

# Deductivist Response to Hume's Problem

Karl Popper

# Induction presents several problems

The “logical” problem:

Are we *justified* in inferring from experience that instances of the same type will behave the same way?

**Hume:** *No.*

**Popper:** *No.*

The psychological problem:

Why do people nevertheless do this all the time?

**Hume:** instinct, custom, habit

**Popper:** They *don't*.

(So Popper's is a *revisionist* view.)

(For later:)

The descriptive problem:

What exactly is it that we're doing in induction?

# Popper vs. Russell

Russell contended that if we go with Hume in rejecting the rationality of induction from empirical data, then we are forced either to:

- reject empiricism, or
- concede irrationality of science

Popper refuses to do either. So, he takes on the task of showing how science could be

1. rational
2. not use induction
3. consistent with empiricism

# What does denying we do induction entail?

No positive inference from the seen to the unseen.

No conclusions: “therefore, this is probable”.

No beliefs that theories are true.

No beliefs that theories are probable.

No claims that evidence supports a hypothesis.

No claims that data confirms a hypothesis.

All we have to work with in describing science is attempted falsifications, and the successes and failures of them.

*Note:* It takes discipline to keep these things in mind as we evaluate the plausibility of Popper’s theory.

# Asymmetry between Verification and Falsification

Popper claims:

Falsification is conclusive. Verification is not.

e.g. Hypothesis says all swans are white.  
You find a black swan. **Boom.**

e.g. Theory implies the planet will move that way. It doesn't. **Boom.**

But no matter how many motions of the planet you observe, verification of the theory is not yet conclusive.

What's behind this: Falsification is deductive. Verification is inductive.

# Falsificationism

Popper: the *only* kind of reasoning or inference in science is deductive (logic or falsification). *We learn from our mistakes.*

*Note:* This is a radical view. Almost everyone thinks falsification *does* happen in science. This view is that it is the *only* way to acquire new information.

The burden of making a theory is now to show how to understand what scientists do as rational without appealing to induction.

In particular, what grounds could they have for preferring one theory to another, if there are no inductive grounds?

(*Note:* at issue is not belief, but preferences<sub>6</sub> between theories.)

# Theory Preference: The theoretical problem

What are the rational criteria for choosing among theories that purport to explain the same phenomena or solve the same problems? (We can't say: more evidence. So what can we say?)

Note that for Popper this is not the question which theory to believe. You shouldn't believe any of them.

(Assume crude distinction between observation, theory. Assume observation is independently accessible.)

Case 1: If there are two theories of exactly the same domain, prefer a theory that is not yet falsified to one that is already falsified.

Why?

What do we learn/(take home) from this?

# Theory Preference – theoretical problem

Case 2: Consider two theories with overlapping but not identical domains. Assume they make different predictions in the domain of overlap. If one of these succeeds in predictions the other succeeds in and in predictions the other fails in, then it is to be preferred. Why?

Case 3: Which should we prefer if these two theories agree in the domain of overlap, and both have parts of their domains that are beyond the overlap, and neither is falsified yet? Why?

# Theory Preference

Case 4: If the set of consequences of one theory are contained within those of another—i.e., one's domain is contained in the other *and* in that domain they make the same predictions— and they have undergone the same number and severity of tests, and neither is falsified yet, then prefer the theory with more consequences. (Also called the **bolder** theory.) Why?

Case 5: What if two theories have exactly the same domain and make different predictions somewhere in it, but neither has yet been falsified?

Case 6: Consider the same case again but add the assumption that one of the two theories has undergone more tests. Can we prefer this one to the other one? Why or why not? (**This case is not possible. Be sure you see why.**)

# Corroboration

A theory has a **degree of corroboration**, measured by its past track record. No conclusion is drawn about future performance. Higher corroboration indicates a preferable theory.

This should be distinguished sharply from degree of confirmation or support. “Corroboration” here is a technical term to include nothing about evidence and no endorsement for belief, probable truth, or reliability of the theory.

Corroboration of a theory depends on:

- 1) Degree of testability (fertility)
- 2) Degree of testability (boldness = informativeness = improbability)
- 3) Severity of tests it has actually undergone
- 4) More tests passed
- 5) Tests failed

# Problems of Corroboration Criteria

1. How can Popper help himself to the idea that these things make a theory preferable? Traditionally, many of these indicate something good *because they indicate evidential support*.
2. What if we have two theories, neither is falsified, every test has been of the same severity, and the theory that has undergone fewer tests is bolder? Which theory is preferable? (Note: placement of tests relative to domain of overlap of the two theories is relevant to seeing how this case is possible.)

# Problem about Boldness

Popper's idea seems to be that we will learn more in the process of falsifying a bolder theory than by falsifying a less bold theory, all other things being equal, so it's the bolder one we should prefer (choose to work with). There is a sense in which this seems true. How?

But do we learn more from actually falsifying a logically stronger claim?

Counterexample: Consider a hypothesis  $A.B$  and a hypothesis  $A$ .  $A.B$  is stronger than  $A$ , but if we learn  $\text{not-}A$  we learn more than if we learn  $\text{not-}(A.B)$ . That is, we get more information.

# Problem of Auxiliary Hypotheses

Popper claims falsification is conclusive, unlike support (or confirmation or verification).

But falsification requires deriving observational implications from the theory being tested.

This cannot be done without the help of auxiliaries.  
(example)

→ When the observational implication doesn't match what is actually observed, the fault may be in either the theory or the auxiliaries. (Pierre Duhem)

(You can try to independently falsify the auxiliary, but that will require auxiliaries too. This is where the complexity of scientific testing matters epistemologically.)

What is to be done? Can falsificationism get out of this problem? Does verificationism (supportism) have the same problem?

# Falsification as Engine of Science: psychological problems

Popper says we learn everything we do learn in science by trying to falsify our theories, and by succeeding.

Can this be consistent with the natural psychology of a scientist, the motivations, investment? What does Popper say?

Popper says we mustn't and don't believe our theories (no positive evidential support).

How come it seems like we (and especially scientists who propose them) do believe some of our theories? What does Popper say?

Aside: Does knowledge accumulate on Popper's view? How? (or Why not?)

# Theory Preference— Practical Problem

Popper says that the criteria that we use to prefer one theory to others in the theoretical domain—that is, when we are doing research, the pure search for truth—are also the ones to be used in deciding which theory to prefer for practical applications. (Highest corroboration, best tested.)  
Why? (p. 22)

# Problem of Rational Prediction

Salmon: For a prediction to be rational you must have reason to prefer the theory it came from to other possibilities.

Different predictions will be arrived at by different theories. Popper gives us “corroboration” as the basis for preference between theories.

But corroboration gives us absolutely no information about future performance of theories (that is, whether they will get right answer).

Let’s disregard the theoretical domain. But this view is disastrous for the practical domain.

A prediction is about the future, but corroboration can give us no info at all about the future, so Popper’s criterion cannot allow that any prediction is rational. *It does not give us reasons concerning the future.*

Yet it does seem that some predictions are rational and others are not. We certainly make such distinctions, and we have to, when we apply theories to action.

# Prediction

There is also a question of whether Popper's criteria pick out the **right** theory to use as predictor. Consider:

Suppose we have a bolder and a less bold theory (more improbable and less improbable). Suppose neither is falsified, and there is a domain of overlap where they give the same answers. Suppose that going to the moon requires an answer to a question they give different answers to. Which theory do we use for the prediction? What does it depend on?

Are we ever going to be forced by Popper's criteria to choose to use the less probable theory in a way that seems wrong practically? We don't want to use the more *improbable* theory to send someone to the moon. Could the standards for theory preference for the search for truth and for practical matters be different?

Do we ever use falsified theories in the practical sphere?

# Popper's Reply

(p. 27)

Pragmatic theory preference by Popper's rules is not irrational because there is nothing more 'rational' than the critical method.

Note the form of this argument. Is it valid? That is, does the conclusion follow from the premises?

# Popper's Reply

Consider:

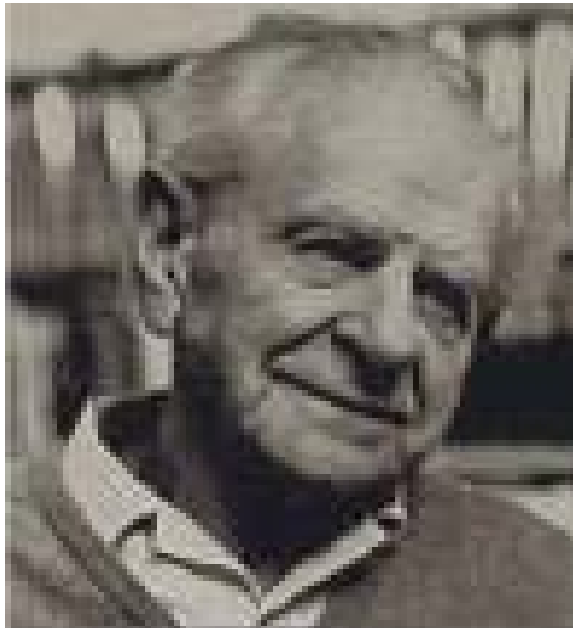
Nothing is more a piece of gold that weighs 5 million pounds than a banana is.

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A banana is a piece of gold that weighs 5 million pounds.

# Sir Karl Popper

## 1902-1994



[Sir Karl Popper (2002-1994)]