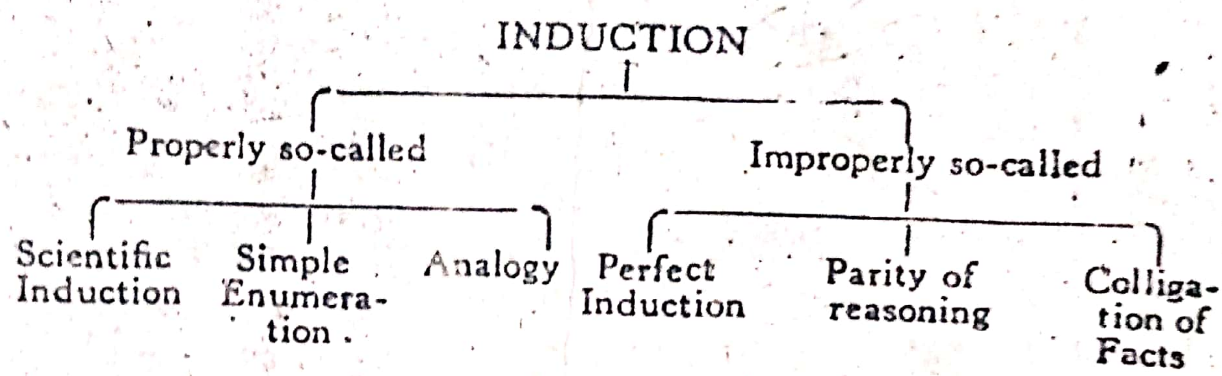
CHAPTER II

KINDS OF INDUCTION

Induction is of various kinds as shown by the following table :—



Scientific Induction

Induction in its ideal form is called **Scientific Induction.** We have already read its **essential** characteristics, namely that

1. *it establishes a general real propasition* ;
2. *it is based on observation of fact* ;
3. *it involves the inductive leap* ;
4. *it is based on causal connections among facts.*

Other kinds of induction which do not possess these characteristics cannot be regarded as scientific. *Scientific Induction establishes a generalization on the evidence of particular instances and their causal connections.*

Simple Enumeration

Simple Enumeration consists in establishing a generalization on the ground of mere uniform or uncontradicted experience, without an attempt at discovering any causal connections. Thus, a person who has seen only green parrots may believe that all parrots are green. He has never come across a parrot of any other colour, nor has he heard from anybody that parrots of other colours also exist. On the ground of this uniform and uncontradicted experience, he arrives at the general proposition--All parrots are green. Thus, in Simple Enumeration, we merely enumerate or count as many instances as we can, and our confidence and certainty depend upon the number of such instances. If we come across a very large number of parrots which are green, our generalization—All parrots are green—may acquire much force. Bacon describes Simple Enumeration as a process in which we have never found an instance to the contrary.

Its formula may be stated as follows :—

Such and such has always been found to be true ; no instance to the contrary has been met with ; therefore such and such is always true.

Simple Enumeration involves the inductive leap which is an essential characteristic of Scientific Induction. It begins from some instances and goes to a general proposition. But it lacks one fundamental condition of Scientific Induction, namely, causal connections among facts. In it the generalization—All parrots are green, for example,—is based on the mere counting of instances, and not on the discovery of any causal connection between "parrotness" and "greenness".

Analogy

Analogy means likeness or resemblance. In analogy, we base our argument on resemblances between things. If *A* and *B* resemble each other in some points and a new point "p" is found in *A*, we infer that it will be found in *B* as well. *Thus, in analogy we reason from likeness in some points to likeness in another point.* It is a reasoning in which we infer that things resembling each other in some respects resemble also in *other respects*. This would be an argument from analogy, for example, to argue that because gramophones sing, talk and laugh like men, therefore they are also rational like men. Again, it is by analogy that we conclude that because women resemble men in physical gifts, therefore they should also be allowed to take part in politics like men. *The formula of analogy is that things alike in some respects are also alike in other respects.* Mill defines analogy as follows : "Two things resemble each other in one or more respects: a certain proposition is true of the one ; therefore it is true of the other." In the words of Welton, *analogy is an inference from partial indentity to further identity.*

Analogy lacks the essential characteristics of Scientific Induction. It is an inference from one resemblance to *another resemblance*, *i.e.*, from one particular resemblance to another *particular* resemblance. It does not give us a universal conclusion or generalization. Secondly, analogy proceeds from some points of likeness to another point of likeness without proving any causal connection between those points.

N.B.—Simple Enumeration and Analogy are also called *Imperfect Inductions*.

Induction improperly so-called

Under this head come the following three kinds of Improper Induction :—

Perfect Induction

The so-called Perfect Induction is not Scientific Induction at all. It is not perfect in the literal sense of the term.

In Perfect Induction, we count *all* the particular instances and then arrive at a general proposition. As in Simple Enumeration, so in Perfect Induction the ground of inference is the counting of instances. The only difference is that in Perfect Induction our *enumeration is complete* because we count *all* instances. It is for this reason that *Perfect Induction is called Induction by Complete Enumeration.* For example, we examine that every student in our class is a bachelor and then sum up our results in a general proposition—"All the students in our class are bachelors." Again, we may prove by Perfect Induction the general proposition "All the months of the year have less than thirty-two days" after an examination of each and every month. Such an induction is called perfect because the general proposition so arrived at is perfectly certain. When we have observed each and every case coming under the "all," the universal conclusion must be certain. But the conclusion merely sums up the particulars in an abbreviated form, without giving any new information. If I observe that every student in my class is bright and then assert that the whole class is bright, this general assertion is just a concise expression or summary of what I have observed. Thus, in Perfect Induction there is no inductive leap, no leap from the known to the unknown, from "some" to "all." Hence Mill and Bain deny Perfect Induction the status of Induction proper.

Parity of Reasoning

In Induction by Parity of Reasoning we arrive at a general proposition not on the ground of our observation of particular cases but on the parity or sameness of reasoning. We suppose that the reasoning which is applied to a particular case might as well be applied to all other similar cases coming under the general proposition. For example, after proving that *A* is mortal, we may infer that this is true of "all men," not because it is true of a particular man *A* but *for the same reason* which proves it to be true of *A*. We argue that because *A* is mortal, therefore *parity of reasoning* demands that *all* men should be mortal.

It will be noted here that the universal conclusion is not believed on the ground of particular instances. We do not say that *all* men are mortal because *A* is mortal but because of the *reason* which is the ground of our reasoning in a particular case. Hence, although Parity of Reasoning looks like Scientific Induction inasmuch as it proceeds from the particular to the general, it *lacks one fundamental mark of Scientific Induction, namely, basing the general conclusion on the observation of particular facts.* To quote Mill: in Parity of Reasoning "the characteristic quality of Induction is wanting, since the truth obtained, though really general, is not believed on the evidence of particular instances."

Colligation of Facts

Colligation literally means binding together (from Latin *colligare, con,* together; *ligar,* to bind). *Thus, colligation of facts means the process by which many isolated facts are gathered or summed up under a single proposition.* In colligation we first observe the parts of a whole separately or piecemeal and then colligate them to have an idea of the whole. Suppose a blind man touches the trunk, legs, tail, tusks, etc., of an animal separately and then sums up his partial observations in a single proposition—This animal is an elephant. This would be Colligation. A navigator sailing in a sea discovers land. He cannot at first decide whether it is a continent or an island. He coasts along it and, after completely going round it, he pronounces it an island. Thus, he connects together the details of his observation under the idea of "island." It was by Colligation of Facts that Kepler, after observing the successive position of Mars, inferred that it moved in an ellipse. He simply colligated the different positions occupied by Mars under the general conception of "ellipse".

A little reflection will show that Colligation lacks the inductive leap, a going beyond our observations. It is merely a summary, under a general description, of what we have observed, and does not involve an inference from facts observed to facts unobserved.

History of Induction

Deduction, in its most important features, has been pretty well recognized from the time of Aristotle. But Induction, especially in respect of its methods, scope and importance, is of comparatively recent growth. Of course, in the philosophy of Aristotle and the Scholastic philosophers of the Middle Ages, there are traces which show that they were not wholly unacquainted with Induction. But most of the work on Scientific Induction has been really done after Aristotle.

Let us briefly trace the history of the development of Induction from the time of Aristotle.

Aristotle (384—322 B.C.)

Aristotle took Induction to mean a process of ascending from the particular to the universal on an examination of all the particulars. According to him, we cannot arrive at a perfectly valid induction unless all the particulars of a class are examined. Thus, Aristotle took induction to mean Perfect Induction. He considered Induction (which meant Perfect Induction) possible with the help of a syllogism, commonly called the Inductive Syllogism. For example :

The cow, the buffalo, the sheep, etc., ruminate,

The cow, the buffalo, the sheep, etc., are horned animals,

∴ All horned animals ruminate.