The Problem of Induction

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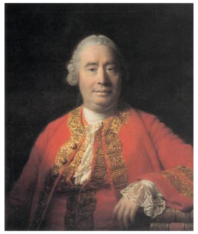
Phil 450: Epistemology
Lecture 8

The Problem of Induction
I.e., Inductive Skepticism

Problem of Induction

al Ghazali (1058-1111)



David Hume (1711-1776)

The next three weeks of this course are about the problem of induction, which is often attributed to the two philosophers above.

What is the problem of induction?

Question: What is the problem of induction?

Answer: To resolve the following dilemma.

- Some inductive inferences appear to be justified or rational (e.g., in light of past weather data, it seems reasonable to infer will rain some time in the future in Seattle). In fact, we might think we **know** some propositions on the basis of inductive inference.
- But al Ghazali and Hume present compelling arguments that inductive inferences are **never** justified or rational.

What is the problem of induction?

Question: What is the problem of induction?

Answer: The challenge to answer the following questions.

1. What, if anything, is wrong with al Ghazali and Hume's arguments that inductive inferences are **never** justified?
2. If inductive inferences are ever justified:
   1. Why? What distinguishes justified ones (e.g., predictions using weather data) from unjustified ones (e.g., predictions using tea leaves)?
   2. Are there any ways we can tell whether a given inference is justified?

What is induction?

What is induction?

Question: What is an "inductive inference"?

Non-Answer: Let's consider some examples of inferences, I hypothesize, neatly every philosopher would count as inductive . . .

Examples of induction

- Inferences about the climate in the future using past climate data and scientific theories
- Inferences about very distant parts of the universe given our knowledge of nearby galaxies
- Nineteenth century scientists' inferences about atoms given only their experiences with macroscopic objects

Induction = Inferences about unobserved properties, objects or events using existing observations.

- Are we justified in believing the predictions of climate scientists?
  - Unobserved = Future
- Could nineteenth century scientists make rational inferences about the behavior of atoms given only their experiences with macroscopic objects?
  - Unobserved = Microscopic
- Can we acquire knowledge about very distant parts of the universe given our knowledge of nearby galaxies?
  - Unobserved = Distant objects

Problem of Induction: When we make inferences about unobserved properties, objects or events using our previous observations, are our inferences ever justified or rational? Can they ever produce knowledge?

If so, why? What distinguishes bad inductive inferences from good ones? And are there any ways we can tell whether a given inference is justified?

Contemporary notion of "induction"

Bird [2010] provides some examples of what philosophers might call "induction" that don't fit the definition I've just given, but I am providing you the above characterization for two reasons:

1. To help you make sense of some of the examples in the assigned readings, and
2. To warn you against narrower characterizations of induction that don't fit many cases of what philosophers call "induction"

Here are some bad attempts to define "induction" . . .

What is induction?

Attempt 1: According to the Oxford English Dictionary, **induction** is

> *The process of inferring a general law or principle from the observation of particular instances (opposed to deduction n., q.v.)*

Popper [2005]'s definitions is similar.

Example: Imagine that having observed 100 white swans, Conor inferred, "*All* swans are white." Then Conor's inference is an example of induction.

Is induction inferring a general law?

Vickers [2016]'s thinks this definition is too narrow, given how "induction" is now used among philosophers.

Question: Why?

Is induction inferring a general law?

Answer:

- There are arguments that philosophers call "inductive" that have general premises and particular conclusions
  - E.g., All swans I've seen have been white. So the next swan I see will be white.
- There are deductively valid arguments that have particular premises and general conclusions.
  - E.g., Suppose I assume that Eric loves philosophy, Maya loves philosophy, and so on **for every student in the class**. I then conclude, "all students in this class love philosophy."

Induction and Statistical Inference

Further problems: Philosophers also typically include statistical arguments as paradigms of induction, even if the premises and conclusions can't be summarized nearly in languages using only all/some/most quantifiers.

Induction and Statistical Inference

Premise: A sample of a larger population X has property P.

- Example: About 68% of **polled** UW students are registered Democrats.

Conclusion: The entire population X has property P.

- About 68% of **all** UW students are registered Democrats.

Induction vs. Deduction

Attempt 2: Some philosophers (e.g., Skyrms [1999]) define an "inductive **argument**" to be any non-deductive argument.

Induction vs. Deduction

Vickers [2016] notes this definition is too lenient:

> *Perception and memory are clearly ampliative but their exercise seems not to be congruent with what we know of induction . . .*

Induction vs. Deduction

What does Vickers mean? Consider the following argument:

Premise: I see a chair.

Conclusion: There's actually a chair in front of me.

Most philosophers won't call this an inductive argument, even though it's possible for the premise to be true and the conclusion to be false simultaneously (e.g., I might be hallucinating).

Induction and Time

Attempt 3: Some philosophers define "induction" as always involving inferences about the future.

Problem: Paradigmatic cases of induction have conclusions about the past or present . . .

Induction and Time

Premise: All/Most observed Xs have had property P.

- Example 1: No living person can turn water into wine.
- Example 2: All observed macroscopic objects and sub-atomic particles travel slower than light speed.

Conclusion: Some/All/Most Xs will have property P.

- Example 1: No person in the past could turn water into wine.
- Example 2: Neutrinos travel slower than light speed.

Note: The first argument is about the past; the second about the past, present, and future.

What is "the" Problem of Induction?

Moral: Philosophers agree widely on examples of inductive inference, but many philosophers' definitions of "induction" fail to capture examples of reasoning that are widely agreed to be inductive.

Practical Upshot

Upshot: As you read Hume and others, ask yourself what types of inferences and arguments are under discussion?

- Must the conclusions be about the future for the author's argument to work?
- Is the author only discussing arguments with *universal* conclusions (e.g., All Xs have property P)? In general, is the author discussing arguments of a particular logical form?
- Are the arguments causal, or do they only involve statistical regularities?

Small Group Discussion

Topic: Matters of Fact
Time: 15 minutes

Small Group Discussion:

1. What is a matter of fact?
2. List at least five examples of matters of fact from the sections of Hume that you read. **Copy the matter of fact precisely and write down the page number in the text**. Determine:
    - Are all Hume's examples of the matters of fact about the future?
    - Are they about unobserved objects or events? Unobserv**able** ones?
    - Are they universal generalizations?
    - Are they causal claims or statistical regularities?
    - What features, if any, do they have in common?

Reconstructing Hume's Argument

That there are no demonstrative arguments in the case, seems evident; since it implies no contradiction, that the course of nature may change, and that an object, seemingly like those which we have experienced, may be attended with different or contrary effects. May I not clearly and distinctly conceive, that a body, falling from the clouds, and which, in all other respects, resembles snow, has yet the taste of salt or feeling of fire? Is there any more intelligible proposition than to affirm, that all the trees will flourish in December and January, and decay in May and June? Now whatever is intelligible, and can be distinctly conceived, implies no contradiction, and can never be proved false by any demonstrative argument or abstract reasoning a priori.

[Hume, 2011, pp. 115, Margins 18-19]

Identifying the conclusion

Question: What's the conclusion?

Answer: "That there are no demonstrative arguments in the case . . . "

Question: What "case" is Hume discussing?

To answer that question, it will help to distinguish (1) arguments from (2) an argument **schema** (which are often called **rules of inference**)

Schema vs. Particular Arguments

Argument instance	**Argument Schema**
P1. Conor teaches logic. P2. Everyone who teaches logic is silly.	X has property P. Every object that has property P has property Q.
Conclusion: Conor is silly.	X has property Q.

Roughly, an argument **schema** is the <u>form</u> of an argument that is obtained by replacing all of the nouns and adjectives with variables (and predicate symbols respectively).

Hume's target

Argument Schema S

P: "I have found that such an object has always been attended with such an effect."

C: "I foresee, that other objects, which are, in appearance, similar, will be attended with similar effects" [Hume, 2011, p. 114].

Hume's Conclusions: (at least as Hume is interpreted by some philosophers of science today)

1. No instance of Argument Schema *S* justifies believing its conclusion.
2. One is not justified in believing a matter of fact about something unobserved.

Today's Class

Remainder of class:

- Reconstruct Hume's argument no instance of Argument Schema S is deductively valid.
- Reconstruct Hume's argument that every inductively strong instance of Argument Schema S is circular.
  - Note: Hume also calls inductive arguments "probable." Hume uses the word "probable" very differently than we do today.

Before you work in groups, let me put those two halves together to defend Hume's conclusions.

Combining Hume's Arguments

P1. One is justified in believing a proposition only if there is a good argument for it.

P2. A good argument is non-circular and either deductively valid or inductively strong.

C1. One is justified in believing a proposition only if there is a non-circular, deductively valid or inductively strong argument for it. [By P1 and P2]

Combining Hume's Arguments

C1. One is justified in believing a proposition only if there is a non-circular, deductively valid or inductively strong argument for it. [By P1 and P2]

P3. One is justified in believing a matter of fact about the unobserved only if it is the conclusion of a good instance of Argument Schema S.

C2. One is justified in believing a matter of fact about the unobserved only if it is the conclusion of a non-circular, deductively valid or inductively strong instance of Argument Schema S [From C1 and P3].

Combining Hume's Arguments

P4. No instance of Argument Schema S is deductively valid.

P5. Any inductively strong instance of Argument Schema S is circular.

C3. One is never justified in believing a matter of fact about the unobserved [From C2, P4, and P5].

Small Group Discussion

Topic: The Deductive Half of Hume's Argument
Time: 25 minutes

Group work: Reconstruct Hume's argument that any no instance of Argument Schema S is valid.

- Note: Pay close attention to the relationship between conceivability and contradiction.
- Write down the premises as precisely as possible.

Group work: Reconstruct Hume's argument that any inductively strong instance of Argument Schema S is (perhaps implicitly) circular.

- To do so, you'll need premises that characterize when arguments are "inductively strong" and when arguments are "circular."
- In your discussion, it may help to call the claim that "the future will be like the past" the **Principle of Uniformity of Nature** (PUN).

Generalizing Arguments

Generalizing Arguments

Sometimes, a small modification of an argument allows us to establish either (1) a logically stronger conclusion or (2) the same conclusion with at least one (logically) weaker premise.

We call the modified argument a generalization of the first argument.

Example Generalizations

Argument	Generalization
P1. Conor teaches logic. P2. Everyone who teaches logic is silly.	P1': Conor teaches. P2': Everyone who teaches is silly
C: Conor is silly.	C': Conor is silly.

- P1' is weaker than P1. P1' only says Conor teaches, but doesn't tell us what he teaches.
- For this reason, the generalization will allow us to show that all teachers are silly, not just logic instructors.

Generalizing Hume's Argument

Many philosophers think Hume's argument establishes the stronger conclusion that we have no justification for placing any confidence in the conclusion of inductive inferences.

Example: Many think that, according to Hume, we have no reason to be confident the sun will rise tomorrow (or think the sun's rising is probable).

Why? Let's try to generalize Hume's argument.

Hume's full argument

- P1. One is justified in believing a proposition only if there is a good argument for it.
- P2. A good argument is non-circular and either deductively valid or inductively strong.
- C1. One is justified in believing a proposition only if there is a non-circular, deductively valid or inductively strong argument for it. [By P1 and P2]
- P3. One is justified in believing a matter of fact about the unobserved only if it is the conclusion of a good instance of Argument Schema S.
- C2. One is justified in believing a matter of fact about the unobserved only if it is the conclusion of a non-circular, deductively valid or inductively strong instance of Argument Schema S [From C1 and P3].
- P4. No instance of Argument Schema S is deductively valid.
- P5. Any inductively strong instance of Argument Schema S is circular.
- C2. One is never justified in believing a matter of fact about the unobserved [From C2, P4, and P5].

A generalization of Hume's argument

- P1. One is justified in *placing confidence in or calling a proposition "probable"* only if there is a good argument for it.
- P2. A good argument is non-circular and either deductively valid or inductively strong.
- C1. One is justified in *placing confidence in or calling a proposition "probable"* only if there is a non-circular, deductively valid or inductively strong argument for it. [By P1 and P2]
- P3. One is justified in *placing confidence in or calling a* *matter of fact about the unobserved "probable"* only if it is the conclusion of a good instance of Argument Schema S.
- C2. One is justified in *placing confidence in or calling a* *matter of fact about the unobserved "probable"* only if it is the conclusion of a non-circular, deductively valid or inductively strong instance of Argument Schema S [From C1 and P3].
- P4. No instance of Argument Schema S is deductively valid.
- P5. Any inductively strong instance of Argument Schema S is circular.
- C2. One is never justified *placing confidence or calling a* *matter of fact about the unobserved "probable"* [From C2, P4, and P5].

Discussion: Are the modified premises any more or less credible than the corresponding premises in the original argument?

For Next Class: Identify which premise of Hume's argument each critic attacks.

References I

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