EPISTEMOLOGICAL STRUCTURE OF POSITIVISM

Positivism is based on the idea that science is based on a solid foundation (given facts) obtained through observation and experimentation and the idea that there are some reasoning procedures that make it possible to extract scientific theories from such a foundation with a reliable method. Logical-positivism (neo-positivism), the second stage of positivism, is also a radical form of empiricism.

> Empiricism: The approach that sees experience as the first source of information in the process of knowledge production.

While this result is based on philosophical thoughts (empiricism / correspondence theory), the positivist / neo-positivist approach bases itself on the detailed analysis of theories of modern science. The recent history of this theory structure is based on the Modern Scientific Revolution. According to Galileo, 'facts' based on observation and experimentation should be considered real, not those that depend on previously adopted thoughts. Observation phenomena would fit or not fit an adopted scheme of the universe; According to Galileo, however, the important thing was to accept the given facts and build the theories to fit the facts.

> **Positivist Science Definition (Orthodox Science Definition):**
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> Scientific information is verified / proven information. Scientific theories are extracted from some experimental cases, which are obtained by observation and experiment. Science is built on what we can see, hear, touch. In science, personal ideas or preferences and speculative imaginations have no place. Science is objective. Scientific knowledge is reliable information as it is objectively verified. Accordingly, if it is not based on facts or if you cannot 'measure' in the same sense, your knowledge is incomplete and inadequate.

Naive Inductionism:

Science begins with observation. The scientific observer should have normal, that is, the sensory organs that have not been damaged, and should record what he can see, hear, honestly and do so without bias. Propositions or some types of propositions related to the state of the world can be verified or established correctly by the direct use of the sensory organs of a prejudiced observer. The propositions (observational statements) obtained in this way thus form the basis on which the laws and theories that design scientific knowledge are derived from.

SAMPLE:

For example, (a) the iron rod expands when heated, (b) objects made of iron expand when heated, (c) all metals expand when heated, (d) all solid objects expand when heated, the process from (a) to (d) is an inductive generalization and (d) is an empirical law. In this process, each stage is testable and open to verification. As can be seen, in all cases the law refers to what is observable (iron, copper, metal, solid body) and measurable (heat, length).

The accuracy of such propositions should be determined by careful observation. Any observer can verify or check the accuracy of the proposition in question, either directly or through their senses.

Empirical Propositions: It refers to a particular event or situation at a given time and place.

Universal Propositions: It refers to a certain type of event, valid for all times and places.

Since science is based on the experiment, it is necessary to obtain universal propositions that make up scientific knowledge from the particular propositions derived from observation.

QUESTION: How can the accuracy of the very general, unrestricted claims that make up the theories be proved based on a limited number of evidence, including a limited number of observational propositions?

ANSWER: It is legitimate to generalize a universal law from a limited set of observations, provided that certain conditions are met. These conditions are as follows:

a) The number of observation propositions that constitute a generalization should be many.

b) Observations should be repeated under very different conditions.

c) No accepted observation proposition, by law from them

shall not conflict.

If a large number of 'A' has been observed under different conditions and if all 'A' observed has the B feature without exception, then all 'A' has B feature.

Induction is the way of reasoning that leads from a limited set of particular propositions to universal propositions, that is, from particular to universe. For naive inductive, the epistemology of science is based on the principle of induction.

Types

The three principal types of inductive reasoning are generalization, analogy, and causal correlation. These, however, can still be divided into different classifications. Each of these, while similar, has a different form.

Generalization

A generalization (more accurately, an *inductive generalization*) proceeds from a premise about a sample to a conclusion about the population. The observation obtained from this sample is projected onto the broader population.

> The proportion Q of the sample has attribute A.
>
> Therefore, the proportion Q of the population has attribute A.

For example, say there are 20 balls—either black or white—in an urn. To estimate their respective numbers, you draw a sample of four balls and find that three are black and one is white. An inductive generalization would be that there are 15 black and 5 white balls in the urn.

How much the premises support the conclusion depends upon (1) the number in the sample group, (2) the number in the population, and (3) the degree to which the sample represents the population (which may be achieved by taking a random sample). The hasty generalization and the biased sample are generalization fallacies.

Statistical generalization

A statistical inductive generalization, often simply called a *statistical generalization*, is a type of inductive argument in which a conclusion about a population is inferred using a statistically-representative sample. For example:

> Of a sizeable random sample of voters surveyed, 66% support Measure Z.
>
> Therefore, approximately 66% of voters support Measure Z.

The measure is highly reliable within a well-defined margin of error provided the sample is large and random. It is readily quantifiable. Compare the preceding argument with the following. "Six of the ten people in my book club are Libertarians. Therefore, about 60% of people are Libertarians." The argument is weak because the sample is non-random and the sample size is very small.

Statistical generalizations are also called *statistical projections* and *sample projection*.

Anecdotal generalization

An anecdotal inductive generalization is a type of inductive argument in which a conclusion about a population is inferred using a non-statistical sample. For example:

> So far, this year his son's Little League team has won 6 of 10 games.
>
> Therefore, by season's end, they will have won about 60% of the games.

This inference is less reliable than the statistical generalization, first, because the sample events are non-random, and secondly because it is not reducible to mathematical expression. Statistically speaking, there is simply no way to know, measure and calculate as to the circumstances affecting performance that will obtain in the future. On a philosophical level, the argument relies on the presupposition that the operation of future events will mirror the past. In other words, it takes for granted a uniformity of nature, an unproven principle that cannot be derived from the empirical data itself. Arguments that tacitly presuppose this uniformity are sometimes called *Humean* after the philosopher who was first to subject them to philosophical scrutiny.

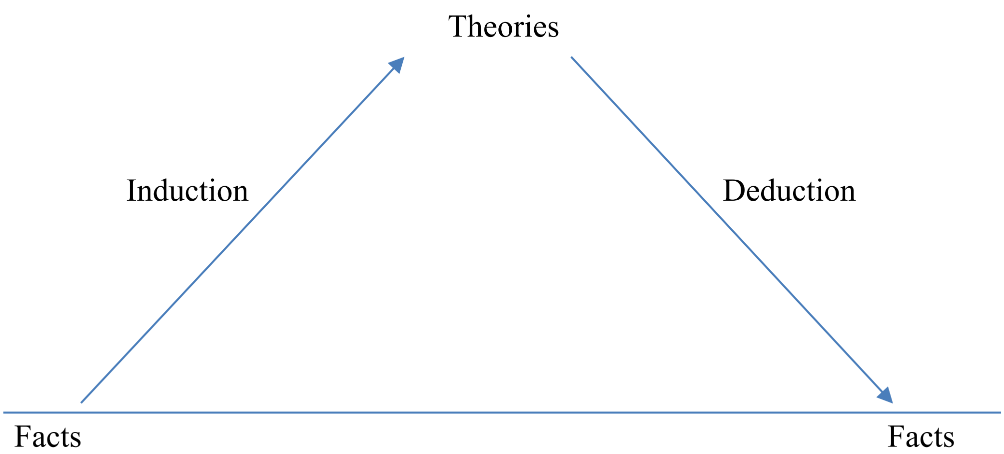
Prediction

A prediction draws a conclusion about a future individual from a past sample.

> Proportion Q of observed members of group G have had attribute A.
> Therefore, there is a probability corresponding to Q that other members of group G will have attribute A when next observed.

According to this theory, scientific knowledge is built with induction based on the solid foundation provided by observation. While a large number of cases are detected by observation and the experiment is expanding, while the facts become more refined and detailed due to the developments in our experimentation and observation skills, the laws and theories built with rigorous inductive reasoning gain to the extent and scope. The progress of science continues consistently upwards and forwards as the stock of observation data grows.

One of the important features of science is EXPLANATION AND PREDICTION. Therefore, it is imperative to apply deductions for the prediction phase.



(1) All metals expand when heated / heated.

(2) The rail track is made of metal.

(3) Railway rail expands when heated.

In this argument, (1) and (2) premises, (3) are results. It is (1) universal proposition and (2) particular proposition. If (1) and (2) is true, (3) will necessarily be true. Otherwise, it will cause contradiction. In logical deductive reasoning, if the deductive premises are correct, the result is also correct.

Thus, the accuracy of the premises in deductive reasoning cannot be determined logically. It is possible to make a 'valid' deductive reasoning based on a wrong premise.

Accordingly, according to the positivist approach, deductive reasoning does not work alone as a source of correct propositions about the world. Science relates to the world and is therefore largely inductive. However, a valid deductive reasoning based on correct premises produces a conclusion proposition as a necessary consequence of premises for a phenomenon that has not yet been observed. This result proposition is a detectable / testable proposition, again through experimentation and observation. If this proposition is confirmed, the prediction of the theory / law is verified and hence the theory / law is verified and once again tested.

Summary:

a) All cases will be observed and recorded irrespective of their significance and without a subjective preference or a priori prediction.

b) The observed and recorded cases will be analyzed, compared and classified without hypothesis.

c) From this analysis of cases, generalizations will be reached according to the classifier or causal relationships between them.

d) Subsequent research will be both deductive and inductive; because additional research will draw from the generalizations that have been determined previously.