

## CHAPTER VII

### FORMAL GROUND OF INTRODUCTION (Continued)

#### (THE LAW OF THE UNIFORMITY OF NATURE)

### Unity of Nature

We have read that all inductive generalizations are based on our belief that Nature is a systematic unity of inter-related parts. If Nature were not a systematic unity, the sun which has been rising for many thousand years may possibly not rise tomorrow ; fire that has been burning so far may become cold tomorrow ; stones that have been seen to fall to the ground when thrown up may begin to soar to the sky henceforth—in fact there would be an utter confusion ; knowledge and even life would become absolutely impossible when there is no guarantee that the future will resemble the past.

Hence, we have to assume that Nature is not a mass of chaotic phenomena, but a well-ordered system of inter-related parts. It is a coherent whole, the different parts of which are harmoniously related to one another. It is not a chaos but a *cosmos* ; it is a whole in which the parts are related to one another and also to the whole. The parts cannot exist apart from one another nor apart from the whole ; similarly, the whole cannot exist apart from the parts. Such a whole in which the parts are *organically related* to one another as

well as to the whole, which, in other words, is a unity viewed as a whole as well as in all its parts, may be called an *Organic Whole*. Thus, it is different from a mere *Aggregate* which is just an inchoate heap of unrelated parts. It is also different from a *Mechanical Whole*, the different parts of which are mechanically related together and to the whole. In a *Mechanical Whole*, each different part possesses its individual significance and retains it even apart from the whole. We can take a watch or any other machine as an obvious example. In the case of an *Organic Whole*, on the contrary, the individual parts possess significance only *in* the whole, and not apart from it. Our body, for example, is an *Organic Whole*; any part cut off from it dies away.

Nature is an *Organic Whole* in which all the parts are so related to one another and to the whole that no part jars against another but each contributes to increase the harmony of the whole. In one word, it is a *unity*. But this does not amount to saying that there is no diversity or multiplicity in it. What we mean by calling it a *unity* is, that all its diverse elements are parts of *one* system, that in spite of the diversity of parts, the Universe is *One Whole*. It is a whole of many parts, a *unitas multiplex*. In brief, it is *One in Many*.

### The Law of the Uniformity of Nature

The Law of the Uniformity of Nature is also a presupposition or postulate of Induction. As such,

it cannot be proved and has to be accepted without proof. According to Mill, it must be *assumed* in all inductive inference. He writes: "We must observe that there is a principle implied in the very statement of what Induction is, namely, that what happens once will, under a sufficient degree of similarity of circumstances, happen again, and not only again, but as often as the same circumstances recur." He further writes: "The principle which we are now considering, that of the uniformity of nature, will appear as *the ultimate major premise of all induction.*"

Briefly, the principle means that Nature is uniform in its course; that under similar conditions, what has been, will always be; that the future will resemble the past; that Nature repeats itself; that the same events recur again and again with such regularity that we instinctively expect them to occur again as before; that the same cause will always have the same effect, and so on. In short, it means that *under similar conditions*, similar things happen. Thus, we say that fire which has burnt me today will burn me again; the sun which has risen today will rise tomorrow again; the seasons will succeed each other this year again as they have been doing in the past; and so with all other phenomena of Nature. There is a *regularity* or *orderliness* in Nature, and this is called the Uniformity of Nature.

It may, however, be objected that the course of Nature is not only uniform but is also infinitely various or multiform. Some phenomena,

of course, are always seen to recur in the same manner, but others seem altogether capricious. In many ways Nature seems not to be uniform ; its course is full of surprises ; the wind and weather are proverbially uncertain. The occurrence of unusual phenomena, like earthquakes, eclipses, etc., shows the irregularity or multiformity of Nature, and not its uniformity. In view of her immense variety and numerous irregularities, how can we say that Nature is uniform ? Does not nature present an aspect of chaos by bringing about phenomena which are exceedingly uncommon, perplexing, and even contradictory to the general run of things ? Quite true. But to this we may reply that uniformity does not mean *monotony*. It is true that events are not always exactly repeated. Yet this does not prevent us from believing in the principle of the Uniformity of Nature, because the principle implies that the occurrence of every event depends upon certain conditions, and *if the conditions are repeated*, then the same event will occur again. Wherever, for example, hydrogen and oxygen are combined according to certain conditions, the result must be water. Similarly, earthquakes and eclipses must happen *if*, and as often as, the same conditions which give rise to them recur.

### Various Uniformities

The uniformity of Nature, taken in a general sense, is something vague. To be definite, Nature is not a single uniformity, but a system of several uniformities or laws regulating its phenomena in

various departments. In other words, Nature manifests its uniformity in its different departments, and so there are as many uniformities as there are departments of Nature. Hence, Bain says : "The course of the world is not a *uniformity*, but *uniformities*." Such uniformities or laws of Nature are classified by Mill under two heads, namely, uniformities of succession and uniformities of co-existence.

### Uniformities of Succession (or Sequence)

Uniformities of Succession are those uniformities which state that certain phenomena are universally followed by certain other phenomena. To these is given the name of *causation*. Thus, the uniformity of succession means the uniformity of causation. This shows that causation is only one kind of uniformity.

According to the uniformity of succession or causation, the same cause, under similar circumstances, will always have the same effect ; and the same effect is always due to the same cause. This law holds that the relation between causes and effects is always uniform and invariable. If A produces X, it always produces X, and X is always produced by A. Two units of hydrogen and one unit of oxygen always produce water, and water is always produced by two units of hydrogen and one unit of oxygen ; the sun always produces sunlight, and sunlight is always produced by the sun ; and so on. If this were not so, *i.e.*, if a cause now produced one effect and now another, and, similarly, if an effect was now produced by one cause and now by another, there would be "a big, blooming, buzzing confu-

sion." But fortunately we are living in a world in which the relation between causes and effects is that of uniform succession. It is on account of the uniformities of succession that we expect the giving of a blast on a whistle to be always followed by a sound, and the drinking of water to be always followed by the quenching of thirst.

### Uniformities of Co-existence

Uniformities of co-existence mean, in general, that attributes are invariably attached to the things they belong to, *i.e.*, the attributes of a thing always co-exist with it. Fire has certain properties; wherever there is fire, its properties will also be there—this is a uniformity of co-existence. Again, inertia and gravity always co-exist in material bodies; wherever there is a material body, these properties will also be there. In our daily life, we often act upon the assumption of this law; for instance, we anticipate the taste of a mango from its colour because we expect that there must be a uniformity of co-existence between a certain colour and a certain taste of the mango.

Mill maintains that uniformities of succession are more important for Induction than uniformities of co-existence. The reason is that the former can give us *causal* connections among phenomena, but the latter cannot. That certain attributes always co-exist in a thing is no proof of their causal connection. If, for example, inertia and gravity always co-exist in material bodies, we cannot say that the inertia of a thing is the cause of its gravity, or *vice versa*. Similarly, if ruminancy and cloven-footedness always co-exist in animals, we

cannot say that ruminancy is the cause of cloven-footedness, or that cloven footedness is the cause of ruminancy. Thus, uniformities of co-existence cannot guarantee causal connections.

Minto holds that uniformities of co-existence and succession are equally important for Logic. He writes: "What Logic is concerned with is the observation of facts and the validity of any inference based on them; and in these respects it makes no difference whether the uniformity that we observe and find upon is one of sequence or of co-existence." Against this it may be objected that, as Induction is concerned with the discovery of causal connections among facts, the uniformity of succession is of more importance than the uniformity of co-existence. Bare co-existence can at best give us empirical generalizations, but Induction aims at scientific generalizations which are established on the evidence of causal connections among phenomena. Hence, Mill's position in this controversy is more sound than that of Minto.

In addition to the uniformities of succession and co-existence, Venn has mentioned the *uniformities of rhythmic character* and the *uniformity of probability*. The periodical and rhythmic recurrence and alternation of natural phenomena, such as the cycles of summer and winter, day and night, seedtime and harvest, are examples of the former. The uniformity of probability implies the regularity of the *general average* amidst the irregularity and uncertainty of individual cases. For instance, we can say that this year again the

average-pass percentage of our class will be the same as it has been in the past, though we cannot say whether a particular student will pass or fail. It is according to this uniformity that we expect that in a city the average number of births, deaths, marriages, suicides, crimes, traffic accidents, etc., will remain the same as before. Of course, the general average is also liable to vary, but not to the same extent as the individual cases.

### **Relation between Causation and Uniformity of Nature**

We have read that both Causation and Uniformity of Nature constitute the formal grounds of Induction. Without Causation, Uniformity *alone* can give us generalizations, but because such generalizations do not rest on causal connections, they cannot be regarded as scientific generalizations. For example, mere Uniformity, without Causation, can lead us to the generalization "all ruminants are cloven-footed," but if no causal connection is shown to exist between ruminancy and cloven-footedness, this generalization will not be accepted as a valid induction. Thus, the Law of Uniformity *alone* cannot be regarded as the ultimate ground of Induction.

On the other hand, it is also maintained that without Uniformity, causation *alone* cannot give us generalizations because in order to generalize it is not enough to grant that every event has a cause (*i.e.*, Causation) but also that the same cause must always have the same effect (*i.e.*, Uniformity of Nature). For example, in order to generalize about fire; what we require is not only that fire produces



heat but also that it *always* produces heat. Thus, it is asserted that mere Causation, without Uniformity, cannot give us a generalization. Hence, Causation and Uniformity are generally believed to be the two equally indispensable formal grounds of Induction.

Some logicians maintain that the Law of the Uniformity of Nature goes farther than the Law of Causation, for it assumes that the same causes are uniformly at work. It is because the same causes are uniformly and always at work that we get to know how they work. The Law of Causation would not be of much use to us, if no cause ever operated more than once, and if at every moment some new causes were at work that had never acted before and never would act again. In such a case, the Law of Causation might still be true (that everything had a cause); but if at every moment some new cause came into operation that we had never come across before, there would be no Uniformity in Nature, and we could never possibly know what to expect next.

Similarly, Mill and Bain maintain that Causation is only one of the forms of Uniformity, namely, uniformity of succession or sequence. Because according to them Causation is but an aspect of Uniformity, they contend that Uniformity *alone* is the ground or 'the ultimate major premise' of Induction.

On the other hand, logicians like Joseph and Mellone believe that the Law of Causation *alone* is a sufficient ground of Induction. Joseph says: "There is no need to distinguish the Law of

Causation from the Uniformity of Nature ; for a cause which does not act uniformly is no cause at all." According to him, the Law of Causation covers the Law of the Uniformity of Nature. In other words, Causation not only means that 'every event has a cause' but also that 'the same cause must always have the same effect' as well as its converse 'the same effect is always due to the same cause.' Thus, if A is the cause of X, it means that A is *always* the cause of X, and X is *always* the effect of A. We have read in the last chapter that Cause is invariable in nature. Hence, the causal relation is necessarily a *uniform relation*. Once a cause, always a cause. If A is the cause of X now, it must be so *always* because as Joseph says, "If it can be the cause now and not at another time, how am I even to tell whether it is the cause now or not." To speak of a cause not acting uniformly (*i.e.*, to believe that the same cause may not always have the same effect, and the same effect may not always be due to the same cause), would be a contradiction in terms as well as a contradiction of the Law of Identity. As Joseph writes: "A thing to be at all, must be something, and can only be what it is. To assert a causal connection between A and X implies that A acts as it does because it is what it is ; because, in fact, it is A. So long, therefore, as it is A, it must act thus ; and to assert that it may act otherwise on a subsequent occasion is to assert that it is something else than the A which it is declared to be." Thus, Joseph rightly believes that Causation necessarily implies Uniformity, and that instead of Causation being derived from Uniformity, it is Uniformity

which can be derived as a corollary from Causation. Hence the ultimate ground or presupposition of Induction is the Law of Causation because it also conveys the idea of Uniformity. This is also the opinion of Mellone. He writes: "By the side of the Law of Universal Causation some logicians place, as another fundamental presupposition of Induction, the law that *the same cause must have the same effect*; when the same conditions are fulfilled the same result will follow. This is sometimes referred to as the principle of the Uniformity of Nature. The student will see on reflection that this principle is *included* in the principle of Universal Causation; for by Cause is at least meant a condition on which the effect *always* follows. If it sometimes followed and sometimes did not, you would simply not have a cause at all."

### **The origin or ground of our belief in the Law of Causation and the Uniformity of Nature**

The Law of Causation and the Law of the Uniformity of Nature are a general belief of mankind. But how do we come to believe in them? What is the origin and ground of our belief in these Laws? There are three main theories regarding this question:—

1. *The Intuitionist or a Priori Theory.*
2. *The Empirical or a Posteriori Theory.*
3. *The Evolutional Theory.*

#### **The Intuitionist or a Priori Theory**

The upholders of this theory maintain that the belief in the Law of Causation and the Uni-

formity of Nature is intuitive or *innate*. It is a *priori*, i.e., prior to all experience. Being inherent or inborn, it is present in us from our very birth. This view is held by Reid, Hamilton, Kant and other Rationalists.

### Criticism

If the belief in these laws had been intuitive, it should have been present in all men, children and savages. But only the belief in the Law of Causation seems to be universal as it is involved in all rational thinking. Even children and savages, if they do not think of it, at least think according to it. In fact, it is impossible to think of an event without at the same time referring it to a cause, known or unknown. On the contrary, the belief in the Uniformity of Nature, as Mill says, "has scarcely entered into the minds of any but philosophers." Mansel also is of opinion that the idea of Causation is intuitive, but not that of the Uniformity of Nature.

### The Empirical or a Posteriori Theory

Locke taught in the 17th century that the mind of a newly born baby is a '*tabula rasa*,' a blank tablet or a clean slate on which experience writes. His opinion was that we are born with no innate ideas and that all ideas are learnt or acquired by experience. He writes: "Let us suppose the mind to be, as we say, white paper, void of all characters, without any idea; how comes it to be furnished? To this I answer: from experience." Taking this hint from Locke, Empiricists, like Hume Mill, Bain and Fowler,

formulated the Empirical Theory according to which our belief in the Law of Causation and the Uniformity of Nature, like every other belief, is not a priori or innate, but a posteriori, *i.e.*, derived from experience. Thus, according to the Empiricists, this belief is *empirical*, *i.e.*, gained from experience. It is said that our own *experience*, coupled with the *experience* of our contemporaries and forefathers, tells us that every cause has an effect, and that the same cause always has the same effect. As our experience is never contradicted by any instance, we *infer* from this uncontradicted experience the General Laws of Causation and the Uniformity of Nature. In short, it is believed that from our very early age we have been observing, *e.g.*, that a fever has a cause, a failure has a cause, an earthquake has a cause, an eclipse has a cause, etc.; from these particular cases of causation, we generalize and arrive at the Universal or General Law of Causation, namely, that every event has a cause. Similarly we observe that, under similar circumstances, water has the same effect, fire has the same effect, the sun has the same effect, laziness has the same effect, etc.; from these particular instances of uniformities, we generalize and infer the Universal or General Law of the Uniformity of Nature, namely, the same cause *always* has the same effect, and the same effect is *always* due to the same cause. Thus, the *Law of Causation* and the *Law of the Uniformity of Nature* are regarded as generalizations based on the enumeration of several particular instances of causation and uniformities. Mill clearly says that

these Laws are "the conclusions of an induction per simple enumeration."

### Criticism

(1) Experience alone does not explain why we feel more sure about certain uniformities than about others. We are more prone to believe that the sun will rise tomorrow or that an orange tree will yield only oranges than that all crows are black or that all dogs are faithful to their masters. And yet experience is the same in all these cases. If experience is the ground, then why, in some cases, is the experience of a single instance enough for a valid generalization, while in others the experience of hundreds of instances, without any exception, carry but a little weight?

(2) It is said that the Principles of Causation and Uniformity of Nature are arrived at by a process of simple enumeration, *i.e.*, "we count instances of causation and of uniformity in Nature and, on account of their frequency, come to believe in these Principles. Now, the Principles which are so arrived at cannot be accepted as grounds for Scientific Induction. Simple enumeration can at best give us probability, but not certainty. And if these Principles are based on simple enumeration, it means that the whole of inductive reasoning is based on weak foundations. But Mill and his followers believe that these Principles possess certainty. How can probability be the source of basis of certainty?

That a generalization based on experience possesses no certainty is frankly admitted by the Empiricists. "We have no warrant for our expectation of uniformity other than our previous experience. What w

have not seen happen, we do not expect to witness. The causal relation is a great generalization. From the observations millions of times repeated, that one event precedes another, we have drawn the conclusion that things must happen thus. This conclusion is valid and serviceable, so long as it is supported by observation, but just as soon as it is contradicted we should revise it. It is rather unfortunate that we should feel towards this particular generalization a sort of reverence. We treat it as though it were Heaven-born, sacred. As a matter of fact, it probably has no greater claim than have many other generalizations. All are human-made and should be held subject to modification." (Yarkes.)

(3) The Empiricists say that the Principles of Causation and Uniformity of Nature are the results of generalization from particular instances of causation and uniformity. But against this we can say that generalization itself assumes these Principles. How can the *assumptions* of generalization be at the same time the *results* of generalization? The Empiricists first *assume* these principles in order to generalize and then extract them *from* generalization. This is a clear example of the fallacy of *Petitio Principii* or *Begging the Question*.

Mill has himself said that the Principle of Uniformity is "an assumption implied in every case of induction" and is "the ultimate major premise of all inductive generalization," but now he says that "the Law of the Uniformity of Nature is a conclusion of induction." How can it be an "assumption" or "ultimate major premise" of induction and at the same time a "conclusion" of Induction? These statements of Mill contradict each other. Thus, Mill's attempt to prove that the Laws of Causation and Uniformity of Nature are manufactured by experience breaks down.

### The Evolutional Theory

This theory tries to reconcile the Intuitionist and the Empirical theories by holding that these principles were *originally* derived from experience by our remote ancestors, but by us they are inherited from our forefathers, so that *now* they are innate or intuitive in us. *What the father learns, the son inherits.* The chief exponent of the Evolutional theory is Spencer.

## Criticism

The Evolutional theory does not essentially differ from the Empirical theory. It only shifts the ground a few generations backward. Instead of making our own experience the basis, it makes the experience of our remote ancestors the basis of these principles. So ultimately *experience* remains the basis. Thus, the Evolutional theory is at bottom empirical. The question is not of the time when the belief in these principles was obtained, nor whether we learnt it ourselves or through our ancestors, but of the *source* from which *mankind* derived this belief. And both the Empirical and the Evolutional theories are one in saying, "From experience." Hence they are open to the same criticism.

## Conclusion

Of all the theories, the Intuitional theory seems most plausible. The Principles of Causation and Uniformity of Nature are *fundamental* principles which must be taken for granted. No knowledge or experience could be possible without them. Therefore *they* are rather the basis of experience. The belief in them is *implicit* in our nature, and experience simply makes it *explicit* and confirms or corroborates it. Experience, therefore, is certainly a factor which *strengthens* our belief in these Laws, but it cannot be the *source* of this belief. Mill forgets that fundamental principles cannot be based on experience. If they were based on experience, they would not be fundamental. The law of Causation and the Law of the Uniformity of Nature are the "Postulates" or "Assumptions" of Induc-