and why is it worth doing?
- In what way and to what extent is science value-laden? Is value-ladenness a problem for its objectivity?
- To what extent can or should science or scientists tell us how to live? Is science always a force for the good? To what extent are other traditions of knowledge valuable?

Outline of lecture

- Part 1: Objectivity (Gaukroger)
- Part 2: Philosophy of natural science: Logical positivism, Popper, Kuhn (+ further developments)
- Part 3: Philosophy of humanities and social science, value-ladenness: Gadamer, Foucault, Feminist approaches in philosophy of science/epistemology
- (Break-out discussions along the way...)

PART 1:
Objectivity: What is it? Is it possible to achieve? Should we seek it? Can/should we live without it?

- A 'common sense' view (A. Chalmers *What is this thing call science?'* 3rd ed, p. 4): Through careful, unprejudiced observation (experiment and the like) we gain an independent and reliable foundation for forming theoretical knowledge about mind-independent reality.
- If this ideal is rejected – do all claims to 'objective' knowledge or 'truth' become veiled attempts to establish or cement a position of power? What intermediate positions are possible?
- Objectivism/absolutism <-------> radical constructivism.

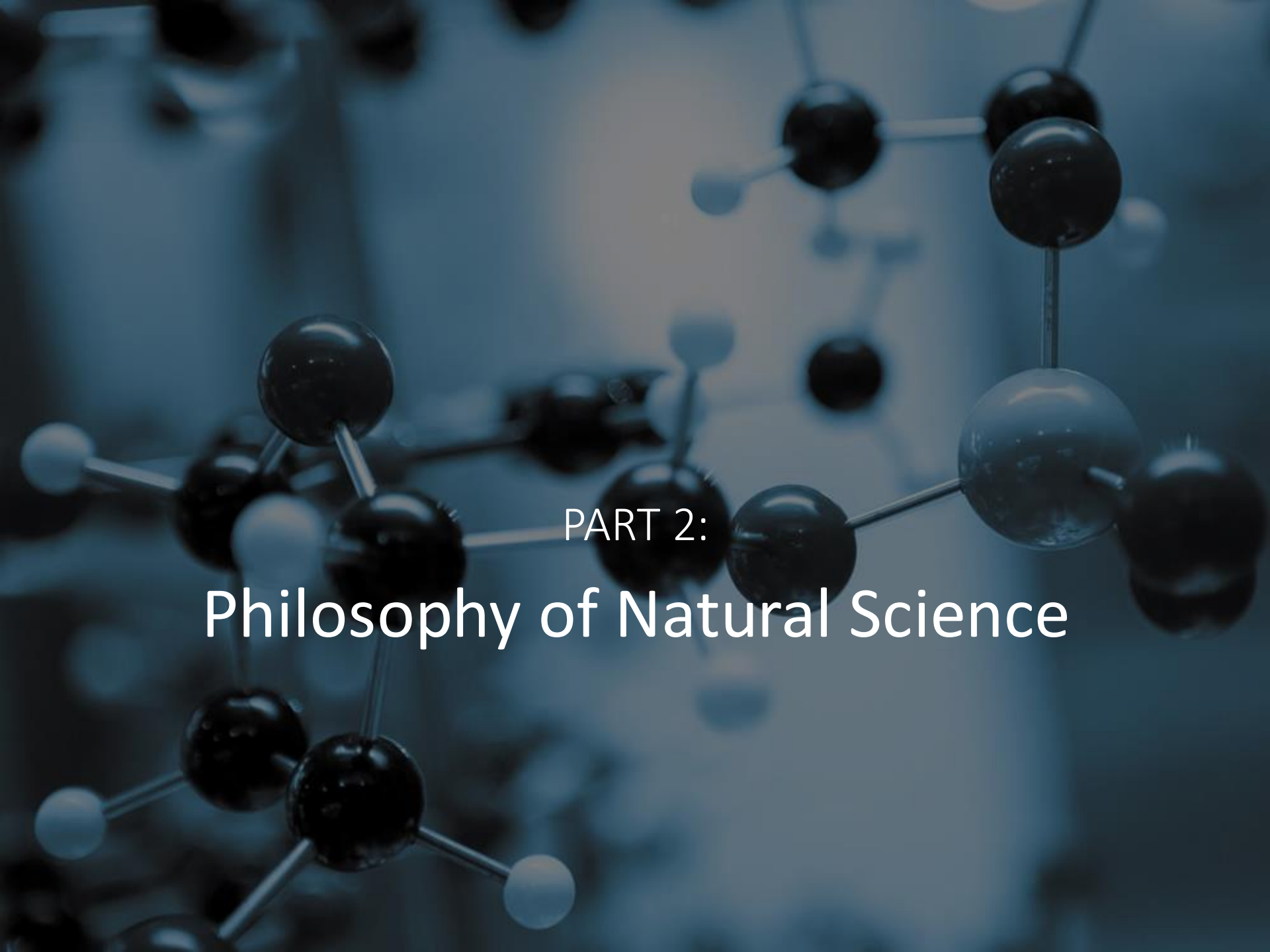


Different senses of objectivity (Stepehen Gaukroger, 1950-2023)

- Sense 1: An objective theory (or view) is one free from *bias and prejudice*
- Sense 2: An objective theory is one free of *all assumptions and values*
- Sense 3: An objective theory is one formed in accord with *a certain method* that can decide between conflicting views
- Sense 4: An objective theory is one that *accurately represents reality*
- Sense 5: An objective theory is one that *is universally accepted*
- (Are there more senses?)

How important is objectivity in (your) research?

- What kind of objectivity is at stake?
- Is it on Gaukroger's list or something different from these?
- Is objectivity possible or even desirable in research (or inquiry more generally)?
  - If not, what is the point of research (or inquiry)?



PART 2:

Philosophy of Natural Science

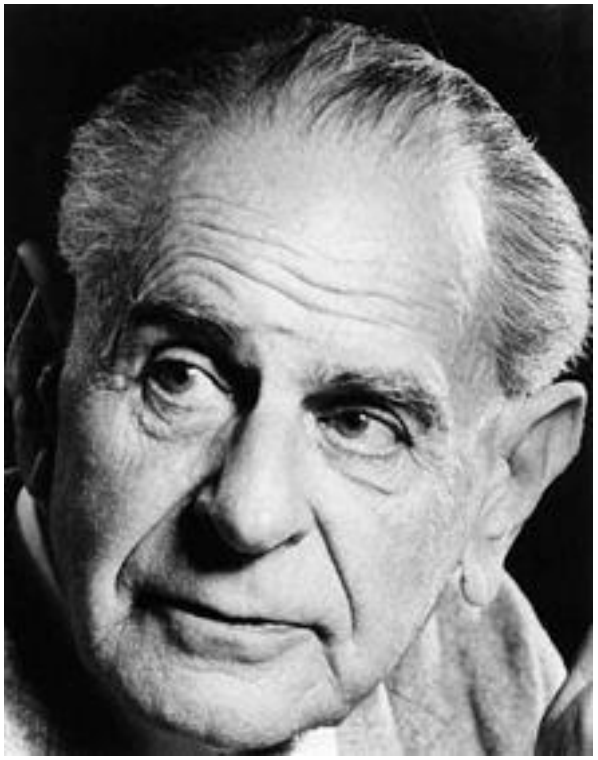
Logical Positivism

- Science and objective, rational belief are *coextensive*.
  - *Unity of science*: All rational beliefs (i.e. all science) can be incorporated into one overarching system.
- *The principle of verification*: All (factually) meaningful statements must be possible to *verify*, in principle, i.e. be such that one can *determine whether they are true or not through observation.*
  - All other statements – that are not *analytic* – are meaningless 'metaphysics'.
- Inductive inference central to science, sought to understand it as a kind of formal logic.

Karl Popper (1902-1994)

Some central works: *The Logic of Scientific Discovery* (1936), *The Open Society and Its Enemies* (1945), *The Poverty of Historicism* (1957), *Conjectures and Refutations* (1963).

In 1992 awarded Kyoto Prize in Arts and Philosophy for "symbolizing the open spirit of the 20th century" and for "enormous influence on the formation of the modern intellectual climate".



The bucket theory

- Sense experiences prior to any knowledge
- Knowledge consists in the sum of your experiences, the more experiences you accumulate, the more knowledge you have

The Searchlight Theory

- Observations secondary to hypotheses
- ‘An observation is a perception, but one which is planned and prepared’ (Popper 1972: 342)
- Observations serve as tests of the hypothesis
- Knowledge as ‘horizon of expectations’

Popper on scientific method

- Rejects induction as rational inference (following Hume) *and* (*contra* Hume) as actual method used in science or everyday experience, cf. 'bucket theory'.
- 'Searchlight theory': organisms always already understand their environment in relation to a *horizon of expectations*. Theory precedes observation.
- 'Science' *per se* started with *conscious critical appraisal* of inherited mythical and then more naturalistic explanations in the Ionian school of philosophy.
- Theories – *conjectures* – are freely proposed and then critically assessed by being tested against (theory-laden) observational data.
  - Cf. *context of discovery* vs *context of justification*.
- Scientific testing, explanation, prediction and application all have same *hypothetico-deductive* structure, and (ideally) involve *laws*.

Popper on scientific method (contd.)

- A confirmation does not prove a law or even make it probable.
- Science makes progress towards the truth through iteratively *falsifying* theories and replacing them with others that avoid the counterexample, plus ideally explain more phenomena (by being more general, more precise, more quantitative etc.).
- Claims that have been subjected to (many) *severe tests* and withstood them are (highly) *corroborated* and can (temporarily) be seen as ‘knowledge’.

Falsifiability as demarcation principle

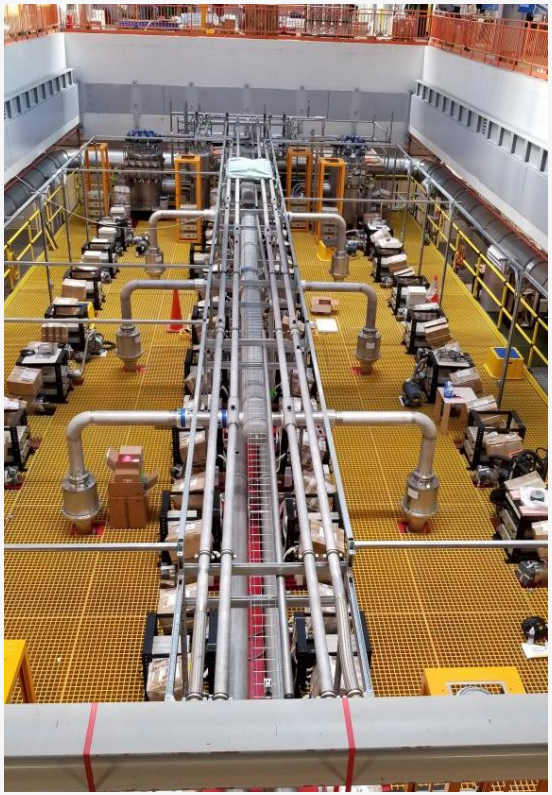
- Scientific claims must be *falsifiable* (rather than *verifiable*):
  - "*Every 'good' scientific theory is a prohibition: it forbids certain things to happen. The more a theory forbids, the better it is…A theory which is not refutable by any conceivable event is non-scientific. Irrefutability is not a virtue of a theory (as people often think) but a vice*." (*Conjectures and Refutations,* 1962, p. 46; cp. B&S, p. 360)
- Irrefutable theories are *pseudo-scientific*. Examples for Popper: psychoanalysis (Freud, Adler), dialetical materialism (Marx).

Summa summarum

- *"[T]he aim of the scientist is not to discover absolute certainty, but to discover better and better theories [or to invent more and more powerful searchlights] capable of being put to more and more severe tests [and thereby leading us to, and illuminating for us, ever new experiences]. But this means that these theories must be falsifiable: it is through their falsification that science progresses."* (B&S, p. 361).

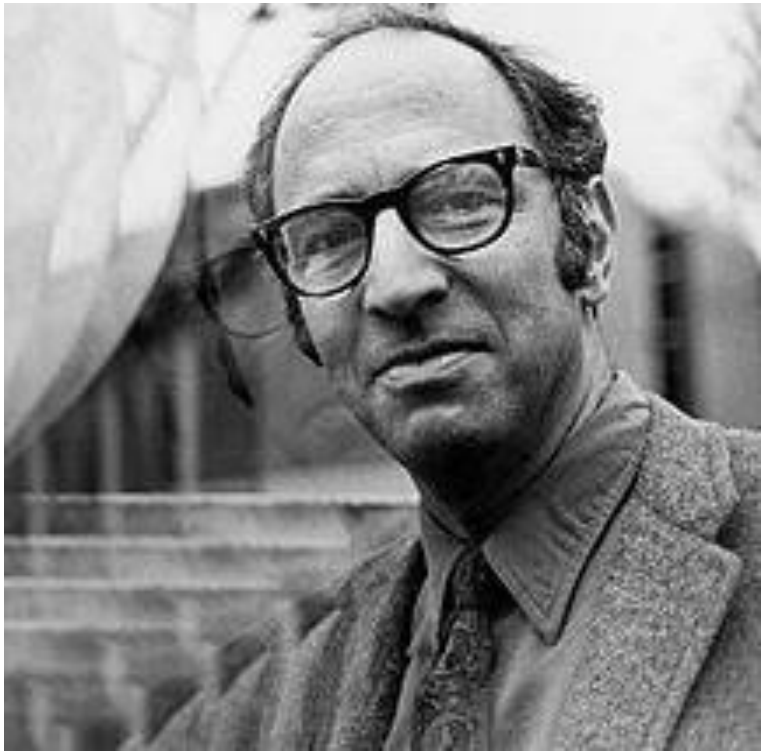
Problems/challenges for Popper

- Since predictions are typically derived from many assumptions, we cannot know what is mistaken if our prediction is falsified.
- His recommendation of a critical attitude is not adhered to in many episodes of science, from Galileo to Darwin.
- Popper thinks of himself as a scientific realist, but in fact it seems we have no reason on his view to think our best theories are true or approximately true.
- Is science really always so theory-driven?



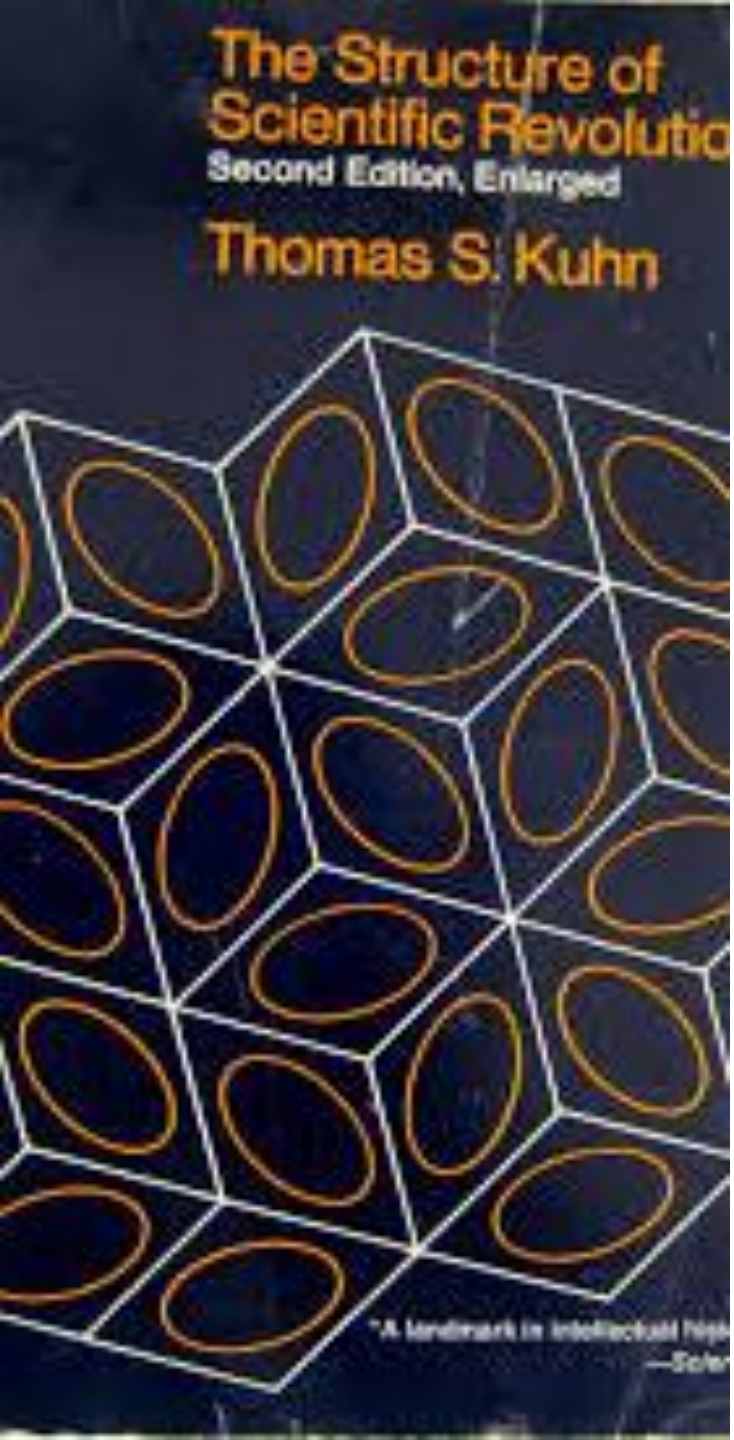
Thomas Kuhn (1922-1996)

- Historian and philosopher of science.
- Most famous book: *The Structure of Scientific Revolutions*, 1962/1970.
- Presents a more empirical account of the the historical development of natural science (mainly physics and chemistry) and introduces various concepts to explain and understand this (in his view) progressive enterprise.



Key concepts

- *Prescience* ->
- *Normal science* (steered by *paradigm*) ->
- *Crisis* (*anomalies* numerous and solution-resistant) –>
- *Revolution* ->
- *New Normal Science (–> New crisis, revolution etc.)*
  - Different paradigms *incommensurable*.



Postscript definition of paradigm (1970)

- Paradigm as *disciplinary matrix* (p. 181).
  - *Symbolic generalizations*: laws/definitions
  - *Metaphysical assumptions*: models, metaphors.
  - *Values*: epistemic virtues a theory should fulfill, e.g. internal and external consistency, scope, predictive accuracy, simplicity, fruitfulness.
  - *Exemplars*: concrete episodes of research that serve as standards or 'paradigms' for further research

Normal science

- “Normal science, the puzzle-solving activity we have […] examined, is a highly cumulative enterprise, eminently successful in its aim, the steady extension of the scope and precision of scientific knowledge. […] Yet one standard product of the scientific enterprise is missing. Normal science does not aim at novelties of fact or theory and, when successful, finds none.” (Kuhn 1970: 52).
- “Mopping-up operations are what engage most scientists throughout their careers” (Kuhn 1970: 24).

Anomalies and discovery

“Discovery commences with the awareness of anomaly, i.e., with the recognition that nature has somehow violated the paradigm-induced expectations that govern normal science. It then continues with a more or less extended exploration of the area of anomaly. And it closes only when the paradigm theory has been adjusted so that the anomalous has become the expected” (Kuhn 1970: 52-53).

Crises and revolutions

- ‘All crises begin with the blurring of a paradigm and the consequent loosening of the rules for normal research. .. a crisis may end with the emergence of a new candidate for paradigm and with the ensuing battle over its acceptance.’ (Kuhn 1970: 84).
- ‘The decision to reject one paradigm is always simultaneously the decision to accept another, and the judgment leading to that decision involves the comparison of both paradigms with nature *and* with each other.’ (Ibid.: 77)
- ‘Once a first paradigm through which to view nature has been found, there is no such thing as research in the absence of any paradigm**.** To reject one paradigm without simultaneously substituting another is to reject science itself.’ (Ibid.: 79).

Incommensurability

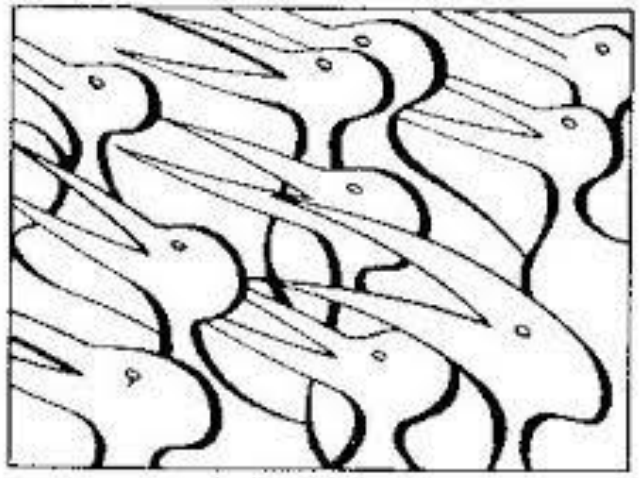
- There is for Kuhn no paradigm-external decision procedure or *algorithm* for adjudicating between different paradigms. Several values are generally shared (*viz*. simplicity, consistency, predictive accuracy, breadth of scope, fertility), but these will be interpreted differently within different paradigms.
- Concepts differ across paradigms in spite of superficial similarity (e.g. ‘movement’, ‘mass’, ‘element’, ‘planet’).
- No theory-neutral observations: practitioners of different paradigms ‘see’ the world differently.

Relativism/irrationalism?

- Kuhn was keen to avoid (charges of) relativism and irrationalism.
- He stressed that the necessary element of *judgement* that is involved in comparing theories does not make that comparison *subjective* in a problematic way.
  - Shared values provides a common framework that survives paradigm changes, even though how these values get applied will require more judgement at times of revolution.
- Having said, some of his statements seem more radical…

Revolutions as ‘arational’?

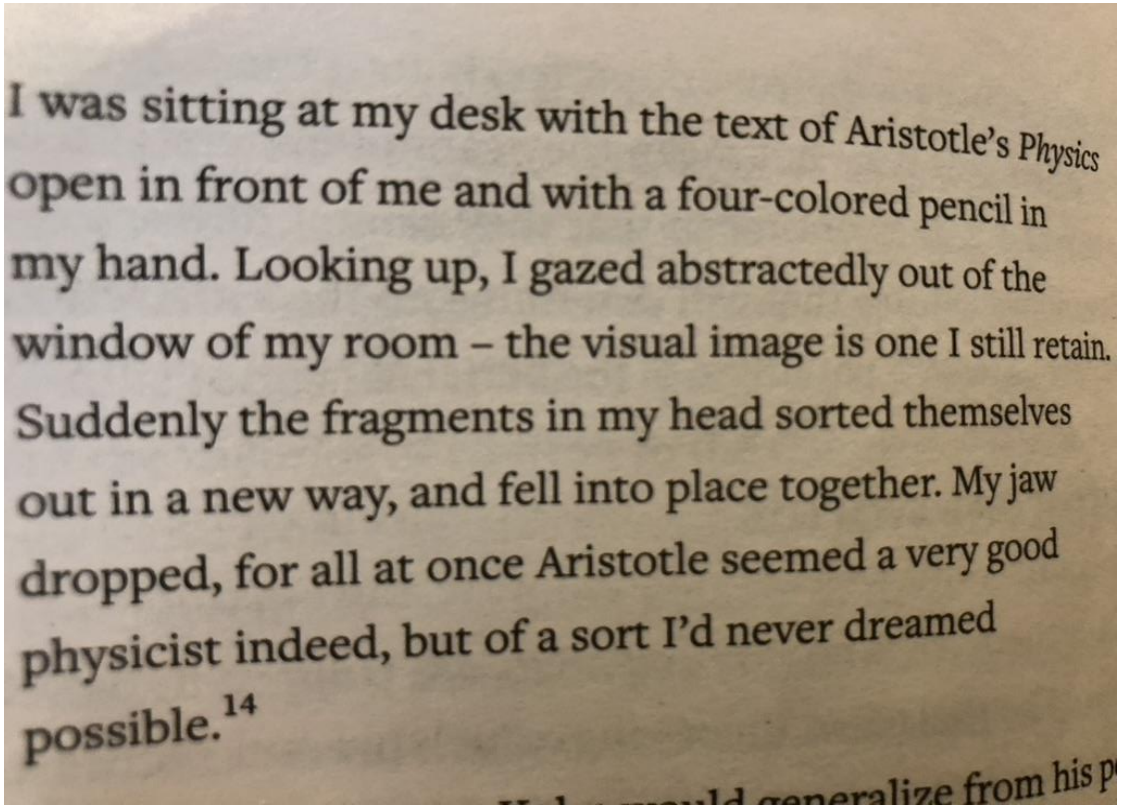
- ‘*As in political revolutions, so in paradigm choice – there is no standard higher than the assent of the relevant community. To discover how scientific revolutions are effected, we shall therefore have to examine not only the impact of nature and of logic, but also the techniques of persuasive argumentation effective within the quite special groups that constitute the community of scientists [..the] issue of paradigm choice can never be unequivocally settled by logic and experiment alone.’ (SSR, 93)*
- (Jf. ‘the strong prorgramme’ in the sociology of scientific knowledge (Barnes & Bloor).)



World changes

- ‘Paradigm changes […] cause scientists to see the world of their research engagements differently. Insofar as their only recourse to that world is through what they see and do, we may want to say that after a revolution scientists are responding to a different world.’ (110).
- ‘[A]fter a revolution, scientists work in a different world’ (134).

When the penny dropped for Kuhn....



I was sitting at my desk with the text of Aristotle's *Physics* open in front of me and with a four-colored pencil in my hand. Looking up, I gazed abstractedly out of the window of my room – the visual image is one I still retain. Suddenly the fragments in my head sorted themselves out in a new way, and fell into place together. My jaw dropped, for all at once Aristotle seemed a very good physicist indeed, but of a sort I'd never dreamed possible.[14]

...ld generalize from his p

Truth and progress for Kuhn

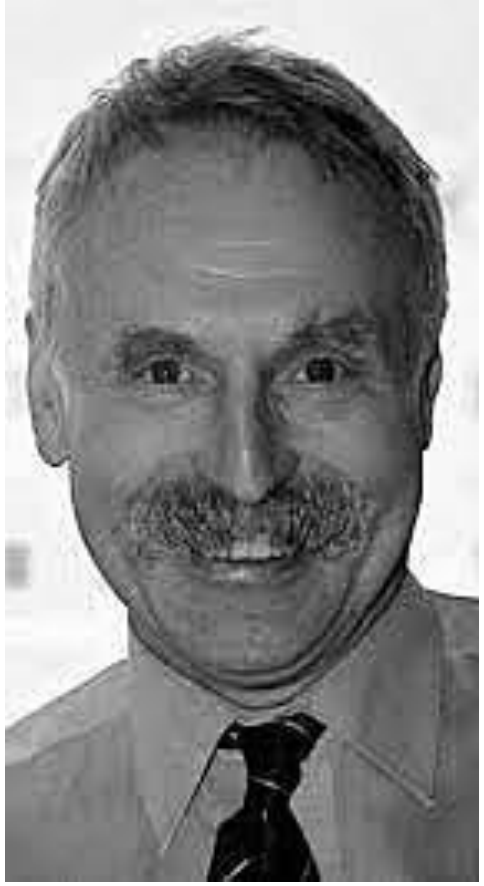
- Kuhn later described his position as a form of ‘post-Darwinian Kantianism’.
- The ‘reality’ of scientists is dependent on the paradigm they accept, though is not just something ‘in the head’.
- Progress is not convergence towards ‘The Truth’, but paradigms do become gradually better insofar as they solve more problems than their predecessors (though not all the problems the latter solved).
- Analogy with evolutionary progress: no final endpoint, but still progress relative to a given starting point and environment (leads to diversification/specialization).

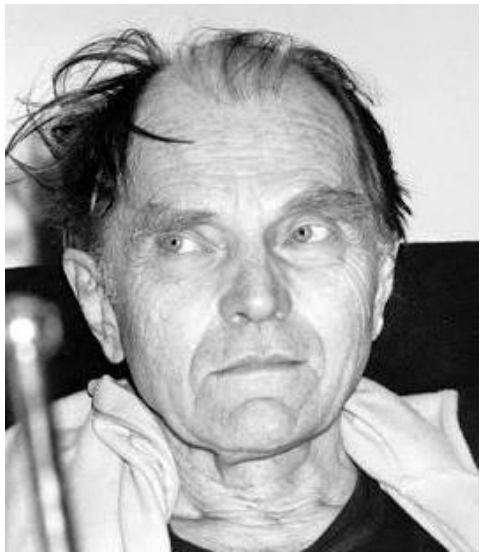
Reactions to/questions for Kuhn

- Popper: pitied 'normal scientists', regarding them as mere 'engineers'. He also doubted the generality of a sharp distinction between normal and revolutionary science. Paradigms can also seemingly compete and exist concurrently over time (e.g. wave and particle theory of light), cf. Lakatos on *research programmes*.
- Kuhn's work focussed on physics and chemistry, not so clear how it applies to other areas, eg biology or applied science (though he also later developed his Darwinian view by seeing the development of new sciences on the model of speciation...).
- Do we really see the world differently today than someone in the Middle Ages? Do Kuhn's arguments really suggest science can't give us objective knowledge, or approximation thereto?
- Kuhn's concepts of paradigm, normal science, values, progress etc. arguably provide no normatively significant science/non-science divide (Feyerabend.)
- Much contemporary science seems more data- rather than theory-driven. (But does this mean that scientists don't work within paradigms?)

Developments after Popper/ Kuhn

- *Imré Lakatos* tried to steer a middle course between Popper and Kuhn. Theories are complex wholes but can be rationally compared.
- *Paul Feyerabend* argued science does not deserve the elevated status it is usually afforded and is oppressive. There is no scientific method except 'Anything goes!'.
- Cf. also 'sociology of scientific knowledge' (Barnes & Bloor)/science and technology studies (and 'science wars' of late. 1990s).
- Still hotly debated amongst 'rationalists': realism-question, value-ladenness, whether there is a scientific method (cf. falsifiability, *Bayesianism*) *inter alia*.





How important are the ideas of falsifiability, method, and/or paradigm in your research or area of study?

PART THREE

PHILOSOPHY OF HUMANITIES AND SOCIAL SCIENCES

Hans Georg Gadamer: ‘The Universality of the Hermeneutical Problem’ (1966)

Art

Alienation in ‘the aesthetic consciousness’

- ‘When we judge a work of art on the basis of its aesthetic quality, something that is really much more familiar to us is alienated.’ (5)
- ‘No artist of the religiously vital cultures of the past ever produced his work of art with any other intention than that it should be received in terms of what it says and presents and that it should have its place in the world where men live together.’ (4-5)
- ‘Despite its use by the national socialists, we cannot deny that the idea of art being bound to a people involves a real insight.’ (5)

Alienation in ‘the historical consciousness’

- ‘No one disputes the fact that controlling the prejudices of our own time to such an extent that we do not misunderstand the witnesses of the past is a valid aim, but obviously such control does not completely fulfill the task of understanding the past.’ (6)
- ‘Misunderstanding and strangeness are not the first factors, so that avoiding misunderstanding can be regarded as the specific task of hermeneutics. Just the reverse is the case. Only the support of the familiar and common understanding makes possible the venture into the alien […] and thus the broadening and enrichment of our own experience of the world.’ (15)
- ‘Every misunderstanding presupposes a «deep common accord»’ (7)
- ‘Whenever we say […] «this is classical; it will endure» what we are speaking of has already preformed our possibility for aesthetic judgment.’ (8)
- ‘The great horizon of the past, out of which our culture and our present live, influences us in everything we want, hope for, or fear in the future. History is only present to us in the light of our futurity.’ (8-9)

Prejudice (‘pre-judice’, ‘pre-judgement’). Language

- ‘Prejudices are not necessarily unjustified and erroneous, so that they inevitably distort the truth. In fact, the historicity of our existence entails that prejudices, in the literal sense of the word, constitute the initial directedness of our whole ability to experience.’ (9)
- ‘The nature of the hermeneutical experience is not that something is outside and desires admission. Rather we are possessed by something and precisely by means of it we are opened up for the new, the different, the true.’ (9)
- ‘The consciousness that is effected by history has its fulfillment in what is linguistic. [...L]anguage [...] has a teleology operating in it [...] a definite articulation of the world is built up .. a process one can observe in children who are learning to speak.’ (13)

Critique of scientism/modernism

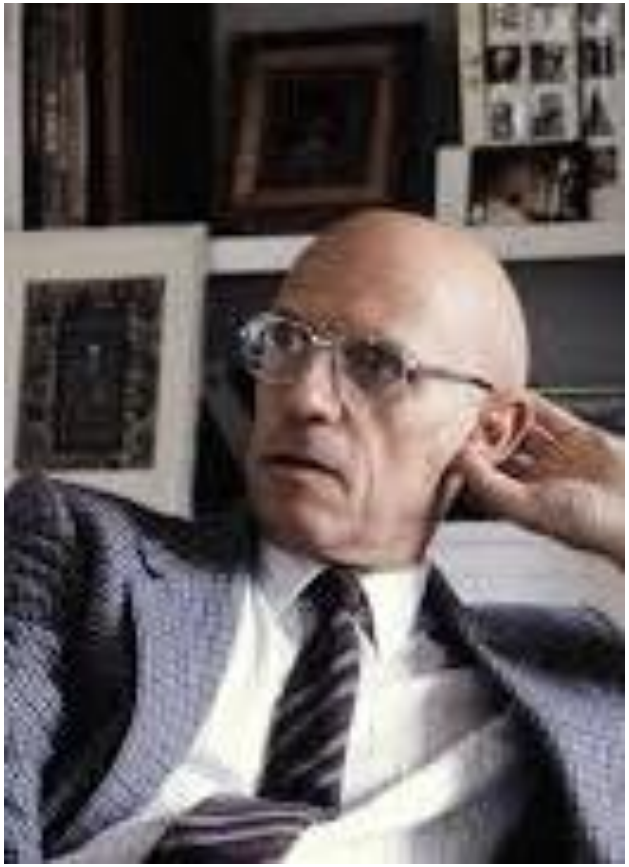
- ‘No assertion is possible that cannot be understood as an answer to a question.’ (11)
- ‘The real power of the hermeneutical consciousness is our ability to see what is questionable.’ (13)
- 'What is established by statistics seems to be a language of facts, but which questions these facts answer and which facts would begin to speak if other questions were asked are hermeneutical questions.’ (11)

Critique of scientism, modernism contd.

- ‘We live in an epoch in which an increasing leveling of all life-forms is taking place – that is the rationally necessary requirement for maintaing life on our planet. [...] Unavoidably the mechanical, industrial world is expanding within the life of the individual as a sort of sphere of technical perfection. When we hear modern lovers talk we often wonder if they are communicating with words or with advertising labels and technical terms from the sign language of the modern industrial world.’ (16)
- ’Genuine speaking, which has something to say and does not give prearranged signals, but rather seeks words through which one reaches the other person is the universal human task – but it is a special task for the theologian, to whom is commissioned the saying-further (*Weitersagen*) of a message that stands written.’

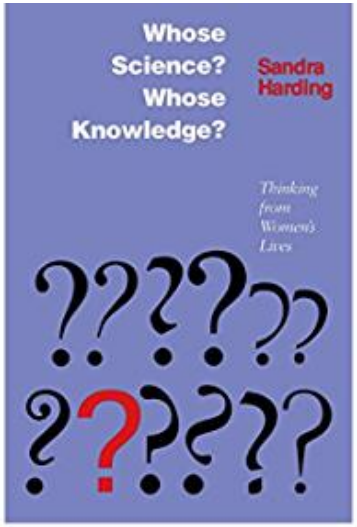
Michel Foucault on truth and power

- *'Each society has its regime of truth, its "general politics" of truth: that is, the types of discourse which it accepts and makes function as true; the mechanisms and instances which enable one to distinguish true and false statements, the means by which each is sanctioned; the techniques and procedures accorded value in the acquisition of truth; the status of those who are charged with saying what counts as true*' (The Foucault Reader, ed. Rabinow 1991).
- "*In a sense, I am a moralist, insofar as I believe that one of the tasks, one of the meanings of human existence—the source of human freedom—is never to accept anything as definitive, untouchable, obvious, or immobile. No aspect of reality should be allowed to become a definitive and inhuman law for us. We have to rise up against all forms of power—but not just power in the narrow sense of the word, referring to the power of a government or of one social group over another: these are only a few particular instances of power. Power is anything that tends to render immobile and untouchable those things that are offered to us as real, as true, as good*" (Power/Knowledge, ed. Gordon 1980)



Feminist approaches to philosophy of science/epistemology, objectivity, and value-ladennes

- Sandra Harding (1935-2025) distinguishes three different approaches to feminist epistemology:
- *Feminist empiricism*: seeks to rectify androgenous (and other power-based) bias in research, also to show how values important to feminism can legitimateely inform science. Upholds traditional value of objectivity.
- *Feminist post-modernism*: critique of power, pluralistic, sceptical towards talk of 'truth' or 'objectivity' (cf. Foucault).
- *Feminist standpoint theory (Harding, Hartsock).* Between feminist empiricism and feminist post-modernism, emphasises the situatedness of knowledge more than FE but also involves a defence of objectivity as *strong objectivity.*



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Feminist empiricism *à là* Helen Longino

- Longino: theory building is *underdetermined* by data, science-internal values can help here but these are themselves ultimately founded on non-scientific values (e.g. predictive control or technological progress).
- *Constitutive values* concern how observations support or falsify theories. *Contextual values* concern criteria that help determine choice amongst theoretical options thaht is left open by constitutive values.
- This process of choice can be objective when everyone in the relevant scientific community is involved in it and reach consensus based on shared (constitutive and) contextual values.
- For Longino, we should be able to agree on contextual values that promote more equality between the sexes and other marginalised groups, e.g. a preference for dynamic-relational, processual explanations over linear, category-based explanations.

Elizabeth Andersons defence/elaboration of Loningo

- Many (e.g. Susan Haack) have criticized Longino's model for putting too much politics into science: letting ideology trump evidence.
- But (says Anderson) one cannot build a good scientific theory just by searching for 'the truth' (cp. Popper). Theories are complex structures. And though science internal values may occasionally be enough to allow theory-development , as a rule we need to bring in wider issues relating to the practical questions and needs we have.
- Good values and truth do not necessarily compete. Values can and should open our eyes to new possibilities and lead us to question traditional and/or entrenched patterns of thinking that we find problematic (though not to decide which conclusions we draw).

Feminist standpoint theory (FST) and strong objectivity (Harding)

- According to standpoint theory knowledge is socially *situated* but not *relative* – at least, not 'judgementally relative'.
- Traditional objectivists/absolutists doubt the possibility of such a middle way: objectivity requires value- and interest-neutrality.
- Some critics of absolutism embrace relativism (e.g. Barnes & Bloor's 'strong programme').
- Harding doubts relativism makes sense, especially in natural science.
- But absolutism is doubtful even in natural science, whilst application of purely 'objective' i.e. quantitative methods in social science can hinder objectivity (cp. Gaukroger).

Harding's middle way

- 'The standpoint epistemologies call for a recognition of a historical or sociological or cultural relativism – but not for a judgmental relativism..[A]ll human beliefs – including our best scientific beliefs – are socially situated but they also require a critical evaluation to determine which social situations tend to generate the most objective knowledge claims.' (142)

More critique of objectivism/absolutism

- Conceptualises the value-neutrality of objectivity too narrowly and too broadly:
- Too narrowly: ‘If the community of qualified researchers ... systematically excludes ... all African Americans and women of all races,.. it is not plausible to imagine that racist and sexist interests and values would be identified.’ (143)
- Too broadly: Requires elimination of all values and interests. But some values are good, and in any case the goal is unrealistic.
- Modern science itself is culturally situated, for better and for worse. We gather many of the same facts across epochs, cultures etc, but what questions these give rise to, theories they support, problems they allow us to solve etc. varies
- Objectivism operates with a ’weak’ objectivity that is contradictory: claims that are historically situated are regarded as ahistorical.
- Knowledge is to an extent power, not just something that lends power.

Strong objectivity (SO)

- ‘We can think of strong objectivity as extending the notion of scientific research to include systematic examination of ... powerful background beliefs.’ (149)
  - Cp. Strong programme of Barnes and Bloor, with its stress on *symmetry* and *reflexivity*. Harding wants to extend this idea to macroprocesses in society, enabling a stronger, more robust notion of reflexivity that allows one to confront one’s beliefs in a fuller social context (ibid.).
- Why use ‘objectivity’? Shouldn’t we just ‘give it’ to the ‘patriarchs’? No: objectivity has a valuable political and intellectual history. We must emphasize the term’s progressive elements. (Cf. pp. 156 ff.)

Some consequences of strong objectivity

- '»[S]tarting from women's lives» increases the objectivity of the results of research by bringing scientific observation and the perception of the need for explanation to bear on assumptions and practices that appear natural or unremarkable from the perspective of the lives of men in the dominant groups.' (150).
- Women and other marginalised groups have a kind *double vision* on society that dominant groups lack: they are 'outsiders within' (ibid.), 'with fewer interests in ignorance about how the social order works' (ibid.).
- Gender difference is a scientific resource because it allows 'the Other to gaze back «shamelessly» at the self who had reserved for himself the right to gaze «anonymously» at whomsoever he chooses'. (ibid.)

Questions for Harding

- Does she really provide a new conception of objectivity? A possible dilemma:
  - Imagine dominant groups accept the new critical perspective on society offered by feminists, and everyone agrees. In what way does this differ from Longino's understanding of objectivity?
  - The dominant groups do not accept the perspective. In what way can we then say that the marginalized view is more objective, just because it represents a 'double vision'?
- Perhaps Harding would take the first 'fork' here and say that she is at least showing more clearly how the experiences of marginalized groups have something distinctive to contribute towards a more complete understanding of society.
  - But could one also object that it may not be as clear as she claims that the viewpoints of the marginalized are important or essential or best suited to this, as opposed to trying to achieve an understanding that *everyone* can achieve from their own experience?

Is value-freedom an ideal for science? Is objectivity compatible with value-ladenness? Do some groups see the world more objectively?