

# Philosophy of Science // Fall 2016

## Handout 14

### Scientific change and Darwinism: Kuhn, Kitcher

**KUHN ON THEORY CHOICE.** Kuhn begins by naming five criteria of choice. They are: *accuracy*, *consistency*, *scope*, *simplicity*, and *fruitfulness*.

*Question 1.* Explain each of these notions.

Accuracy is understood not only quantitatively, but also qualitatively. Note that accuracy has no logical relation to truth. A false theory (assuming the use of 'true' and 'false' is legitimate) may also be accurate. (Explain!)

Kuhn observes that the application of these criteria in concrete cases is marred with ambiguities. Also, the relative importance of each of them is different on different occasions. Illustrations follow from the Ptolemaic/Copernican astronomy. But there are, it turns out, also criteria lying outside the sciences (425). Notice here the influence of philosophical/theological background of particular scientists (Kepler).

*Question 2.* How can theology play any role in theory choice?

**DISCOVERY OR JUSTIFICATION?** Kuhn addresses the objection from context of discovery/context of justification. The traditional view: an algorithm governs theory choice. Kuhn: this view is misled by science textbooks.

Another issue is the role of so-called 'crucial experiments'. These experiments took place mostly after the theory they were supposed to test has already been accepted.

The critic might say: as evidence accumulates, individual algorithms of choice converge. The algorithm to which they converge is objective. Kuhn: such convergence is possible. But, the 'subjective' factors will still be present in the ultimate algorithm. This response seems too quick and unclear (to me).

**VALUES.** Values can influence choice, but they cannot *dictate* choice. Since at the time of the crisis there is more than one theory to choose, the choice cannot be characterised as determined by rules. Pragmatic factors feature as values able to influence, but not determine, the actual choice.

*Question 3.* What is the difference in saying 'Choice is determined by rules' and 'Choice is determined by values'?

Kuhn further argues that no explanation offered as to why a discipline governed by values would be so successful in prediction and control. This is the 'problem of induction'. In other words, Kuhn has nothing to say about the argument for *realism*, according to which anti-realism makes scientific success a matter of miracle.

**OBJECTIVITY** Kuhn contrasts two senses of 'subjective'. In one sense it is contrasted with 'objective', in another sense it is contrasted with 'judge-able'. I find Kuhn's discussion muddled, if interesting. Let me articulate a few relevant (hopefully) points.

My reports about my own *mental states*, such as 'I am hot', 'I am in pain', may be regarded as objective. That is, so far as they accurately describe the facts. Well, what is the fact they describe? Presumably nothing other than my own mental state.

Somewhat surprisingly, more apparent subjectivity is found in a statement (judgement) such as 'The coin is round.' This is not a report about my mental state. But it is done with the aid of *my concept* 'roundness'. Now the question will be whether I, so to speak, borrowed this concept from the world, or perhaps it is 100% mine, not being in the world at all. In the latter case we envisage a possibility that the coin *in reality* is not round.

Next, consider:

Woody Allen is funny.

(14-1)

This looks like a judgement about WA. But often what I mean to say is: 'I find WA funny.' Often I take this report about my preferences to be the only justification for the judgement about WA. That is why, on these occasions, you would not be able to argue with me. So we would conclude that the

original judgement about WA is 'subjective'. But, on the other hand, we could try to find general reasons for saying that WA is, or is not, funny.

The upshot: If there develops any meaningful discussion, then the judgement is objective. Objective, as Kuhn says, in essence means discussable. However: even if the discussion is fruitful, there is no reason to believe that it will be conducted in total separation from *our own* concepts, preferences, opinions. Then how *subjective* is it?

**PARTIAL COMMUNICATION.** In the final page of the article Kuhn addresses the issue of communication between adherents of different paradigms. Their communication is imperfect, and there is no choice, but a 'conversion'. But the conversion is not arbitrary. Adherents of rival paradigms are able to exemplify to each other and compare the technical achievements—i.e. accuracy—provided by their respective theories.

**DARWIN'S INNOVATION.** Kitcher begins with the following problem: every major claim in Darwin's theory, as presented in page 19, could have been endorsed by his opponents. Thus we have to understand where precisely the crucial disagreements lay. Preliminary answer: Darwin attached different theoretical significance to these claims. That is, he was able to see their explanatory power and to create novel explanatory techniques based on those claims.

In other words, Kitcher suggests that we view Darwin's contribution in terms of articulating the explanatory links between the history of the given organism and its extant properties. As I understand it, Darwin was unique among his contemporaries to insist that these histories *alone* can provide the required explanations. That contrasts his approach with, e.g., de Candolle's and Forbes' (page 22).

*Example 4* (Analogy and homology in comparative anatomy). Evolution of wings in different species (insects, birds etc.) represent an analogy. Wings evolved as a response to similar environmental pressures. By contrast, forelimbs in different mammals are explained as originating in the same organism. In both cases the crucial difference between Darwin and his contemporaries (Owen) is Darwin's appeal to a historical 'explanation'.

*Example 5* (Biogeography). Question: why do we find so many marsupials in Australia? This is a quest for explanation, roughly in accordance with the pragmatic model of explanation. We have to fix the comparative class: why so few elsewhere outside Australia? Then we outline a Darwinian history. We show that marsupials reached Australia before the evolution of the placentals. We also claim that, elsewhere, the placentals were able to outsmart the marsupials and push them out. And that the placentals were not able to reach Australia (after the continental breakup).

**DARWINIAN HISTORIES.** We can reconstruct Darwin's explanations further by focussing on the notion of Darwinian histories. Begin with *minimal* Darwinian histories (pages 26–27). Here we do not pretend to identify the causes of evolutionary change. But this pattern may invite the objection that it merely 'lists' changes, without properly explaining them. Hence Darwin, on many occasions, turned more ambitious: evolutionary change was said to be caused by natural selection. That is, the occurring change allowed for a better reproductive success of its possessor.

**HOW DARWIN CHANGED BIOLOGY.** The creation of a new *first* paradigm: before Darwin, there was no one acceptable way for biologists (as *we* would call them now) to practice their craft. Teleologists, for example, had little in common with practising naturalists. The language has changed: even though reference to theoretical entities (such as species) was preserved, ways of fixing this reference have changed. Similarly, Darwinism set new questions the biologists were supposed to ask. It set the criteria for acceptable answers. In all these regards it resembles scientific paradigms, as we saw in Kuhn.