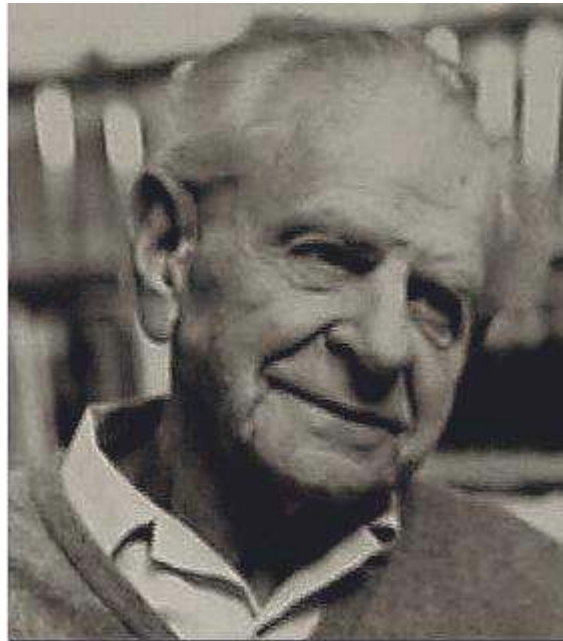


Karl Raimund Popper



Sir Karl Popper (1902-1994)

Life of Popper

- Karl Popper is generally regarded as one of the greatest philosophers of science in the 20th century. He was also a social and political philosopher of considerable stature, a self-professed 'critical-rationalist', a dedicated opponent of all forms of scepticism, conventionalism, and relativism in science and in human affairs.
- Sir Karl Popper was born on 28 July 1902 in Vienna, which at that time could make some claim to be the cultural epicentre of the western world.

- His father was a lawyer by profession, but he also took a keen interest in the classics and in philosophy, and communicated to his son an interest in social and political issues.
- His mother inculcated in him such a passion for music. Subsequently, Popper's love for music became one of the inspirational forces in the development of his thought, and manifested itself in his highly original interpretation of the relationship between dogmatic and critical thinking, and between objectivity and subjectivity.



- Popper obtained a primary school teaching diploma in 1925, took a Ph.D. in philosophy in 1928, and qualified to teach mathematics and physics in secondary school in 1929.
- In 1934, Popper published his first work to articulate his own view of science, and his criticisms of the positivists. In 1937 Popper took up a position teaching philosophy at the University of Canterbury in New Zealand.
- In 1946 he moved to England to teach at the London School of Economics, and became professor of logic and scientific method at the University of London in 1949.
- Sir Karl Popper, who died on 17 September 1994, will continue to stimulate the best minds through his work, which now has a life of its own.

Honors of Popper

- Fellow of the Royal Society
- Fellow of the British Academy
- Honorary member of the Harvard Chapter of Phi Beta Kappa
- Honorary Fellow of the London School of Economics, King's College London, and of Darwin College Cambridge
- Austrian Grand Decoration of Honour in Gold, the Lippincott Award of the American Political Science Association
- Knighted by Queen Elizabeth II in 1965



KARL POPPER

the problem of demarcation

- 3 Theories
 - Einstein's gravitational theory
 - Marxist theory of history
 - Freud's psycho-analysis
- Explanatory Power
 - Same event can be described according to different theories
 - World full of theory verifications
- When should a theory be ranked as scientific?
- Distinguish genuinely empirical from non-empirical method
 - For Example Astrology
 - Huge amount of empirical evidence based on observation but doesn't reach scientific standard

- Summarising Poppers ideas:
 - It is easy to obtain confirmations if we look for them
 - Confirmations should only count if they are the result of risky predictions
 - Every good theory is a prohibition (forbids certain things to happen)
 - Any non-refutable theory is non-scientific
 - Any genuine test of a theory should be an attempt to falsify or refute the theory
 - Confirming evidence of a theory should only count if it is the result of a genuine test.
- Therefore the criteria for the scientific status of a theory are:
 - Falsifiable, Or
 - Refutability, Or
 - Testability

- **Einstein's gravitational theory:**

Fulfils the requirements for being a scientific theory

--Founded on risky predictions

--Could be clearly stated wrong

- **Marxist theory of history:**

Scientific in the beginning, not scientific anymore

--The original version has been falsified

--After re-elaboration the theory was save from refutation

- **Freud and Adler's psycho-analysis theories**

Not scientific from the beginning

There is no conceivable human behaviour that could contradict them



Criticism of Inductivism

According to Popper the problem of induction arose from:

- the fact the science proposes and uses laws “everywhere and all the time” (the scanty material – the few observed instances upon which the law may be based, Born)
- Hume’s discovery that it is impossible to justify a law by observation or experiment, since it transcends experience (induction cannot be logically justified)
- the principle of empiricism which asserts that in science, only observation and experiment may decide upon the acceptance or rejection of scientific statements, including laws and theories

Going back to logic

SINGULAR EXISTENTIAL STATEMENT

$\exists (x)$ x is white

\Rightarrow *There is an x which is a swan, and x is white*

UNIVERSAL STATEMENT

$\forall (x)$ x are white

\Rightarrow *For all x, if x is a swan, then x is white*

Scientific laws are commonly supposed to be of the second type.

The most difficult question in the methodology of science is:

How does one move from observations to laws?

How can one validly infer a universal statement from any number of existential statements?

INDUCTIVIST METHODOLOGY

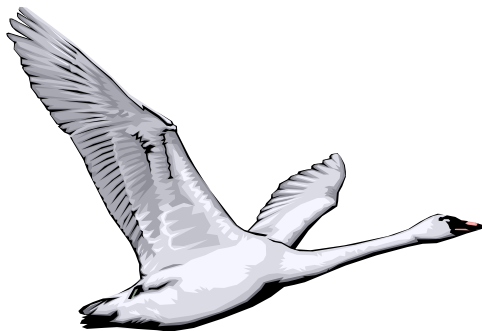
We can somehow move from a series of singular existential statements to a universal statement

All swans observed so far have been white
Smoothy is a swan

Therefore, Smoothy is white

This argument is not deductively valid because the premises are not necessarily sufficient for the conclusion.

Smoothy may well be a black swan.



FALSIFICATION AS A SOLUTION TO THE PROBLEM OF INDUCTION

A singular existential statement can be used to show that the universal statement is false through the MODUS TOLLENS

$U \rightarrow O$

$\neg O$

$\neg U$

If it's a wood stick then it floats
(All wood sticks observed so far float)

Ebony wood doesn't float

It's NOT true that
All wood sticks float

Hume - We can know nothing about nature prior to its experience, even a rational man with no experience "could not have inferred from the fluidity and transparency of water that it would suffocate him, or from the light and warmth of fire that it would consume him." (*Enquiry Concerning Human Understanding*, 4.1.6) – "It transcends experience".

Kant - " Our intellect does not draw its laws from nature but imposes its laws upon nature"
(*Foundations of Natural Science*)

The Principle of Empiricism

According to Popper the principle of empiricism can be fully preserved, since the fate of a theory, its acceptance or rejection, is decided by observation and experiment – by the result of tests.

So as long as a theory stands up to the severest tests we can design, it is accepted; if it does not, it is rejected. But it is never inferred, in any sense, from the empirical evidence.

=> Only the falsity of the theory can be inferred from empirical evidence, and this is a purely deductive one (Modus Tollens).

Popper tried to answer this question:

How do we actually obtain our knowledge if induction is a procedure which is logically invalid or irrationally unjustifiable?

He realized that the two problems of his interest – of demarcation and induction – were in a sense one. Then it became easy to see that the real method of science is criticism; attempted falsifications.

- **Problem of demarcation:** some scientists believed in induction and they think that the difference between genuine science and metaphysical or pseudo-science speculation depended solely upon whether or not the inductive method was employed. They believed that only the inductive method could provide a satisfactory criterion of demarcation.

- **Problem of induction:** No rules can guarantee that a generalization inferred from true observations, however often repeated, is true. There is no logical argument for its acceptance (induction): it's a question of faith".

The success of science is not based upon rules of induction, but depends upon luck, ingenuity, and purely deductive rule of critical argument (deduction).

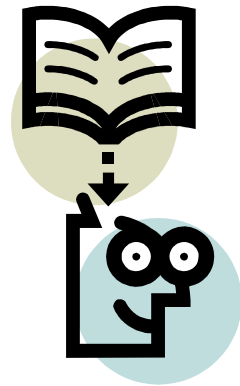
- Induction is a myth
- The actual procedure of science is to operate with conjectures: to jump to conclusions
- Repeated observations and experiments function in science as tests of our conjectures or hypothesis
- The mistaken belief in induction is fortified by the need of a criterion of demarcation which, it is traditionally but wrong believed, only the inductive method can provide
- The conception of such an inductive method, like the criterion of verifiability, implies a faulty demarcation
- None of this is altered in the least if we say that induction makes theories only probable rather than certain

Conjectures and Refutation as scientific method

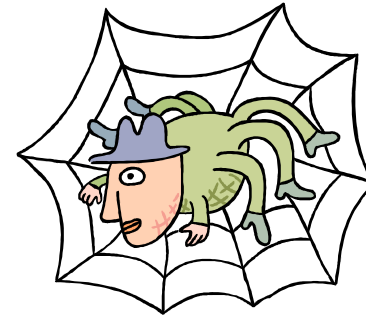
There is no more rational procedure than the method of trial and error – of conjectures and refutations - : of boldly proposing theories. Of trying our best to show that these are erroneous; and of accepting them tentatively if our critical efforts are unsuccessful.

Limits and Critique

- What if the observation statement is fallible rather than the theory?
- We may actually reject a theory that is true based upon this false observation statement
- 'Conclusive falsifications are ruled out by the lack of a perfectly secure observational base on which they depend'

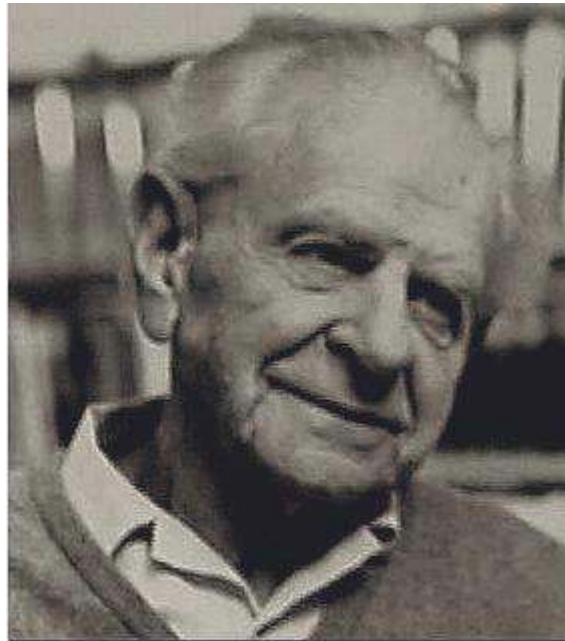


- Complex web of assumptions



- The theory may not be false but rather one of the assumptions underpinning its proposition maybe
- History shows that theories were developed in spite of being subject to numerous rejections and falsifications. If Popper was correct shouldn't these theories have been rejected in their infancy?
- However in Popper's defence he does highlight the human dogmatic attitude!

THE END



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