# Lecture 24
# Maher on Justification of Induction

Patrick Maher

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## Introduction

- An inference is a psychological process in which a proposition (called the conclusion) is accepted on the basis of other accepted propositions (called the premises).

- Inductive inference used to be defined as inference from particular premises to a general conclusion. Now all inferences from the observed to the unobserved are called inductive.

- Hume, Popper, and others say that when we make inductive inferences we are making a synthetic assumption that can't be justified. (Hume said it is that the future will resemble the past. Popper said it is a principle of induction.)

- To see if that is true, we ought to first examine inductive inferences and determine what their form is. That's the first thing I'll do in this lecture.

- Once we have the form of inductive inferences right, we'll see that they don't assume anything of the sort alleged by Hume and Popper.

# The form of inductive inference

## The standard model

- *Example of an inductive inference:* After noticing that John hasn't attended class for 3 weeks, I infer that he probably won't attend today either.

- *Question:* What are the premises and the conclusion for this inference?

- *Standard model:*

    John hasn't attended class for 3 weeks.
    ----
    John won't attend class today.

    What is above the line is a premise; the conclusion is below the line.

- *Characteristics of the standard model:* (1) Probability is not part of the conclusion; it is regarded as a relation between premises and conclusion. (2) The premises state non-epistemic facts, not facts about knowledge or evidence.

*Standard model (again):*

> John hasn't attended class for 3 weeks.
> ―――――――――――――――――――――――――
> John won't attend class today.

**Criticism of the standard model**

*The conclusion is wrong:* I don't infer categorically "John won't attend today," I know he might turn up. My conclusion is just that he probably won't.

### How to represent the conclusion

- It needs to be a statement of probability: "Probably John won't be in class today."
- The probability here is ip. (If it was pp, I would still say the conclusion is only probable.)
- Ip is relative to evidence, so for an explicit representation of the conclusion we need to say what the evidence is.
- When people make ip statements without mentioning evidence, normally the evidence is their evidence, i.e., what they know.
- So the conclusion is:

    $ip$(John won't be in class today|my evidence) is high.

## How to represent the premises

- The premises should support:

  $ip$(John won't be in class today|my evidence) is high.

- What John has been doing is irrelevant to this, if it isn't part of my evidence. The only relevant synthetic facts are facts about what my evidence is.

- *Abbreviations:* $E$ = John hasn't been to class for 3 weeks, $H$ = John won't be in class today.

- The inference can be represented as:

  I know $E$.
  I have no other evidence relevant to $H$.
  $ip(H|E)$ is high.
  ―――――――――――――――――
  $ip(H|$my evidence$)$ is high.

- I call this *the probabilistic model* of inductive inference.

## Comparison of the models

- What people ordinarily say:

  $$\frac{E}{\text{Probably } H}$$

- The standard model represents this as:

  $$\frac{E}{H}$$

  That is even more reduced than what people ordinarily say!

- We should add *more* to what people ordinarily say.
  The probabilistic model:

  I know $E$.
  I have no other evidence relevant to $H$.
  $$\frac{ip(H|E) \text{ is high.}}{ip(H|\text{my evidence}) \text{ is high.}}$$

## Hume and Popper revisited

- They say inductive inferences are based on a synthetic assumption that hasn't been observed to be true.
- The form of inductive inference:

    I know $E$.
    I have no other evidence relevant to $H$.
    $ip(H|E)$ is high.
    $\overline{ip(H|\text{my evidence}) \text{ is high.}}$

- This is a deductively valid form of argument.
- The third premise is analytic if true.
- The first and second premises can be known by observing what my evidence is (together with knowing relevance relations, which are propositions about ip and hence analytic if true).
- So the argument is valid and the synthetic premises can be known by observation. There is no unobserved synthetic assumption!

1. Suppose you were to reason as follows: "Only a small proportion of people live to be 100 years old, so I will probably not live to be 100 years old."

   (a) How would your inference be represented in the standard model of inductive inference? State a criticism of this representation.

   (b) How would your inference be represented in the probabilistic model of inductive inference?

2. Hume and Popper claimed that inductive inferences are based on a synthetic assumption that hasn't been observed to be true. Were they right? Justify your answer.