Notes on Hume's Problem of Induction

1740 - *Treatise of Human Nature*
1748 - *Inquiry Concerning Human Understanding*

Recall: Subject of confirmation = *How* scientific claims are justified.

This assumes that they are capable of justification in the first place.

Hume asks: Is there a rational basis for inductive inferences?
Hume response: No!

Consequence: To the extent that scientific claims are based on inductive inferences, they cannot be justified.

Example:

$$\frac{\text{All observed ravens are black.}}{\text{All ravens are black.}}$$

Hume asks, Can we ever be justified in believing the conclusion?

Two types of objects of knowledge, according to Hume

(I) *Relations of ideas* = Products of deductive (truth-preserving) inferences; negation entails a contradiction. *Ex*: $2 + 2 = 4$

(II) *Matters of fact* = Products of inductive inferences; negation does not entail a contradiction. *Ex*: All ravens are black.

Outline of Hume's Argument

(1) Matters of fact can only be *known through experience* ("*a posteriori*").
(2) Therefore matters of fact can only be justified by recourse to experience.
(3) But any attempt to do so is circular.

∴ There is no justification for inductive inferences.

ASIDE

1. Hume is *not* just saying that we can never be certain about inductive inferences (*i.e.*, we can never be 100% certain that all ravens are black). This would be uncontentious: Most people would agree that there's always room for error in making an inductive inference. However, most people would at the same time claim that we *are* justified in making (some) inductive inferences, even though they aren't 100% guaranteed to work (*i.e.*, we think there *are* standards by which we can judge good inductive inferences from bad ones). Hume is saying that this is wrong: we are *not* justified in believing *any* type of inductive inference.
2. Premise (1) is the fundamental claim of *Empiricism*. *Rationalism*, on the other hand, claims that some matters of fact can be known "*a priori*" (without recourse to experience). So a Rationalist can block Hume's argument by rejecting the first premise.
3. Hume demonstrates Premise (3) for a particular notion of *justification*. Briefly, for Hume, to justify a method of inference requires *knowing* with certainty that it works. There are weaker notions of justification.

Examples of Circular Reasoning

Main question: What *justifies* inductive inferences?

(1) *Causal relationships*: We are justified in inferring general claims from finite amounts of evidence just when there's a causal relationship involved.

Problem: Causal relationships are *matters of fact*, known only through experience; *i.e.*, they are established by means of induction (we never directly observe causal connections--we *inductively* infer their existence based on our observations of correlations). *So to say that causal relations justify induction is to say that induction justifies induction.*

> *Hume's analysis of cause/effect relationships*
>
> Three parts: cause, effect, causal connection.
>
> *What we observe:*
>
> (1) *Temporal priority*: cause comes before effect.
>
> (2) *Spatiotemporal proximity*: cause and effect are close to each other.
>
> (3) *Constant conjunction*: same cause-effect sequence on numerous observations.
>
> *What we don't observe:*
>
> Causal connection. This is only *inductively* inferred from (1)-(3).

(2) *Uniformity of Nature*: We think a causal relation is present given past observations *and* the assumption that the future will be like the past (uniformity).

Problem: Why should we believe that nature is uniform? If it's because this has been our past experience (*i.e.*, nature has appeared to be uniform in the past), then we are using circular reasoning: the inference from past to future is an *inductive* inference. *So to to say that the uniformity of nature justifies induction is to say that induction justifies induction.*

(3) *Appeal to Track Record*: Induction has worked in the past, so we are justified in believing it will work in the future.

Problem: Same as for (2) above.

Some Responses to Hume

(1) Success of Science: *Scientific* forms of inductive inference *are* justified by their success. (Scientific forms of inductive inference are based on highly controlled experiments. Since these experiments are very stringent, their success in identifying correlations justifies us in believing that these correlations are evidence for underlying causal connections.)

Problem: This is an appeal to track record (successful in past, therefore successful in future), and hence is circular.

(2) Ordinary Language Dissolution: Hume doesn't understand what it means to be "rational".

Claim: To be reasonable (rational) is *by definition* to base one's beliefs on evidence (indutive or deductive).

So: In the context of induction, Hume is just asking: *Is it reasonable to be reasonable?* (*i.e.*, Is it reasonable to base our beliefs on inductive evidence?) And this by definition is *trivially true.*

Problem: There are two ways to justify a method:
Validation: Appeal to more basic principles.
Vindication: Indicate how method achieves its goals.

So: Response (2) says it makes no sense to ask if induction can be *validated*--by definition, induction forms one of the basic principles by which we justify our beliefs.

But: Hume's question is, Can induction be *vindicated*? And the answer to this is, No: We can't demonstrate how it achieves its goals without circularity.

Goal of induction = to successfully project past regularities into the future.

So: The *real* question Hume is asking is: *Is it reasonable* (*i.e.*, does it serve our goal of making successful predictions) *to be reasonable* (*i.e.*, to use inductive inferences)? And this is *not* trivially true.

(3) *Deductivism*: Give up inductive inferences.

Claim (Popper): Scientific inferences are *deductive*; so science does not face a problem of *induction*.

Recall the simple negative-outcome form of HD reasoning:

If H is true, then O is true.
O is not true.

$\therefore$ H is not true.

If H does not yield false O's (*i.e.*, if it passes *severe tests*), then Popper says that H is "corroborated" (as opposed to "confirmed").

Problems:

(a) Recall that this simplistic account faces the *Duhem-Quine Problem*: In realistic situations, H cannot be tested in isolation; we need additional assumptions (aux. hypotheses; initial conditions) in order to derive O from H. Hence if O is not true, we can always retain H and blame these additional assumptions.
Moral: The falsification method on which the "Deductivism" response to Hume is based, is too simplistic.

(b) Furthermore, the falsification method only describes the *past performance* of H. It says nothing about the *future success* of H in making predictions. So Popper must claim that science is concerned entirely with explanation, *not* prediction. Otherwise, he still faces Hume's Problem: What informs us about which H to use if we want to make a prediction? Successful past performance does not guarantee successful future performance.

(4) <u>*Pragmatic Vindication*</u>

Given the alternatives, induction is the best option.

<u>*Reichenbach's decision matrix*</u>

Let our goal be to predict the future with reliability. Reichenbach lists our options in achieving this goal in the following table:

options \ *possible states*	*Nature is uniform*	*Nature is not uniform*
use induction (sci. methd)	*success*	*failure*
don't use induction (crystal ball)	*success or failure*	*failure*

induction = projection of past regularities into future

<u>*Why "failure" here?*</u>

<u>*Claim:*</u> Any successful method can provide the basis for the inductive method. In other words, if any method works, then so does induction. *Or*: If induction *doesn't* work, then *no* method works.

<u>*Ex:*</u> *Crystal ball forecasting*. If it works, it establishes a uniformity. And we can use this uniformity as the basis for induction. So if crystal ball forecasting can produce consistent successful predictions, then so can induction.

<u>Conclusion</u>: *We have nothing to lose and everything to gain in using the inductive method.*

<u>*Problems:*</u>

(a) Notion of *uniformity*: How much is needed to allow induction to work?

(b) What *type* of induction is being vindicated?