Lecture 16: Philosophical Bias in Science

Philosophy in science

In this course, we have looked at various philosophical theories. Some of these are about ontology (what exists), some about epistemology (how we can know) and some are about ethics and norms (what we ought to do).

Here, we will see how these philosophical assumptions are also present in science and research. It can be about how scientists think of the world (ontology), or how they think about the best research methods for gaining knowledge about the world (epistemology), or the norms for how science ought to be practiced (what we ought to do).

For instance, we have seen that empiricists and rationalists disagree over what counts as the best knowledge. Hume thought we can only know what we can observe, which many scientists would also assume. If so, they would place more emphasis on empirical data then on theories. Hume didn't like theories at all, since he thought of them as ontological speculations. Scientists who are empiricists, would thus be equally sceptical of theories that were not based in solid data.

Plato was a rationalist, and had very different views from Hume on knowledge. The best knowledge, he thought, is when we try to find the universal principles behind the messy reality. Knowledge, if worth anything, should be general, abstract and ideal. We cannot find these by looking at the material world, but must instead use our thinking to abstract away from the particular.

In science, the rationalist perspective means that one would be more interested in universal laws and principles that can explain the behaviour of things. One might have to create ideal or artificial conditions to find them, or use closed systems or models to arrive at these law-like truths. Theoretical physics is often more concerned with laws of nature than with empirical data, and as Plato, mathematics is the most important tool for knowledge.

Which philosophical theory is correct? Who knows!

So what is the correct view? Well, no one can really say! As long as we are not dealing with facts, but with philosophical theories, either position is perfectly valid. Different scientific disciplines will have adopted a philosophical position, but it is not always clear that they did so, or why they chose that philosophical position.

If we ask, then: should true knowledge come from observations of particular things, as Hume argued? Or is true knowledge found by searching for idealised, abstract and universal truths behind the changing reality, as Plato argued? Scientists would give different answers, just like philosophers do. But unlike philosophers, scientists rarely think about their choice or the alternatives. They might not know there is an alternative.

Should scientists stay clear of philosophy?

Can scientists choose not to make any philosophical assumptions at all? Is it possible for science to avoid dealing with philosophy? Some philosophers of science will say yes, especially if one thinks that science should be purely empirical. The logical positivists are philosophers famous for saying that science should stay clear of philosophy, values, dogmas or even theory. Only facts matter!

Others will say that there is philosophy in science whether one is aware of it or not. Philosophy is thus unavoidable in science. Daniel Dennett, for instance, says that there is no such thing as philosophy-free science. Just science that has been conducted without any consideration of its underlying philosophical assumptions.

We will now present one philosophical perspective on the relationship between science and philosophy.

Philosophical bias is the one bias science cannot avoid

In the article, '[Philosophical bias is the one bias that science cannot avoid]', Andersen, Anjum and Rocca define philosophical bias as '*b*asic *i*mplicit *a*ssumptions in *s*cience about how the world is (ontology), what we can know about it (epistemology), or how science ought to be practiced (norms)'.

Like other biases in science, we argue, philosophical biases 'skew the development of hypotheses, the design of experiments, the evaluation of evidence, and the interpretation of results in specific directions'. The tension between empiricism and rationalism is thus an epistemological bias that influences scientific theory, choice of methods and norms of practice.

In medicine, there is an ontological bias of Descartes' mind-body dualism. This bias influences the way medical research and practice is divided into physical and mental illness. The only way to get rid of the dualist bias, is to replace it with the assumption of holism (no division) or reductionism (mind = brain). This means that one cannot choose to have *no* philosophical bias. It also means that one needs to know what the alternative is.

Biases in science is usually seen as something that threaten the ideals of objectivity, transparency and rationality. This is why vast efforts are made to detect and eliminate biases. When it comes to philosophical biases, however, the best one can do is to detect them, make them explicit and to critically examine them.

EXAMPLE: Lithium is the key ingredient in rechargeable batteries of electric cars, but extraction is highly water consuming and research suggests it is environmentally unsustainable. On the other hand, resource extraction in South America is an important source of national welfare and income.

There are at least two views on good science-based governance of resource extraction in developing countries:

1. Good governance gives priority to increased national income, wealth, employment rate, and improved social conditions, due to efficient exploitment of resources.
2. Good governance gives priority to the preservation of the environmental resources of the country.

Which of these one holds, depends on one's moral position and values. For instance, position 1 is motivated by utilitarianism: the positive outcomes on a country's economy and overall utility. It is also an anthropocentric form of argument. Position 2 seems to have a non-anthropocentric starting-point, as some of these mines are in areas where no people live. The question is then whether nature has moral value in itself.

In a new course, we learn about philosophical bias in science and how they motivate expert disagreement on sustainability.

Discussion questions

How do you see the relationship between philosophy and science?

What is a philosophical bias in science?

How is your own discipline philosophically biased, you think?

Do you know of any controversies over sustainability in science that could be linked to different biases about ethics?

Do you think scientists ought to discuss philosophy at all?

Elena Rocca talks about the course in the NMBU pedpod episode.

Episode 4 - scientific disagreement and philosophy

Scientific data can be interpreted in numerous ways, and while data may be objective, different scientific and value perspectives shape the way we individually interept information. These interpretations are not always congruent, leading to scientific disagreements over the meaning of results. Associate Professor Elena Rocca, along with her collegue Rani Lill Anjum, believe that philosophy has a role to play in navigating these scientific disagreements. Elena talks about her role in developing a university course that applies philosophical thinking to scientific disagreements.

Learn to detect philosophical biases in science

In the NMBU Centre for Applied Philosophy of Science, we work on philosophical biases related to ontological, epistemological and normative assumptions about causation, probability and complexity in science and medicine. We have developed two teaching courses at NMBU to teach students how to recognise and discuss philosophical biases in their own discipline: 'Causation in Science' (2013-2019) and 'Interdisciplinarity and Expert Disagreement in Sustainability Research' (2020). We also organised a virtual event, where all the talks are openly available.

From 2023, NMBU will be offering a version of this course in the January block, open for all students: MINA301.

Heather Douglas

(Born 1969)

Philosopher of science famous for her work on the relationship between science and values. She has written on science policy and the history of philosophy of science.

Selected works

- *Science, Policy, and the Value-Free Ideal* (2009)
- "Inductive risk and values in science" (2000)
- "The irreducible complexity of objectivity" (2004)
- "Bullshit at the Interface of Science and Policy: Global Warming, Toxic Substances, and Other Pesky Problems" (2006)