



Lecture 15: Philosophical Bias in Science



What is (philosophy of) science?

Philosophers disagree over what science is. Before we begin with philosophy of science, we should ask: what is science? But this is a philosophical question. It is not an empirical question, so one cannot decide scientifically what science is.

While science is about the world, philosophy of science is about science. It is meta-science. Philosophy of science deals with the conditions, scope and limits of science. One asks questions such as:

- What is science and what type of knowledge counts as scientific knowledge?
- How does science differ from non-science, and is science always better?
- What types of questions can be answered by science?
- Does science uncover already existing truths, or does it create new truths?
- How does science develop? Can science make progress?
- What are the best scientific methods?
- Do we need laws of nature? Are they even true?
- Must science *explain*, or is it enough to *describe* or *predict*?
- Is science ever objective and neutral? Should it try to be?

Philosophers of science disagree over all these issues, and many scientists do too.

Separating science from non-science

What is the alternative to science? Religion? Philosophy? Dogmas? Expectations? Subjective beliefs? Are none of these things a part of science? Some philosophers of science argue that science involves many of these aspects, as we will see later. Does this make science less objective?

If we think that science is the best way to generate true knowledge, then: *what exactly are the features of science that makes it superior to any other alternative?* The best methods? Universal theories? Empirically testable hypotheses? Derived from facts? Describes reality? Proven true?

It is not easy to distinguish scientific knowledge from other types of knowledge. For instance, one might think that science involves *detailed*, yet *universal* theories that allow us to *explain* how things are related in a way that can be used for *predictions*. Or that it gives *unity of knowledge*: that all the different parts and theories form a consistent whole.

Still, this would not be specific enough. Astrology provides all these things: it gives us a unified, detailed, universal theory, and it is used to explain personal traits, events and actions. In addition, astrology is used for prediction. But astrology is not accepted as a scientific theory. So how do they differ?

Philosophy in science

In this course, we have looked at various philosophical theories and seen that philosophers disagree over ontology (what is), epistemology (how we can know) and ethics (what is good).

For instance, we have seen that empiricists and rationalists disagree over what counts as the best knowledge. 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?

In science, we can detect a similar tension. Some assume that science should begin with empirical data and place less confidence in theories. Others search for laws of nature and theories aimed at explaining the data. Often, these laws will be quite abstract and hold only under some ideal conditions.

Can scientists choose not to make any philosophical assumptions at all? Some philosophers of science will say yes, especially if one thinks that science should be purely empirical. Others will say that there is philosophy in science whether one is aware of it or not. We will now present one such position.

Philosophical bias in science

In the article, '[Philosophical bias is the one bias that science cannot avoid](#)', Andersen, Anjum and Rocca define philosophical bias as 'basic implicit assumptions in science 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 an epistemological bias that influences scientific theory, choice of methods and norms of best practice.

An example of an ontological bias is 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. Here is an 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 exploitation 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.

Discussion questions

- What is science?
- How would you separate science from non-science?
- Would you side with empiricism or rationalism in science?
- What is a philosophical bias in science?
- How is your own discipline philosophically biased, you think?
- Do you think there are questions that science cannot answer? Which?

What do you think of the following claims?

- Philosophy of science can make us better students or researchers.
- Philosophy of science can help us become aware of the limitations and conditions of our own discipline.
- Philosophy of science provides a tool for critical reflection about our own scientific framework (incl. theory, methods and concepts).
- Learning to detect philosophical bias in science is important for disciplinary and inter-disciplinary research.



NO TOPIC OF SUSTAINABILITY IS FREE FROM SCIENTIFIC CONTROVERSY

LEARN ABOUT PHILOSOPHICAL BIAS AS A SOURCE OF EXPERT DISAGREEMENT

LEARN TO IDENTIFY, UNDERSTAND AND CRITICALLY DISCUSS BARRIERS FOR INTERDISCIPLINARY WORK

LEARN TO TRANSFORM CONTROVERSIES INTO CONSTRUCTIVE DIALOGUE

JUNE BLOCK 2020
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INTERDISCIPLINARITY AND EXPERT DISAGREEMENT IN SUSTAINABILITY RESEARCH

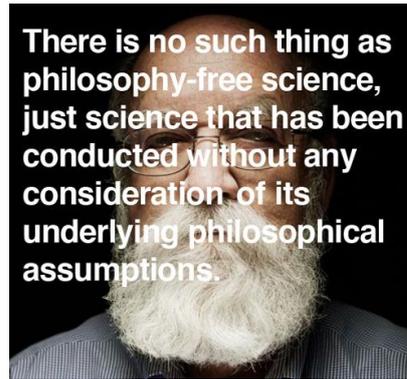
Collaborative learning
teaching seminars with discussions | interdisciplinary group work
analysis of real cases | invited guest lectures | flipped classrooms
poster conference | introducing a practical method for interdisciplinary collaboration and writing



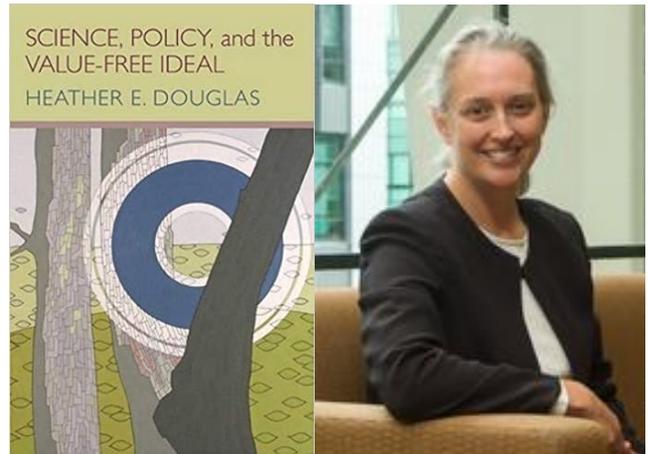
Learning to detect philosophical biases in science

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.

Quote by philosopher Daniel Dennett:



There is no such thing as philosophy-free science, just science that has been conducted without any consideration of its underlying philosophical assumptions.



Nancy Cartwright (1944 -)



One of the most famous contemporary philosophers of science.

Professor of Philosophy at the University of Durham and the University California San Diego.

Critical of idealised, universal, law-like truths (laws of nature) forced upon the messy reality.

Served as president of the Philosophy of Science Association and as president of the Pacific Division of the American Philosophical Association.

