The Problem of Induction and Popper's Deductivism

Issues:

I. Problem of Induction

II. Popper's rejection of induction

III. Salmon's critique of deductivism

I. The problem of induction

1. Inductive vs. deductive inferences

Deductive: Truth of premises guarantees truth of conclusion.

Sample deductive rules.

Modus Ponens	*Disjunctive Syllogism*
If *p* then *q*	*p* or *q*
p	~*p*
Therefore, *q*	Therefore, *q*

Inductive: Truth of premises *supports* (but does not guarantee) truth of conclusion. (The relation of support is called *confirmation*.)

Sample inductive rules.

a) *Enumerative Induction*

All observed A are B	All observed A are B
Next observed A will be B.	All A are B

b) *Analogy*

c) *Hypothetico-deductive method*

Hume's problem concerns only *inductive inferences*.

2. Science appears to need inductive inferences. Theories go beyond the observed evidence; they do not follow from the observed evidence by any deductive rule.

3. Hume's skeptical argument

1. If an inductive rule is to be justified, it must be justified by either a deductive rule or an inductive rule.

2. It cannot be justified by a deductive rule (or else the principle would not be inductive).

3. It cannot be justified by an inductive rule (that would be circular).

4. But any justification has to be either via a deductive rule or via an inductive rule.

Hence, no inductive rule can be justified.

II. Popper: "The Problem of Induction"

1. Popper accepts Hume's conclusion that induction can't be justified.

a) Need for induction.

1. Experience (i.e., observation) can only deliver *singular statements*.
2. Scientific theories require *universal statements* (generalizations).
3. There can be no justification in passing from singular to universal, without *inductive inference*, which means a principle of induction.

b) Impossibility of justifying induction.

What is the **status** of such a principle?

a) Not a logical truth. [Else induction would reduce to deduction]

b) Not derived from experience. [The derivation would presuppose some higher-order rule of induction. That leads to an infinite regress.]

Stating the principle of induction in *probabilistic* terms is no help

2. Popper's solution: *deductivism*. There is no justification for scientific theories. There is only *falsification*, and deductive logic is good enough for that.

3. Discovery vs. justification.

Why do we **think** that induction is needed in science? Two-stage analysis of scientific progress.

Stage 1: Context of discovery. [Popper: psychology of knowledge.] Hitting upon a scientific theory. Pure psychology; no logic is possible.

Stage 2: Context of justification (testing). [Popper: logic of knowledge.] An *already existing* theory is tested. Deductive logic is adequate.

At Stage 1, we pass from singular to universal statements – but via psychology, not logic. At stage 2, we already have the universal statement before us and can use deductive logic to try to falsify it. At neither stage do we need inductive rules.

4. Testing theories (Popperian science)

Science consists of bold conjectures and refutations – *but no confirmation.*

- *Internal tests*: test for internal consistency, non-triviality, consistency with other scientific theories. Deductive logic suffices.
- *External tests*: derive consequences that are observable and see whether or not the consequences are observed.

  Something contrary observed $\Rightarrow$ the theory is *falsified*
  Predicted consequences observed $\Rightarrow$ the theory is *verified*

  Deductive logic suffices.
- Theories that repeatedly pass tests are *corroborated*. This is just a record of *not* being falsified. It is NOT confirmation. It has no implications about the truth or probability of the theory, or how confident we should be about its future predictions.

III. Salmon: Rational Prediction

Salmon agrees: philosophers have not solved the problem of induction.
But he rejects deductivism.

***Basic problem*:** too many *unfalsified* hypotheses to choose from!

> Deductivism rules out falsified hypotheses, but gives us no reason to prefer a *corroborated* hypothesis over a completely untested hypothesis.
>
> **Crucial thesis (p. 436):** There is (or ought to be) a rational basis for preferring one unrefuted generalization to another for use in a predictive argument.

1. *Theoretical preference* vs. *pragmatic preference*

> *Theoretical preference*: choosing a scientific hypothesis because it's easier to test (e.g., easier to falsify).
>
> *Pragmatic preference*: choosing a hypothesis because it's a better basis for decision-making (e.g., for building a bridge).
>
> Salmon focuses on the latter. We want a theory we use in practical decision-making to be more likely to be true.

2. Salmon's basic argument

> Suppose *H* is corroborated by lots of tests.
>
> We have reason to rely on *H* rather than on a falsified hypothesis.
>
> But Popper gives us *no reason* to rely on *H* rather than any other unfalsified hypothesis to make predictions for use in a decision.
>
> There are countless unfalsified hypotheses consistent with the evidence, which would yield very different predictions.
>
> *Example*: 10,000 ravens observed, all black.
>
> $H_p \equiv$ the proportion of black ravens in the world is p ($0 \leq p \leq 1$).
>
> The evidence falsifies only H_0; for Popper, the evidence gives no rational basis for choice among the rest.

3. First Popperian response

We are justified in using a corroborated theory because it has been subjected to critical scrutiny.

Salmon: why prefer a corroborated generalization to an uncorroborated (but not yet falsified) generalization?

A theory has *predictive content* if it has implications for future experience.

An activity (e.g., a decision) has *predictive import* if it has practical influence on our future predictions.

The *directive* to use the most highly corroborated theory for making predictions has predictive import. *Either* corroboration has predictive import and we have a rational basis for prediction, *or* it has no predictive import and does not give us a rational basis.

Popper's position – corroboration has no predictive import and nevertheless gives us a basis for rational prediction – is unsustainable.

4. Second Popperian response (Watkins, p. 438): In a situation of forced choice, we have *no better reason to rely upon any non-corroborated theory* rather than a corroborated theory.

Salmon: Popper needs a stronger result: that relying on *corroboration* is better than relying on the other methods.

5. Third Popperian response (p. 442): The best-corroborated theory is accepted because we have "nothing nearer to the truth". Now reliance on corroborated hypotheses rests on assumption that they are 'likely' to track genuine regularities. But that looks like accepting induction!

6. Final remarks.

a) Salmon suggests that induction is needed even for rational prediction (and hypothesis-preference) in a theoretical setting.

b) If Salmon is right – **both** that rational prediction needs induction, and that no justification for induction yet offered succeeds – should we embrace inductive scepticism, the view that rational prediction is not possible?