

The Hypothetico-Deductive Method According to Popper

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Introduction:

20th century philosopher of science Karl Popper (Figure 1) believed that inductive reasoning had no logical place within science. In attempting to show that induction did not exist and was not required to construct scientific theories, he formulated the deductively based hypothetico-deductive method.

Scientific modeling:

Popper's hypothetico-deductive method was his attempt at describing how science should be conducted and can be viewed as a rendition of the scientific method. Figure 1 shows a simplified breakdown of its steps.

When formulating his method in *The Logic of Scientific Discovery* (1959), Popper stated that falsification and inference by deduction are the two key components.

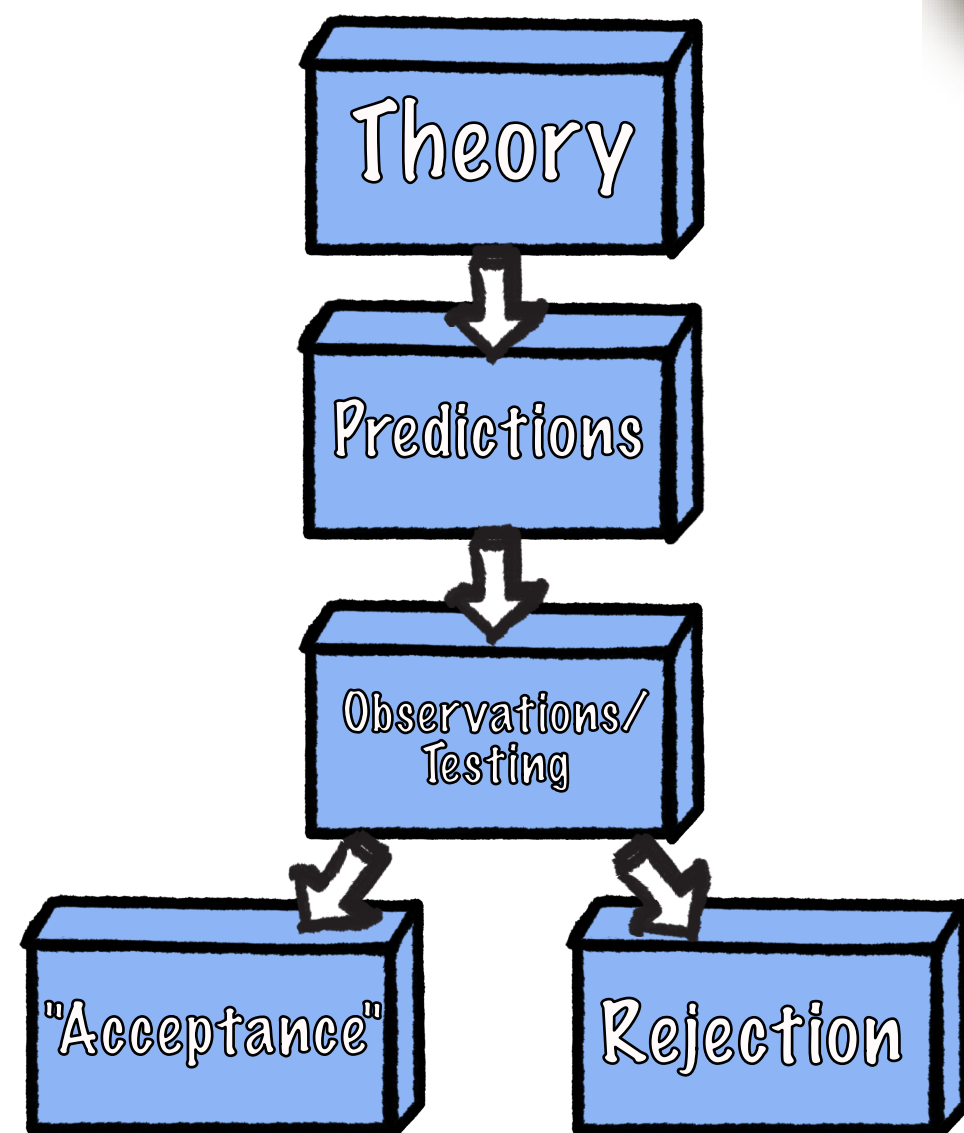


Figure 1: Flow chart of the hypothetico-deductive method.

Falsification:

Popper thought that the most fundamental component of a scientific theory was that it should be falsifiable. A theory or statement is said to be falsifiable if there exists the possibility that it can be proven to be false. Thus, it can be said that falsification is the process of disproving theories.

To illustrate how falsification works, take the statement

"All swans are white"

According to Popper's method, this statement can never be proven. It can be argued that no matter how many white swans are observed, this is never sufficient to prove the statement. However, it can be falsified with the observation of, for instance, a black swan (see Figure 2).

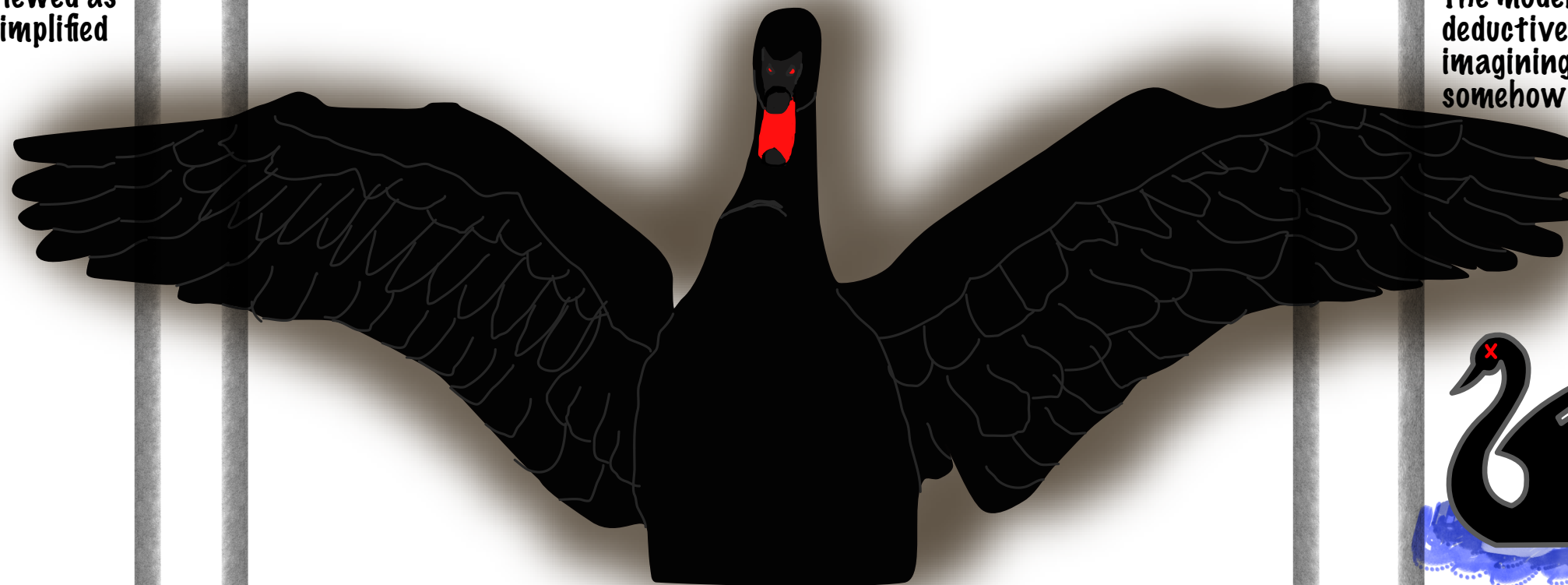


Figure 2: An observation of a black swan such as the one depicted may falsify the statement "all swans are white".

Trueness of a theory and deduction:

Though it seems impossible to assess the trueness of a theory using the hypothetico-deductive method, as a theory can never be proven (hence "accepted" in Figure 1). Popper claimed that a theory can still be corroborated. This entails that a theory has survived increasingly rigorous testing without becoming falsified.

Popper's choice of deduction as a means of scientific inference stems from his belief that induction is a "myth". He further claimed that to justify an inductive argument requires induction, creating a circular argument. The hypothetico-deductive method was in fact his attempt at solving Hume's problem of induction.

Critique and reception:

Though the hypothetico-deductive method introduced a new outlook on scientific theory-making by introducing a "formula" (see the steps of Figure 1), his method was still heavily critiqued. Other philosophers as well as scientists argued that performing science without induction was impossible and deemed his method "too simplistic".

Opponents of the method also stated that it was unrealistic in the way that scientists rarely spend time trying to disprove, or falsify, their work. Additionally, the outcome of the method deals in absolutes: a theory is either 100% wrong or has yet to be falsified.

The model was also accused of not actually applying deductive reasoning, but inductive. This can be illustrated by imagining that the entire population of black swans somehow went extinct (see Figure 3). Then, suddenly, the statement "all swans are white" becomes true, and a previously falsified statement has been "unfalsified".

The hypothetico-deductive method fails to account for such scenarios, giving rise to another point of criticism.



Figure 3: If all the black swans died, Popper's falsification fails.

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