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# Lecture 4

### Induction

### 1. Introduction

For the purposes of this lecture, we will say that:

- a belief formed via induction is an inductive belief
- if that belief constitutes knowledge then it is **inductive knowledge**
- beliefs justified by inductive are **inductively justified**.

# 2. Hume & The Old Problem of Induction

Two kinds of reasoning:

- (1) **Demonstrative reasoning** "that concerning relations of ideas" (IV.2.18)
- (2) Reasoning from experience "that concerning matters of fact" (IV.2.18)

Now, consider:

- P1. Every cat I have observed has whiskers.
- **C1.** All cats have whiskers.
- **P1** is a matter of fact.
- **C1** is not a relation of ideas. So **C1**, if it constitutes knowledge, is a matter of fact.

By what argument are we entitled to conclude C1 from P1, though?

 Not a demonstrative on (i.e. it is not deductive). P1 and ¬C1 are consistent—they can both be true together.

Hume: "all arguments from experience are **founded on the similarity**, which we discover among natural objects" (IV.2.20).

It is certainly true that I will **expect** similarity. But, this expectation is not informed or legitimated by any valid argument.

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Now, we could add a premise to make the argument valid:

- P1. Every cat I have observed has whiskers.
- P2. All cats are like the cats I have observed. (Similarity)
- **C1.** All cats have whiskers.

But **P2** is unsubstantiated.

## 3. <u>Response to the Old Problem</u>

**Probable conclusions**. We could state the conclusion in less absolute terms:

C1\*. It is highly likely that all cats have whiskers.

Strategy: provide an *a priori* argument for the claim that the premises of an inductive argument make their conclusion more *probable*.

If this can be done, then inductive inference can be proven to be a legitimate form of inference by "demonstrative argument".

# 4. Goodman & The New Problem of Induction

Let's suppose for the sake of argument that one of the responses to Hume' argument is successful and the method of inductive inference is a legitimate means of acquiring knowledge.

**Goodman's argument**: Even if this were the case, induction would still face a challenge with respect knowledge-acquisition.

Question: What kinds of conclusions we can inductively draw from a given set of observations?

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Paradox of the Raven (Hempel (1945)) Seeing instances of black ravens provides evidence for the proposition

(R) All ravens are black.

But (R) is equivalent to:

(R-cond)  $\forall x(Rx \rightarrow Bx)$ (R-contra)  $\forall x(\neg Bx \rightarrow \neg Rx)$ 

Now, on the plausible assumption that for any hypotheses H and H\*, if H and H\* are equivalent then E is evidence for H iff E is evidence for H\*, it follows that any evidence for (R-contra) is evidence for (R).

- P2. All non-black things I have observed are non-ravens.
- **C2.** All non-black things are non-ravens.
- **C3.** All ravens are black.

Answer? Maybe negative properties like 'non-black' are not projectable.

#### The Grue Paradox

Suppose you've seen lots of emeralds in the past. Each time, you observe an emerald, you observe that it's green. So you form the belief:

- **P3.** All of the emeralds I have observed are green.
- Then, via induction, you conclude:
  - C4. All emeralds are green.

Let's define a new predicate called 'grue':

Grue: For all x, x is grue iff x is observed before t and is green, or x not observed before t and is blue.(Where t is an arbitrary time in the future)

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Suppose that t is 1 January 3019.

It follows that all of the times at which I observed emeralds are times before *t*, and I observed them to be green. Thus it follows that:

P4. All of the emeralds I have observed are grue.

And so, by induction:

**C5.** All emeralds are grue.

What should I believe about emeralds given that **C4** and **C5** are equally well inductively justified.

#### NOTE

- We could generate infinitely many grue-like predicates for which we have equally good inductive evidence. Simply change *t* by some non-zero increment each time and you'll have a new predicate.
- t could just as well be in the distant past as in the distant future and a similar problem would arise. Suppose t\* is 50 million years ago, we could define a predicate like the following:

**Grue\***: For all x, x is grue iff x is unobserved before t\* and is blue, or x is observed after t\* and is green.

Solution? Rule out disjunctive predicates.

Problem: Let's define the predicate **bleen** as follows:

**Bleen**: For all x, x is bleen iff x is observed before t and is blue or is not observed before t and is green.

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We can now define green in terms of grue and bleen:

**Green**: For all x, x is green iff x is observed before t and is grue or x is not observed before t and is bleen.

Solution? Deny the principle of enumerative induction:

**Enumerative Induction**: Every instance of a generalisation confirms that generalisation.

#### 5. Inference to the Best Explanation

For a statement of IBE: Lipton (2004, Ch.4

Roughly, we can state IBE as follows:

**IBE:** Given a set of evidence, {E<sub>1</sub>...E<sub>n</sub>}, and distinct (potential) explanations of E, H<sub>1</sub>...H<sub>n</sub>, we have most justification for believing the member of {H<sub>1</sub>...H<sub>n</sub>} that *best explains* {E<sub>1</sub>...E<sub>n</sub>}.

#### Notice that IBE is not enumerative (or at least, need not be).

• The strength of an explanation is not reducible to the number of confirming instances.

Lipton identifies two competing considerations: likeliness and loveliness.

**Likeliness** concerns the likelihood of truth, and is plausibly measured in enumerative terms (e.g. if there are more instances of green emeralds than of red emeralds, then 'all emeralds are green' is more likely than 'all emeralds are red').

**Loveliness** concerns how enlightening an explanation is, i.e. how much it helps us understand the evidence. This is much harder to measure.

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According to Lipton, considerations of loveliness are "an important guide to judgements of likeliness". Here's his motivation for this view:

[...]we have an attempt to account for epistemic value in terms of explanatory virtue. This [view] claims that the explanation that would, if true, provide the deepest understanding is the explanation that is likeliest to be true. Such an account suggests a really lovely explanation of our inferential practice itself, one that links the search for truth and the search for understanding in a fundamental way. (61)

Lipton: we've been **misled** into thinking that we're only interested in the likeliest explanations for evidence because, the loveliness and likeliness "**tend to go together**" (61).

### Subjectivity?

Lipton tries to bridge the 'gap' to truth by saying that the subjective considerations are a good guide to truth.

If you accept Lipton's argument, then you could say that we are inductively justified in believing something like **C1** on the basis of IBE.

**C1.** All cats have whiskers.

However, if you don't, then you could still accept that we are inductiely justified in believing something like **C1'**:

C1'. 'All cats have whiskers' best explains my evidence.

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