

## CHAPTER I

### NATURE, SCOPE AND USE OF INDUCTION

#### Why is Induction Needed ?

Logic is the science of the laws of valid thought. In other words, it is concerned with the validity of thought. Validity means : (i) *freedom from self-contradiction* and (ii) *agreement with facts or actual reality*. Validity in the first sense is called *formal*, and in the second sense, *material*. In *formal validity*, we see whether our thought agrees with itself or not ; that is, whether there is self-consistency in our thought or not. In *material validity*, we see whether our thought agrees with actual reality or not ; that is, whether there is consistency of our thought with actual facts or not.

This distinction of validity has divided Logic into two parts, namely, Deduction and Induction. Deduction simply sees the *formal validity* of an argument and does not bother about the *material validity* of the premises and the conclusion. Taking the premises for granted, its business is to see whether the conclusion is in harmony with the accepted premises or not. In other words, Deduction merely sees whether the conclusion *necessarily follows* from the given premises or not ; whether the argument is *formally* correct or not. It is not the function of Deduction to ask whether the premises and the conclusion are actually or really true. Thus, it does not fall within the scope of Deduction

to give us material truth. Let us take an example :—

All men are triangles

All students are men

∴ All students are triangles.

According to Deduction, this argument is perfectly correct because it obeys all the rules of syllogism, being in the form of the mood *Barbara* of the first figure. But when we inquire into the material truth of the premises and the conclusion, we find that they are false because they do not agree with actual facts. The argument is formally correct but materially false. Such arguments Induction will bid us reject because an argument, to be acceptable, must be both formally and materially true. That is, it must be true in form and in fact. We cannot be satisfied by the mere form of an argument ; we also see its actual matter. Besides possessing formal validity, an argument must also possess material validity, *i.e.*, it must also be true in fact. Now, Deduction cannot give material validity. It is here, therefore, that Induction comes to the aid of Deduction and performs a function which is beyond the scope of Deduction. By its appeal to actual facts, Induction ensures the material validity of an argument, which cannot be given by Deduction. Here, then, there is a need for Induction.

Moreover, in all deductive reasoning of the standard form, the major premise consists of a general or universal statement, and the conclusion is always less general than the premises. But



the question arises : How to prove the universal proposition which enters into a deductive reasoning? Now, a universal proposition may be either Verbal or Real. A verbal proposition is one in which the predicate states nothing but the connotation of the subject. For example, "All triangles are three-sided" is a verbal proposition. Because in a verbal proposition, the subject includes the predicate, therefore if it is universal, its universality can be established by merely analysing the meaning of the subject. But if a universal proposition is Real (*i.e.*, one in which the predicate adds something new to the subject, *e.g.*, "All crows are black") its universality cannot be established by a mere analysis of the connotation of the subject. In such a case, an appeal to facts is necessary. Thus, Universal Real propositions are established inductively, *i.e.*, by an appeal to actual facts. Deductively we can prove a universal proposition by assuming two other universal propositions, and to prove these two, we have to assume still other universal propositions, *ad infinitum*. For example, "All kings are mortal" can be proved by assuming two universal propositions, namely, "All men are mortal" and "All kings are men." Again, to prove "All men are mortal", we have to assume two other universal propositions, *i.e.*, "All animals are mortal" and "All men are animals." Again, "All animals are mortal" can be proved by yet another syllogism, *i.e.*, "All living beings are mortal" and "All animals are living beings", and so on. Now, this backward process of Deduction cannot go on indefinitely.

It must ultimately stop at a proposition whose universality will have to be guaranteed not by going back in the like manner, but by reference to actual facts, *etc.*, by Induction. Thus, the ultimate universal major premise of a chain of deductive reasoning is established by Induction.

To sum up: Deduction accepts universal premises as true without challenge or proof, regardless of whether they are in harmony with outer reality or not, while Induction seeks to prove their universality and material truth. Hence a need for Induction.

### What are the Essential Characteristics of Induction?

It is clear from what has been said above that *Induction arrives at universal real propositions through observation of particular facts.* For example, I observe that my dog is faithful, your dog is faithful, his dog is faithful. From these particular observations, I infer the general proposition "All dogs are faithful". This is an instance of inductive reasoning. *Induction, therefore, is the process of inferring universal propositions from particular facts.* Starting from individual cases, it goes to general laws. In other words, it goes from *some* to *all*. From what is mentioned here, we may note the following essential marks of Induction:—

Induction must establish a *proposition* as opposed to a *notion* or term. A notion expresses a single idea or quality, while a proposition expresses a relation or connection between two notions or terms. "Man", "black", *etc.*, are notions;