HPSC 1001/1901/2101/2901

WHAT IS THIS THING CALLED SCIENCE?

Semester 2, 2020

Lecture 7: Empiricism and Evidence

Today:

1. First papers

2. Empiricism and evidence

1. First papers

Things to do:

(i) Write as clearly as you can. Usually, the best way to do this is to write *simply*. Use short sentences. Give some thought to the organization of paragraphs (should this part come before this part? etc.). Use paragraphs to collect ideas and separate those blocks from others.

(ii) *Think* before you write.

(iii) My preferred way of writing: don't start at the beginning. Start in the middle and then work forwards and backwards. Have the whole paper planned in notes or bullet points before writing whole sentences.

(iv) Imagine *saying* what you are writing. You are trying to explain something or convince someone of something. It is fine if your writing looks a bit like direct, simple newspaper writing. Better to write like that than to write in too complex and elaborate a way. Don't show off.

But write in complete sentences. Not fragments of sentences, or dot points. [That is an example of a sentence fragment – it has no main verb.]

(v) Sometimes there is a 'right answer' (at least, one that the markers have in mind). Sometimes there is not. Don't worry too much about that. Give your own response. Say what you think. But give us *reasons* why you think what you think. It's not enough to say "I feel that...." Feelings are usually not relevant.

Things not to do:

(i) Don't roam the internet looking for guidance. Most internet philosophy is very bad. (The *Stanford Encyclopedia. of Philosophy* is good.)

(ii) Don't pack your paper with extra references just for the sake of it. You can do extra reading for this paper if you want, but it's not really necessary. Talk to your tutor about readings.

(iii) Don't try to impress with florid language or complex jargon.

A fragment of a well-written undergraduate paper on another topic:

What We Can Learn From Chess Masters

Introduction

Fairly recently, a group of a psychologists and cognitive scientists have attempted to understand the human mind using a *dual-process* theory of intelligence. They argue that there are two distinct systems at work in the mind: one that operates using rough and ready heuristics, the other taking a more slow, measured approach through conscious reflection, explicit judgments, and rule application. These two systems are so separate and distinct that we can say that humans

operate in two minds. They often work independently of one another, coming into conflict when they both work on the same task, and this fact helps explain why humans seem to mess up even some of the most basic logic problems. The aim of this paper is to take these claims as a starting point and investigate the relationship between these two systems. I'd like to know whether these characterizations sufficiently capture the kinds of processes that underlie complex cognition. To begin to address that question, we must first take an in-depth look at the dual-process theory of intelligence.

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* It is fairly informal, and that helps make it clear. Short sentences, too.

2. Empiricism and Evidence

First phase of early C20 empiricism: logical positivism.

Second phase, "logical empiricism." After WWII.

LE: Holism about testing is accepted. When we do a test, the thing we are testing is a big network of claims or belief: theory plus background assumptions of many kinds.

But still, it seems that the *only possible role* for the parts of language that seem to refer to unobservable things is to help us pick out patterns in the things (whatever they are) that *can*

be observed. (I say "seems that" because people were starting to doubt this, but could not see another option.)

What is observable? Not sure. Probably not just sensations, but ordinary objects like chairs and instruments. But this was seen as difficult.

Quine's "web of belief" view

I said above: "When we do a test, the thing we are testing is a big network of claims or belief: theory plus background assumptions of many kinds." Quine took this to an extreme. All of a person's beliefs at a time form a big network or web.

If predictions are going well, there is no need to change anything in the web.

When they are not going well, you can change *whatever you like*, in order to get your predictions back on track. This can include changing beliefs about mathematics and logic. There is no distinction between "analytic" and "synthetic" statements in Quine's view. All beliefs are considered in the same terms – *is this belief helping me to predict what is going on?*

Some beliefs are more closely tied to experience than others – "it is raining now." But they all play the same kind of role

and all of them can be adjusted to see whether our predictions might be more successful.

If you want to read more, see Quine and Ullian, *The Web of Belief.*

By about 1960 or so, the main empiricist views on the table were Quine's view and a more moderate logical empiricist view. That LE view included sharper distinctions between observational and non-observational language, analytic and synthetic, etc. (Also Popper's view, which we cover next week.)

Problems of evidence

Terminology: *Confirmation* - support for a hypothesis. This might be very partial. Confirmation comes in degrees. A theory can be confirmed at one time but later shown to be false.

Fallibilism – any of our beliefs could be wrong.

More on fallibilism: What about beliefs about my present experiences? What about mathematics? Perhaps mathematics and present experience are special cases. I think fallibilism is right about maths too, because of the role of memory in any proof-based belief. Proofs might give a guarantee in principle, but time introduces uncertainty about whether you have gone through a proof that works.

Most C20-21 philosophers have thought that:

(i) None of our scientific beliefs can be known to be true with certainty.
(ii) Some beliefs and hypotheses have much more support than others.
(iii) There is *no conflict* between (i) and (ii). Certainty is not the goal.
All of life is a bit of a gamble, but some bets are better than others.

It seems that scientific questions and theories are diverse:

Why did dinosaurs like *Tyrannosaurus rex* go extinct?
Why do some inherited biological traits 'skip a generation'?
Why are substances containing iron often red?
What is the charge on a single electron?
How many teenagers smoke cigarettes?
Are humans making the climate warmer?
Can any signal travel faster than light?

Despite this diversity, for 20th century empiricism, this problem came to have a particular shape.

Remember this earlier summary:

(i) Scientific theories are networks of generalizations.
(ii) Our evidence for any scientific theory is a collection of observations.
(iii) Observations are always of particular things – particular objects, particular events.
So what we need is some understanding of how observations of particular objects and event can give support to generalizations that go beyond what has been observed.

"(i) Scientific theories are networks of generalizations."
Really? What about theories of climate change? Extinction of dinosaurs?

Some empiricists thought: if these are really part of science, then they are general in an implicit way.
Or: the most important parts of science are general – the search for laws. These are just sideshows.
Either way: the focus became the confirmation of generalizations.

This approach brought C20 philosophers back to the classic *problem of induction.* Why do patterns seen in the past give us reason to expect particular events in the future?

David Hume (*Treatise of Human Nature,* 1739): no reason!

How could there be a justification for using past experience as a guide to the future? First, there is no contradiction in supposing that the future might change dramatically.
Perhaps we can say: induction has worked in the past. It has a good track record.
But: that brings us back to the same problem. Why believe that *anything* about the past gives us real information about

the future?

Hume: induction is just a habit. It has no justification.

How the logical empiricists and others wanted to handle this: a *logic* of induction.

Distinguish two kinds of logical argument:

A *deductively valid* argument: *if* all the premises of the argument are true, the conclusion *must* be true. The premises *deductively imply* the conclusion.

1. All men are mortal

2. Socrates is a man

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3. Socrates is mortal.

1. All spiders are vegetarians

2. James is a spider

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3. James is a vegetarian

1 and 2 are premises. 3 is the conclusion.

An inductively valid argument? (Or just, a good inductive argument?)

Perhaps:

All the many spiders (all species) we have studied up till now have been found to be carnivorous.

All spiders are carnivous.

The double line is sometimes used to indicate that the argument is not supposed to be deductively valid.

We might add hedges to the conclusion: "Probably, all spiders are carnivous." Or: "We have good reason to think that...."

Either way, we want to understand how support works in cases like this. And because of the nature of theories (which are general) and evidence (which is made up of particular observations), what we really seem to need is a *logic of induction*, or *inductive logic*.