Philosophy of Science: Empiricism

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Scientific knowledge?

Put empirical evidence into a large mixing bowl. Add reasoning and rhetorical spices. Mix and pour the filling into a journal paper crust. Bake until the pie is ready for the social practice of epistemic justification.
Knowledge: A classical analysis (Episteme)

S knows that p if and only if

1. p is true,
2. S believes that p, and
3. S is justified in believing that p.

Skepticism

- Skepticism is the view that knowledge is impossible because no one can have justified beliefs.
- The problem of skepticism is based on two arguments for skepticism, a classical and a modern one.
- A theory of epistemic justification needs to give an account of how justified beliefs are possible.
Method in epistemology

- Philosophers often take a common sense view or an “intuition” about knowledge as a starting point and ask what follows if one accepts it.
- If the implications are absurd, then something must be wrong with the view or the “intuition.”
- The goal is to find out what is wrong.

Classical argument

Any attempt to provide an epistemic justification for a claim leads to three discouraging prospects:

1. One will embark on an infinite regress by being forced to provide reasons for reasons ad infinitum. An infinite regress undermines the very possibility of epistemic justification.
2. One will bring the regress to an end at some point by claiming to know some beliefs without justification. This move makes one vulnerable to the charge of dogmatism.
3. One repeats something one has already justified before. This move makes one guilty of circular reasoning.

On the basis of these three prospects, the skeptic concludes that no claim is ever justified to the slightest degree.

Sextus Empiricus (c. 160-210 a.d.)
Modern argument

(1) I do not know that I am not a brain in a vat.
(2) If I do not know that I am not a brain in a vat, then I do not know that I have two hands.
(3) Therefore, I do not know that I have two hands.


The modern argument appeals to an imagined brain-in-a-vat scenario which is designed so that there is nothing in my inner experience that enables me to tell whether I am part of a brain-in-a-vat scenario or a common sense scenario where I have two hands.
Two main strategies to respond to the classical argument

**Foundationalist** theories of epistemic justification: epistemic justification avoids lapsing into infinite regress, dogmatism, or circular reasoning by citing basic beliefs.

A belief is justified if and only if it is either itself basic or inferentially connected (in some appropriate way) to other justified beliefs.

There are basic beliefs, that is, beliefs that are justifiably held without resting on further evidence.

Basic beliefs are justified in virtue of their content (e.g., being observational reports).
Another strategy

**Coherence** theories of epistemic justification:
The unit of epistemic justification is not a single claim; it is a web of beliefs.

British empiricism

Empiricism is a form of foundationalism: basic beliefs are particular kinds of observation reports.

John Locke (1632-1704)
George Berkeley (1685-1753)
David Hume (1711-1776)
Logical empiricism

- The Vienna Circle (e.g., Moritz Schlick, Otto Neurath, Rudolf Carnap, and Herbert Feigl).
- The early 20th century developments in logic were seen as a key to understanding the relations between empirical evidence and hypotheses/theories, between statements about observable and unobservable phenomena.
- Verificationism: The meaning of a proposition is related to its method of verification.

Behaviorism

One behaviorist walks up to another at a party and says, “You are doing fine, how am I?”

One behaviorist asks another: “How many philosophers does it take to change a light bulb?”
The other behaviorist says: “No room for humor here – it’s purely an empirical question.”
Seeing is believing?

- Are there observation reports that are independent of other beliefs (e.g. beliefs about a proper way of classifying observations)?
- Are there observation reports that are infallible?

A trade-off

I can try to increase the reliability of my observation reports by stripping away their conceptual content (e.g., by preferring “red” and “round” to “tomato”). But the problem is that I end up with observation reports which are not sufficiently informative to support any interesting hypotheses.
"There is more to seeing than meets the eyeball."

Myths about "facts:"
- "Facts" are directly given to the observer.
- "Facts" are prior to and independent of theory.
- "Facts" constitute an infallible foundation of scientific knowledge.

"Facts" about "facts:"
- An experienced and skilled observer sees things in a different way from a novice.
- "Facts" are expressed in statements in a particular conceptual framework.
- The search for relevant "facts" is guided by the current state of knowledge.
- "Facts" are to some degree fallible but they can nevertheless be more or less objective.

Chalmers, A. F. 1999. What is this things called science?

Empirical evidence in science?

**Empirical evidence** plays an important role in the epistemic justification of scientific knowledge. However, empirical evidence does not consists of basic beliefs (as foundationalism suggests).

→ What alternatives are there to foundationalism?
Contextualism

- Unlike foundationalist and coherence theories of epistemic justification, contextualism does not attempt to provide a direct response to the problem of skepticism.
- Contextualism aims to provide a diagnosis of what is wrong with the skeptic's arguments.


Diagnosis

- The classical argument for skepticism is based on the mistaken view that the claimant has merely three alternatives: infinite regress, dogmatism, and reasoning in a circle.
- Contextualism provides a fourth alternative: the claimant can be justified in believing that p even though she does not provide reasons in support of p.
- Her believing that p can be justified in virtue of her belief having the status of a default entitlement.
Epistemic justification in contextualism

Epistemic justification is like innocence in a court of law: “presumptive but in need of defence in the face of contrary evidence” (Williams 2001, 25).

Contextualist solution to the problem of skepticism?

- Contextualism enables the claimant to avoid infinite regress and circular reasoning because the chain of reasons is brought to an end by beliefs which function as default entitlements.
- Contextualism enables the claimant to avoid dogmatism because beliefs which function as default entitlements are justified beliefs; they are not adopted dogmatically.
Defense commitment

- A scientist does not need to present evidence in support of all her beliefs.
- She has to adopt them with a defense commitment, and provide evidence when it is requested.
- To make a knowledge claim is to make a promise. A promise generates obligations which are social and epistemic.

Epistemic responsibility

- Epistemic justification is a matter of being epistemically responsible and not merely a matter of having adequate grounds for a belief.
- A scientist is epistemically responsible if she provides evidence for her beliefs or adopts them with a defense commitment.
Foundationalism

Are there basic beliefs?

What kinds of beliefs are they?

Contextualism

Epistemic justification can appeal to relatively "strong" beliefs even though they are not "basic beliefs".
The burden of proof

- The classical argument for skepticism is based on the problematic assumption that the skeptic, or anybody else, has always a right to demand that others present evidence in support of their beliefs.
- As soon as we abandon this assumption, the burden of proof is shifted to the skeptic. The skeptic has a duty to explain why others should doubt their beliefs in the first place.

Brains-in-a-vat?

- The modern argument is more challenging than the classical one because the modern skeptic does not simply assume that she always has a right to demand that others present reasons for their beliefs. Instead, she provides an argument that gives others a reason to doubt their common sense beliefs.
- The modern argument is based on two problematic assumptions:
  - The distinction: inner experience versus knowledge of the external world.
  - The former is epistemically privileged in relation to the latter.
In contextualism, epistemic justification is thought to take place in a context of assumptions some of which function as default entitlements.

Default entitlements can be articulated and challenged but only by a recontextualization that involves assumptions of its own.

Inquiry is open-ended, that is, recontextualization can go on indefinitely.

I am justified in believing that I am not a brain in a vat (default entitlement).

Observation reports are not basic beliefs.

They are paradigmatic cases of beliefs which function as default entitlements in many contexts of inquiry.

Scientists are justified in believing in them as long as no one has provided reasons to suspect that they are false or that they have been produced in an unreliable way.
**Empiricism revisited**

Observation reports play a **special** role in the epistemic justification of scientific knowledge even though they are not independent of other beliefs and they are not infallible.

**The problem of demarcation**

Karl Popper: A hypothesis is scientific if and only if it has the potential to be refuted by some possible observation.

Falsificationism: Scientific knowledge consists of hypotheses which has survived repeated attempts to falsify them.
Larry Laudan on demarcation

- The problem of demarcation between science and non-science is a pseudo-problem (1983, 124).
- Ideally, a solution to the demarcation problem would have to specify a set of individually necessary and jointly sufficient conditions for deciding whether an activity or a set of statements is scientific or unscientific (1983, 118).
- But there is no solution that a majority of philosophers would accept (1983, 112).
- And it is unlikely that there will be one because of “the epistemic heterogeneity of the sciences” (1983, 125).

Boundary work

The “boundary work” literature takes off at the moment when many philosophers give up the attempt to solve the so called demarcation problem: the question of how to distinguish between science and non-science (especially pseudoscience which appears to be scientific but is not scientific).

Gieryn on boundary work


Attempts to provide a definition of science that would demarcate science from other kinds of intellectual activities have failed. We should replace the normative problem of demarcation with the empirical problem of understanding how and why “boundary work” is done.

What is boundary work?

- “Boundary work” is an umbrella concept intended to cover a variety of rhetorical strategies that are used to designate some activities, theories, methods or concepts as belonging properly to a particular discipline (or science) while others are pushed beyond the boundaries of a particular discipline (or science).
- Gieryn (1983) focuses on the style and the content of “public science,” that is, documents where scientists describe science for the public and its political representatives.
Why is boundary work done?

- Boundary work can have different goals: (1) the expansion of discipline to new domains, (2) the monopolization of epistemic authority and resources, and (3) the protection of autonomy (Gieryn 1983, 792).
- Science is no single thing: Characteristics attributed to science vary widely depending upon the specific intellectual or professional activity designated as “non-science” and upon particular goals of boundary work (Gieryn 1983, 792).
- “The boundaries of science are ambiguous, flexible, historically changing, contextually variable, internally inconsistent, and sometimes disputed” (Gieryn 1983, 792).

Criticism

- Demarcation is routinely accomplished in practical everyday settings such as education, hiring and funding decisions in academia, and peer review processes in conferences and journals. Why should we give up an attempt to understand it?
- Demarcation has practical relevance: When a body of knowledge is classified as scientific, it can legitimately play certain roles in society: public education, public health care system, public funding of research, and legal system. There are good moral and political reasons to be concerned with it (Pennock 2011; Resnik 2000).
A pragmatic approach


- Any attempt to solve the demarcation problem by analyzing the sufficient and necessary conditions that define “science” and “scientific,” is likely to fail. This is because conceptions of science depend partly on the context where demarcation is accomplished.
- While there are some core principles (or criteria) that we can use in distinguishing between science and non-science, particular judgments and decisions about something’s scientific status depend, in part, on practical goals and concerns.

Science and religion


- Laudan focuses too narrowly on the problem of demarcation as Popper defines it. The task is not to demarcate science by pinning down its precise borders and defining a set of necessary and sufficient conditions that are shared without exception among all and only sciences, both historical and contemporary.
- "What is needed is not an ahistorical formal definition but something more pragmatic and down to earth – what might be a ballpark demarcation that simply identifies a position as violating a basic value, or ground rule, inherent in the practice" (183-84).
A ground rule?

- According to Pennock, a ground rule is *methodological naturalism*: we should regard the universe as a structured place that is ordered by uniform natural processes, and we may not appeal to miracles or other supernatural interventions that break this presumed order (2011, 184).
- Methodological naturalism is not a dogma; it continues to be accepted in part because of its success (2011, 199).

Today’s message

The *context* of scientific debates determines what one is allowed to take for granted, what one needs to argue for, and how much evidence one needs to provide in support of one’s view.