

Question: **Outline the difficulties involved in the problem of induction. What bearing do these have on the practice and claims of science?**

1. **Difficulties involved:**

a) The **problem** – how to establish the truth of universal empirical generalisations

(i) Induction involves moving from singular observation statements to universal generalisations

but (ii) a statement referring to an infinite set cannot be entailed in a finite set of singular observation statements

therefore (iii) since evidence = always finite, belief in truth of universal statement can never be justified

b) **Solution:**

(i) **Principle of Induction**

-- inserted into invalid inductive argument to turn it into a valid deductive argument i.e.

All observed swans are white

All unobserved cases resemble observed cases

(Principle of induction)

Therefore All swans are white

S is a swan

Therefore S is white

(ii) But – Hume's '**vicious circle**':

I. To know that inductive methods of argument = correct we need to know that the principle = true

But II. we can only know this = true once we can show we can rely on induction

Therefore III. no reason for thinking inductive arguments = correct

2. Bearing on the practice and claims of science:

a) Formulating hypotheses and theories:

(i) **Narrow inductivists** conception of scientific enquiry

Stages:

- I. Observe & record facts without preconceptions
-- without selection
- II. Analyse and classify facts without hypotheses
- III. Inductive derivation of generalisations
- IV. Testing

But (ii) **Untenable**:

I. **Collection of *all* the facts = impossible**

-- collection of *relevant* facts need hypothesis to give enquiry direction

II. Facts can be **analysed and classified in many different ways**

-- therefore we need hypothesis about how phenomena are connected – otherwise analysis & classification = blind

III. **Hypotheses not just introduced in 3rd stage by inductive inference** – there is no such general mechanical inductive procedure from facts to hypothesis via inductive inference

Re. Einstein: 'A theory can be proved by experiment; but no path leads from experiment to the birth of a theory.'

Re. Watson and Crick

Therefore (iii) **Non-rational explanations** of scientific practice:

- I. Popper – 'conjectures'
- II. William Whewell – 'Happy guesses'
- III. Medawar – 'Intuition and imagination'

b) **Testing theories:**

(i) **Problem** = not enough evidence to conclusively confirm a universal empirical generalisation – only finite evidence for an infinite claim

(ii) Answer – **Popper – falsification:**

- I. **Asymmetry** between falsification and confirmation – no amount of confirming evidence = conclusive, whereas one falsification is
- II. **Bold theories** with more claims inspire more confidence because they are forced to pass more tests
- III. **Pseudo-scientists** seek to confirm and immunize their theories against falsification

Re. Bacon: ‘the force of the negative instance is greater.’

(iii) But:

- I. **Not rational to abandon a theory** that has been successful in other areas e.g. Neptune and Newton
- II. **Fundamental theories** about the ultimate determinants of the world = by their very nature unfalsifiable, because they don’t forbid anything without other theories.
- III. If experiment results in falsification you **cannot be sure where the problem lies** –

background theories
theory
initial conditions
experimental design and equipment
observations

Failed predictions cannot point one way or the other, but confirmation confirms everything, including the theory.

(iv) Therefore (**Kuhn**) only reliable evidence = confirm:

- I. Normal scientists seeks to confirm paradigm by concentrating on the questions it defines as relevant and which it guarantees to have a solution
- II. Rational to save theories with auxiliary hypotheses
- III. Only accumulated failure of a theory = decisive