CHAPTER II

CAUSALITY & ITS IMPORTANCE IN INDUCTION AND SCIENTIFIC INVESTIGATION
An induction relies upon the law of causality. The inductive leap is justified by the belief in the uniformity of nature and the law of causation. The law of causation states that every event has a cause. A scientific induction is based upon the establishment of a causal connection between the ground of inference and the inferred property. For example, a causal connection is established between "the essential nature of man" and "mortality" and the general proposition "All men are mortal" is established on the strength of this causal connection. The uniformity of nature and the law of causation are the postulates or presupposition of induction.

In scientific induction a causal connection is proved between them by the Experimental Methods. Scientific Induction means generalisation on the strength of a causal connection proved by Experimental Methods. The conclusion of scientific induction is certain.

The law of causation means that the parts of nature are causally connected with other parts; every event is causally related to other events. The uniformity of nature emphasises the identity and systematic unity of the whole. The law of causality emphasises the causal relation among the parts within the whole. Thus they are related to each other. If the Reality were a chaos of disconnected parts; no induction would be possible. If all events in nature were spontaneous or uncaused without any relation to one another and to the whole, induction would be impossible. Therefore the uniformity of nature and the law of
causation are the postulates of Induction.

The law of causation means that there can be no event without a cause. Whenever an event comes into existence it must be brought about by a prior event. "Every phenomenon which has a beginning must have a cause." There can be no uncaused events. There are no miracles in nature. We speak of chance owing to our ignorance of causes. All phenomena are determined by their causes. Nature is a system of changing events which are causally determined by other events. Nature is not a chaos of unconnected spontaneous events.

Again, the law of causation means that the same cause must produce the same effect under the same circumstances. This is called the uniformity of causation.

The law of causation denies two things. First it denies pure spontaneity of commencement. If the law is true, no change arises out of variety or stillness; there must be some prior event, change or movement, as a sine qua non of the occurrence of any new event.

Secondly the law denies that events follow one another irregularly, indiscriminately or capriciously. In short, the law is the statement of uniformity in the succession of events.

According to Joseph, the law of causation involves the uniformity of Nature. Causation implies necessary connection between cause and effect. If A is the cause of B, A must always

2. Inductive Logic : Bain, Pg. 16.
produce B and B must always be produced by A.

According to Sigwart, Bosanquet, the law of causality is the formal ground of scientific induction only. In scientific induction we must prove a causal connection between the ground of inference and the inferred property.

The idea of causality is supposed to be derived by induction or generalization from particular cases of invariable succession. But induction itself is based upon the law of causation. Hence it is arguing in a circle to derive causation from induction and induction from causation.

Early Greek thinkers regarded cause as the world-stuff, the material out of which all things have been made. Cause, for them, is the principle of unity rather than of production. The Milesians did not speak of causes or of the causal principle. Parmenides for the first time spoke about the law of causality. Of course, they did not regard it as the principle of change or Becoming out of Being. It was Leucippus who associated it with change and as a case of causation. He says that without a cause nothing happens. Everything has a cause which is necessary. Heracleitus maintained that all change is subject to law as thus enunciated the inductive principle, which is a necessary supplement to the law of causality. Empedocles, on the other hand, traced motion to moving forces and his view falls under the activity view of causation. Plato distinguished between various forms of causes, but for him true causes were logical entities devoid of motion. Aristotle sets forth the famous four-fold view of causality and his theory of causation was accepted as gospel truth later on.
Meantime progress in science meant triumph for mechanistic determinism, and the mechanistic method came to be hailed as the only scientific method. The theory of evolution as interpreted by Darwin was mechanistic through and through. Russell, as an interpreter of scientific truths maintains that scientific determinism does not mean a reign of causes but of laws. He says that physics has ceased to look for things, for there are no such things. Philosophers, in general conceded the point of the argument as regards the phenomenal world, but scientists would not be convinced by such sophistries. They were firm believers in mechanistic determinism or the reign of causal laws. It would be a necessary to be a scientist as well as a philosopher in order to deal adequately with scientific method.

Eddington and James Jeans are the most vocal exponents of indeterminism. Eddington maintains that determinism is nothing but "faded out of theoretical physics." Einstein is the faithful advocate of the deterministic creed. He recognises that science cannot dispense with the law of causality. He believes that the validity of the law cannot be decided on grounds of abstract reasoning; that would go indeed against the whole tenor of scientific method.

The theory of Relativity has affected the causal category in its reference to temporal relations. As Jeans says that past and present have no longer any objective meanings, since the four dimensional continuum can no longer be sharply divided into

3. Causality in Science and Philosophy : Dr. B.K. Bhattacharya, Ch. Introduction, Pg. 4, Sanskrit Pustak MANDAR, Calcutta.
past, present and future."

Bacon as is well-known, sounds the key note of modern
scientific method when he exhorts all to turn to Nature herself
for the solution of problems of knowledge. He rejects the last
three causes of Aristotelian scheme, and accepts only the
"formal causes". "Form" is understood here as the abiding
essence or nature of a phenomenon. The final cause is rejected
by Bacon, since it tends to misdirect scientific inquiry. The
material and efficient causes are regarded as superficial, not
able to give the real nature of the thing.

The discovery of "forms" is the professed aim of Bacon's
"new" method of induction. The Baconian Induction is not simple
Enumeration, but a complex process of abstraction resting on
the metaphysical assumptions of the Scholastic Formalism.

The whole physical world, on Bacon's view, consists of a
limited number of 'forms' or simple elements variously combined.
Induction is the generalisation by abstraction and it is the
process by which forms are to be discovered and Nature to be
interpreted for the purpose of increasing power and ministering
to human satisfaction.

Bacon was not, however, the discoverer of inductive infer-
ence; that honour goes to Aristotle. Aristotle had used the
name 'dialectic' to indicate probable or inductive reasoning.

Baconian induction is not the same as the process which is
now-a-days, known as induction. As Hoffding points out, "Bacon
seeks by way of induction to find a definition of the nature
of 'form' of things to determine the essential nature of each one. Properly speaking however, such a definition is not induction in the modern sense of the word. It does not give the dependence of one phenomenon on another, it gives not a law, but a concept. Bacon describes "forms" as the permanent causes underlying all phenomena but in fact they are the highly general physical properties of things. The 'form' of a thing is thus a static entity rather than a power which produces a phenomenon.

Induction by simple enumeration is a process which consists in an uncritical observation of a number of instances in which a phenomenon is present. Bacon condemns this type of Induction and calls it a childish thing because, in his opinion, it cannot lead to the discovery of 'forms'. The induction of the ancients has been well described by Bacon, under the name of Inductio per enumerationem. Simplicies, ubi non reparitur instantia contradictoria.

Bacon lays great emphasis on the importance of discovering the causes of things. "To know truly" he says, "is to know by the causes". The aim of his inductives is to discover the 'forms' or 'formal causes' of things. But Bacon, does not give us a precise definition of 'form'. In Aristotelian philosophy the 'form' of a thing means its definition, its essence.

According to Bacon the object of scientific investigation is to find out the form of the simple quality or nature of a thing. It is not however clear as to how Bacon distinguishes between a form and that of which it is the form. He says at some places that the form of the thing is the very thing itself. He
seems to assume that all that is necessary in inductive investigation is to collect a number of facts and conclusion can be read off from this collection.

Bacon began the outline of his scientific method with what he called the three tables of Investigation. The first of these was the table of Affirmation, or 'the rule of presence'. This was to be the assembling of all known instances of a phenomenon that agreed in having the same characteristic. For example, if the subject was heat — a subject incidentally in which Bacon was especially interested — then the scientific investigator would have to study all known instances of warm "bodies", the sun, flames and so forth. However, such a study of affirmative instances alone would suffice to instruct only God and the angels, but not men. Men must therefore add the study of negative instances to the study of affirmative instances. Bacon's Tables of Affirmation and Negation are reproduced in John Stuart Mill's "Joint method of Agreement and Difference."

Bacon's third table is the Table of Comparison or "the rule of differing degrees". This enjoins the study of variations in different phenomena to see if there is any correlation between the various changes observed. When Mill adopted this method he called it the Method of Concomitant Variations.

Although Bacon's scientific method is richer than any summary can indicate, it is undoubtedly defective in parts and in several ways outmoded. However it would be an error to under-estimate either its originality or its value. Some crude anticipation of Bacon's inductivism can be found in Greek philosophy,
notable in that of the pre-Socratics, but these are fragmentary, whereas Bacon offers a complete theory. The merit of Bacon lies in directing men's minds to the accurate observation of facts, freed from the "idols" or perversions of pure experience or a priori knowledge.

Bacon himself made no important discovery and none have been made by adopting his methods. But his indirect service to science was enormous: Aristotle had used the name 'dialectic' to indicate inductive or probable reasoning. But the elaborate method formulated by Bacon is his own. His influence on subsequent logicians was great.

But, it is also true that the fundamental postulate behind the Baconian method is wholly wrong. For it presupposes that the "forms" are limited in number and that we know all of them; otherwise how could we expect to find the cause of any sensible quality amongst them? Bacon indeed promised to give us an exhaustive list of the "forms", but he never carried out his promise. Again, the "new instrument" of discovery, on the invention of which Bacon prides himself so much, is not new in the sense that it has nothing in common with the traditional forms of reasoning. It is a combination of hypothetical and disjunctive reasoning of the Aristotelian logic.

In Mill's view, induction is clearly of central importance, since it is the only possible source of substantive general propositions. All methodical and critical induction rests on

4. F.W. Mistaway, The Endless Quest - Three thousand years of Science, Pg. 178.
the fundamental principle of the uniformity of nature; namely, that what has happened once will happen again, if circumstances are sufficiently similar. Mill thought that this is a factual proposition which is itself derived by a primitive and natural process of induction; we first note a few limited regularities and predict that they will hold in the future. After our predictions come true, we spontaneously generalise, saying that since some events have been found to occur in repeating patterns, all events will be found to occur in repeating patterns. Mill defined "cause of a phenomenon" to be "the antecedent or concurrence of antecedents, on which it is invariably and unconditionally consequent." Like the "axiom" of the uniformity of nature, the principle that every occurrence has a cause is confirmed by all our experience. It is, in fact, simply a more precise way of stating the principle of the uniformity of nature. The hope of science is to formulate propositions about specific sequences of phenomena that can be relied on to the same degree as the law of causation. And the problem of methodical induction which is the core of the problem of scientific reasoning — arises when it is discovered that the simplest method of induction often leads to general propositions which turn out to be false. We then seek ways of obtaining better results.

According to Mill, there are four inductive methods: the method of agreement, the method of difference, the method of residues, and the method of concomitant variations. He also

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discussed a combination of the first two, calling it the joint method of agreement and difference. We use the first two methods in this way. If we find that A under circumstances BC is followed by abc, then under circumstances DE it is followed by ade, then A cannot be the cause either of bc or of de, since they sometimes do not occur when A occurs. But a occurs under both sets of conditions; hence it could be the effect of A: this illustrates the method of agreement. To ascertain if something other than A might be the cause of a we use the method of difference. Will BC without A be followed by a? If not we have so far confirmed our view that A causes a, for in that case we have examined, A is always followed by a and a never occurs without being preceded by A.

The Buddhist logicians had anticipated Mill in their invention of five conditioned method (Pancakārāni) with a view to establish causal connections, (1) the perception of neither cause nor of the effect, (2) the perception of the cause, (3) the perception of the effect in immediate succession, (4) the disappearance of the cause and (5) the disappearance in immediate succession of the effect. The relation between the cause and the effect is invariable, inseparable and uniform. If two things are related as cause and effect there is universal relation (vyāpti).

The early Buddhist says that if A precedes B, and the disappearance of A means the disappearance of B, other things remaining the same, then A is the cause of B. This is the method of difference. Later Buddhists develop this doctrine by emphasising the immediate antecedents of the cause. Of course, relations
of co-existence such as those of genus and species can also be established though in a different manner. If we notice a number of instances of the association of a certain character with certain others, and if we have never perceived the one without the other, we suspect some fundamental identity between the two. And if the suspicion is confirmed and identity established, then the generalisation follows. So among successions the causal ones, and among co-existences the genus—species ones, warrant generalisations, according to the Buddhists.

Science does not rely upon induction and experiment alone. It is only infrequently Mill thought, that we will find genuine causal laws, that is absolutely invariable sequences. The "empirical laws" are not be considered basic laws of nature. Much/the practical application of science depends on them, but we cannot claim to have truly scientific knowledge until we can deduce empirical laws from basic laws of nature, showing why the combination of circumstances and laws renders inevitable the limitations within which the empirical laws hold. This makes clear the aim of science to discover laws of nature and empirical laws, and to connect them, in a deductive system, in such a way as to show how the unrestricted laws would give rise to the regularities reported by the empirical laws.

J.S. Mill maintained that universality of causation is a "co-extensive with human experience", but this is inaccurate. The causes of many events that men have experienced have never been experienced at all. If the reverse were true, there would be no such thing as an unsolved murder. Causes are in such
cases assumed that men have experienced, but they are not experienced.

To say that causation is universal is to say that no change ever occurs without some cause — in short, that every event has a cause. To affirm, on the other hand, that causation is uniform is to affirm that the causal relation between changes or states can be expressed in the form of general laws or, in short, that similar causes always produce similar effects. David Hume, Mill and others have expressed the principle of uniformity in the dictum, "the future will resemble the past". Although this statement is, of course, ambiguous, it is intended to mean that the laws of nature that prevailed heretofore will continue to hold in the future.

It seemed to both Hume and Mill, that, we can define the causal relation simply in terms of such invariable sequence. According to this suggestion two changes or sets of changes A and B, are respectively the cause and the effect of each other, if A was immediately followed by B and if thing similar to A are always immediately followed by things similar to B. Mill added the qualification that the two must be "undconditionally" conjoined — that is, conjoined under all "imaginable" circumstances but that introduces another consideration to which we shall return later. For Hume, in any case, this empirical — that is, a description of the causal relation which does not involve any ideas which do not have their source in observation or experience. Whether two changes are such that one immediately follows the other, for example, is something that can be tested
in experience, and whether other similar changes likewise succeed one another in the same way can also be checked and confirmed by experience. There is in this conception of causation no reference to any necessary connection between cause and effect, and Hume thought, no such connection can be experienced, nor is it needed for a complete description of the causal relationship.

J.S. Mill says that the "law of causation, the recognition of which is the main pillar of inductive science, is but the familiar truth that invariability of succession is found by observation to obtain between every fact in nature and some other fact which has preceded it." 6

There is something majestic in the way in which Mill in his Logic ignores the basic difficulties in his attempt to build a positive theory of causality on Humean foundations. Then indeed it might be possible on purely inductive principles to discover the cause of a phenomenon, which in Mill's definition, is the antecedent, or concurrence of antecedents, on which it is invariably and unconditionally consequent. 7 Then too it might be possible in the same way to arrive at the supreme principles of causality and uniformity of nature. Unfortunately it is too clear that, although A has been accompanied by B or thousand time and in every variety of circumstances, this by itself is not sufficient ground for the assertion that the next instance of A will be accompanied by B or that A is always accompanied by B. The principles of Mill's philosophy, which are pure Hume, afford no slightest ground for inferring anything invariable or unconditional.

7. Logic - Book III, Ch.V §6 - Mill.
It is important to note here that, all modern discussion of the philosophy of induction takes off from Hume's celebrated analysis of causation, whose connection with the philosophical problems of induction (a word that Hume never used) arises from his view that all reasoning concerning matters of fact is founded on the relation between cause and effect.

Unlike J.S. Mill, Hume was not satisfied with analysing the notion of cause and effect into the notions of spatial contiguity, temporal succession, and joint occurrence; he added to these the criterion of "necessary connection". Something more is required before an event can properly be recognised as the cause of the other; we must be able to pass from post hoc to prior hoc.

Hume's scepticism rests entirely upon his rejection of the principle of induction. The principle of induction as applied to causation, says that if A has been found very often accompanied or followed by B and no instance so known A not being accompanied or followed by B, then it is probable that on the next occasion on which A is observed it will be accompanied or followed by B.

The problem of causation has logical importance because much of the inductive logic is based on it. We knew that much of our inference is based on causation. The validity of inference depends, to a very great extent, on the validity of the law of causation. If we are able to establish some connection between two occurrences we can infer and thus, predict that if one event occurs, the other will also occur. Thus, we can pass on from what has happened in the observed cases to what is likely to happen in cases which have not been observed. And on this inference is based not only the
whole of our practical life, but it is also absolutely necessary if we are to have any science at all. It is sometimes said that science now-a-days is able to dispense with cause. Bertrand Russell, for instance, has declared the concept of cause as a 'relic of bygone age'. But, in fact, this is always said with regard to some metaphysical conception of cause with which many people do not agrees. It is absolutely necessary for science to pass on to generalisations from the observed regularity of two kinds of events and, thus, to infer the second kind of event. Thus, the concept of cause is utilized even now, of course, sometimes, in the name of 'functional dependence'.

Again we have seen the two-fold bearing of Buddha's theory of causal genesis: Logical and Metaphysical. As a logical principle, it is no other than what we now call the principle of identity, the great value of which was recognised by him in the sphere of thought. Being is, non-Being is not. That which is, is; that which is not, is not. In order to think correctly and consistently, we have to think as A is A, or as A is not not A.

Any way, the belief we entertain in the universality, throughout nature, of the law of cause and effect, is itself an instance of induction, and by no means one of the earliest which any of us, or which mankind in general, can have made. We arrive at this universal law by generalisation from any laws of inferior generality. However, all rigorous processes of
induction presuppose the general uniformity, our knowledge of the particular uniformities from which it was first inferred was not, of course, derived from rigorous induction, but from the loose and uncertain mode of induction per enumerationem simplicem; and the law of universal causation, being collected from results so obtained, cannot itself rest on any better foundation.

It would seem, therefore, that induction per enumerationem simplicem not only is not necessarily an illicit logical process, but is in reality the only kind of induction possible; since the more elaborate process depends for its validity on a law.

Assuredly, if induction by simple enumeration were an invalid process, no process grounded on it could be valid. But though a valid process, it is fallible one, and fallible in very different degrees; if therefore we can substitute for the more forms of the process an operation grounded on the same process in a less fallible form, we shall have effected a very material improvement. And this is what scientific induction does.

A mode of concluding from experience must be pronounced untrust-worthly when subsequent experience refuses to confirm it. According to this criterion, induction by simple enumeration in other words, generalisation of an observed fact from the mere absence of any known instance to the contrary affords in general a precarious and unsafe ground of assurance; for such generalisations are incessantly discovered, on further experience to be false. Any way the law of causality rests on an induction by simple enumeration as maintained by Mill.
Buddhist logicians attempted to make a distinction between inferences concerned with production (i.e., with the production of a type of effect by a type of cause) from inferences concerned with identity. For example, "All cases of smoke are cases of fire" is distinguished from such instances as "All pines are trees". The Buddhists usually denied that a cause could be simultaneous with its effect. When, therefore, two properties are invariably conjoined in the same locus, but are simultaneous, they must be identical.

The real is the efficient, i.e., that which causes some effect (artha-kriya = kīrin). The permanent as the non-efficient is unreal. Causal efficiency can be either simultaneous or successive.

It is known to almost all, that, Kant regards Hume's treatment of the nature of causal connection as a specimen of the dogmatic procedure in philosophy to which he himself was addicted in the first stage of his philosophical career. Kant feels the necessity of adopting a new approach to the problem of philosophy and comes to the conclusion that he should begin by taking up for consideration the problem of synthetic a priori judgments.

Hume rejects the ideas of necessity and efficiency in causal connection which is the view of popular notion of causal connection. He points out that these ideas have no warrant in our experience. The causal connection (connection between a cause and its effect) is purely a subjective affair, and does not involve any objective necessity. Judgments concerning matters
of fact, which are derived from experience can never be necessary. Mathematic judgments are necessary but they deal only with our concepts and their relations. They are necessary because they are ultimately theological in nature. "7 + 5 = 12" is a necessary proposition, because 12 is the same as 7 + 5, and in asserting that 7 + 5 = 12. We do not add anything to our knowledge of 7 + 5. "Fire melts wax" is a proposition concerning a matter of fact but there is no necessary connection between fire and the melting of wax.

Hume thus denies the existence of a purely rational knowledge of matters of fact, that is, knowledge which mind has produced by its own activity independently of experience. He has unduly assumed that experience taken in the sense of a conglomeration of impressions is the only source of knowledge and has altogether neglected the question how there comes to be for us an objective world of inter-connected things and events. With regard to the universal law of causation which lays down that every event must have a cause, Hume holds that this universal law like any other judgment connecting a particular effect with a particular cause cannot be strictly regarded as necessary. As against Hume, it can be maintained, that the claim to universality and necessity which such a judgment make should not be lightly laid aside.

While Hume had refused to view the causal relation as necessary in one sense, Kant proved it to be necessary in a different sense. In other words, Kant showed the necessity of the employment of causality in the knowledge-situation, but
failed to explain whether the causal relation was a necessary relation among specific objects. Thus while Hume raised the question whether causation was objectively necessary Kant replied that causality was a necessary concept in the judgmental situation.

What we ordinarily understand by the law of causation is that for any particular phenomenon there is another antecedent phenomenon on which the former is dependent for its appearance. The popular conception of causation is incomplete without the ideas of productivity and necessity. The regular sequence of cause and effect is an indication of the existence of the causal nexus and not the essence of that nexus. Hume who wants to prove the idea of causation from experience, says that, when we have repeatedly observed that the phenomenon $X$ is followed by the phenomenon $Y$ the ideas of $X$ and $Y$ are so conjoined in our mind that when afterwards we experience $X$ we are forced by custom-bred association to think of $Y$. The principle that every phenomenon has a cause is also a generalisation from experience. When Kant proves the causal principle he has mainly in view the Humean doctrine of causation which he wants to refute.

In the "Analytic of Conceptions Kant has shown that the category of causation is one of the twelve categories imposed by the understanding on the materials of sense and that it corresponds to the form of the hypothetical judgment as given in Logic but has not explained the category in detail.

Kant deals with the principle of causation under the heading "The Second Analogy". He formulates the principle established
by the Second Analogy. We have seen that the principle of being or identity is admitted in Buddhism. Aristotle also maintains that identity is necessary for all change. We cannot think of change without a permanent. It is the truth contained in Kant's Second Analogy of Experience also. "Without the permanent, no relations in time are possible." The succession of "B" upon "A" means that "A" is ever before "B" begins. The relation between them called succession cannot exist for either "A" or "B", but only for something present to each of them. The possibility of any succession implies a relative permanence. Kant has maintained that "all changes take place in conformity with the law of the connexion of cause and effect." What his argument proves at all, is that the succession of events in the objective world is necessitated just as some acts of apprehension appearing in an irreversible order are necessitated.

The causal law cannot be said to be established unless it is shown that one event is necessitated exclusively by another preceding event or group of events and not by the totality of events which precede a single effect. This is implied by the statement that the cause of an event is that which is invariably and unconditionally followed by it. The proposition that an event is necessitated by the total state of the world preceding it may be true but it cannot take the place of the causal law because it has neither the theoretical nor the practical value which that law can legitimately claim to have.

On Hume's view the conception of causality is merely a generalisation from a number of observations, i.e., he holds that we have the repeated experience of certain events as
following certain antecedents in time, and, comparing these experiences with one another, we frame the general idea of cause.

This analysis of the causal relation is revolutionary in the history of philosophy, but despite the lucidity of Hume's exposition, diverse estimates have been made of his performance. Some thought that the Humean view is simply the old wine in a new bottle, while others despair of the fate of science and philosophy. Even a modern scientist-philosopher like Heisenberg has argued that Hume "denied causation and induction and thereby arrived at a conclusion, which, if taken seriously, would destroy the basis of all empirical science." But Hume is a thinker more sinned against than sinning. His treatment of causality, in particular, — instead of shaping the foundations of science, prepared the ground for a positivistic philosophy of science that is subscribed to by a majority of present day thinkers including the Logical Positivists and others.

Kant seems to be insisting on the very point on which Hume dwelt with such emphasis, viz., that there is no link of necessary connection between the phenomena which we regard as cause and effect. On consideration, however, we see that, though there is a verbal parallelism, the premises from which the two thinkers start and the conclusions to which they are pointing are quite different. The result to which Kant points is just that which Hume is led by his argument to reject, viz., that the causal connection must be given in experience. For whereas Hume sought

to prove that the causal relation, because of its necessity, cannot be given in experience, Kant seeks to show that the same relation, because of its synthetic or ampliative character, cannot be derived from pure thought. Kant seems to have always understood Hume in his own sense; connected with this we may say that Kant does not yet deal with the general problem of causality.

We find that Hume is not arguing against the idea of a synthetic power of thought, for he excludes that idea at the outset by the reduction of ideas to copies of impressions. He speaks, indeed, of the relation of causes and effects as incomprehensible — in conformity with his general view of experience as consisting of isolated impressions, which have no relations except the external relations of time and space. But his object is to, not to bring arguments against the doctrine that the intelligence possesses a synthetic power, but simply to show that in the impressions as given there is no hint of "power or necessary connection." When, however, we turn to Kant, we find that he connects these two ideas. Kant maintains that "Hume started from a single but very important conception of metaphysics, the connection of cause and effect ....... He proved beyond contradiction that it is quite impossible for reason, a priori and out of conceptions, to establish such a connection, a connection which involves necessity; for it is quite impossible to understand how, because one thing is, something else must necessarily be, and consequently how the conception of such a connection can be attained a priori. Hence he concluded that reason altogether deceives itself with this idea, falsely
regarding it as its own offspring, when it is nothing but a bastard child of imagination, begotten upon it by experience. For the whole secret is that imagination, having brought certain ideas under the law of association, tries to pass off the subjective necessity arising from such association, i.e., a mere habit of the mind itself, as if it were an objective necessity of thought.¹⁰

Kant thus reads Hume's argument against the possibility of deriving the idea of necessary connection from experience, as if it were intended to disprove the existence of a synthetic power in thought. Now, as we know that, Hume did not seek to prove that thought is not synthetic. He assumed it to begin with. It is the premise from which he starts, and indeed the pre-supposition of the whole school of Locke to which he belongs; and Kant refutes this presupposition only in so far as his transcendental deduction cuts away the ground from Hume's explanation of the origin of the principle of causality, by proving that the particular experiences from which Hume derives that principle could not exist without it.

Passing, however, from the question as to the exact relation of Kant's thought to that of Hume, we can see that from the point he had reached, there were two special problems which opened up before him. On the one hand, he had to consider how, consistently with its essential nature, pure thought could become synthetic in relation to experience; and on the other hand, he had to show how experience, consistently with its, essential nature, could be

¹⁰ Prolegomena, Introduction. - Kant.
proved to conform to the principles.

Again, it has been maintained that Kant's main object was to prove against Hume that there is an a priori knowledge of objects. Kant seeks to supply both a metaphysical and a transcendental deduction of his categories and ideas, as well as of the a priori principles of understanding and reason which are based on them. Kant has connected his lists of categories and ideas with the analysis of the process of thought which is supplied by formal logic. Universalising the problem suggested by Hume in relation to the objective value of the principle of causality, Kant asked how we are authorised to say that an objective value attaches to any of the a priori conceptions; and this again led him to ask what a priori conceptions there are. In seeking to answer this question Kant found that the list of Aristotle's categories would not serve his purpose. For it seemed to be constructed on no definite principle, but merely by taking up any a priori conception which happened to present itself in a general review of experience. Besides, it contained several ideas which Kant had already discovered. Kant maintains that there could be no knowledge, no connected world of experience without original a priori acts of thought, without a unifying consciousness which operates with certain categories. A judgment is the combination of two or more representations. But these representations do not combine by themselves, they require an activity on the part of the mind, viz., the activity of thinking. Since it is our understanding which performs this activity understanding may be called the faculty of judgment. Again in a judgment many possible cognitions are gathered into one. And every judgment must one or more
concepts. In fact the act of judging and the act of conceiving are both activities of the understanding.

The activity by means of which a judgment unites representations is the synthetic activity. In addition to this synthetic activity, judgment involves an analytic activity also. That means every judgment involves both analysis and synthesis. Synthesis however is more important than analysis, since analysis presupposes synthesis. This synthesis is pure or a mathematical synthesis.

When our understanding works on sense impressions it connects or unifies them in certain ways. Now we may ask the question: In how many different ways does the understanding connect or unify the sense — impressions. Traditional logic gives us a list of the different forms of judgment. But it is however not complete. When the list is completed and when we ignore the contents of judgments we get a list of twelve forms of judgment which can be arranged under four different heads. That is to say there must be as many ways of uniting sense impressions into individual objects as there are forms of judgment. The form of unity which a mathematical synthesis imposes on sense impressions is a category. Therefore there must be as many categories as there are forms of judgment.

Again as the different forms of judgment as well as the categories owe their origin to the same activity of the understanding there must be as many categories as there are logical forms of judgment, and each form of judgment must provide us with a clue to a particular category. This is the metaphysical deduction of the categories of Kant.
There are four groups and three categories have been found in each group. Causality and Dependence (cause and effect) is one of the categories out of the twelve categories.

Kant thinks that he has already demonstrated that the applicability of the category of causality is a necessary condition of objective experience. But he considers that it is necessary to add further demonstrations in order to confirm the previous result. Kant says that all changes take place according to the law of the connection of cause and effect. According to him, we perceive that some appearances are followed by others, and this means that we are connecting two different sense-perceptions in time. This connecting activity cannot be performed by mere sense or intuition, it requires the synthetic power of imagination. Again if we are to know the relation of phenomena as they occur in the object we must not only imagine, but also think the temporal relation of the phenomena. And we must do so in a particular way so that we should be able to lay down quite precisely which of the phenomena must be placed before and after. To do this is to attribute the relations of objective phenomena to causal necessity.

According to Kant, whenever we perceive an event or change we perceive something else immediately before it. We are also aware of an objective succession, that is, of the succession of one event by another in the object itself. This belief in the objective order of events is already there and is not inferred from a subjective order of mental occurrences. It is because, we knew that the event A is followed by the event B in the object that we can assert that the order in which the perception of A,
vis, a is followed by the perception B, vis., B is irreversible. There is no determined order in the series of perceptions when they do not correspond to events occurring in a certain order, but there is a determined order of those perceptions when we apprehend an objective succession of events. The succession of a by b is a necessary succession and since the events A and b are not things in themselves but contents of the sense - perceptions a and b (according to the Critical philosophy) to attribute necessary succession to a and b is the same thing as to attribute a necessary succession to A and B. If the succession A — B is a necessary succession it can only mean that there is an order of the manifold in the objective world according to which it is necessary that one event should follow another in conformity with a rule. "It is necessary that in that which antecedes an event there must be found the condition of a rule, according to which this event follows always and necessarily." Any way, we are entitled to conclude that every event is causally determined. If there were not such causal sequence in the world our experience would have been only a confused medley of representations (subjective processes) and we would not be able to distinguish between objective facts and mere subjective associations of ideas.

"Irreversibility implies necessity and a necessary sequence is a sequence which is determined by the category of causality."  

It is to be mentioned that Kant does not assert that when we experience a succession of events in the objective world any

11. Critique of Pure Reason (Every man's Library), Pg. 151
event that precedes another must be the cause of the latter. He only asserts that such a succession must be causally determined and that this only means that with regard to any event it is true that "something existed in the foregoing state, upon which it follows inevitably and always, that is, in conformity with a rule."\textsuperscript{13}

Again Kant maintains that time is an essential form of our sensibility. But this time cannot be experienced by itself. It is only by reference to the events which take place in time that we can perceive the continuity of time. Events which take place in a certain period of time must therefore be necessarily determined by the events which take place in the preceding period. Hence every event that takes place in time must be subject to the law of causality.

Kant has rejected the Humean view that our belief in the causal law is derived from experience. He says that if this view were correct every particular causal law as well as the general principle that every event must have a cause would be merely a contingent generalisation. No causal law would be universal and necessary. Since we attribute universality and necessity to the principle of causation — this principle cannot be merely an empirical generalisation. It must be an \textit{a priori} principle based on an \textit{a priori} category.

Causation is one of the twelve category imposed by the understanding on the materials of sense and that it corresponds to

\textsuperscript{13} Critique of Pure Reason (Every man's Library), p. 154.
the form of the hypothetical judgment as given in Logic, but has not explained the category in detail.

Now the question arises in our mind — Has Kant answered Hume? Hume has asserted that our belief in particular causal laws (e.g., "poison is the cause of death") as well as our belief in the universal operation of the causal law ("Every event has a cause") is derived from experience. Kant has shown as opposed to Hume that the second belief is a precondition of there being a systematic world of experience and is therefore *a priori* but has not been able to show that a belief in a particular causal law is *a priori*. He has also proved that our belief in the principle of universal causation ("Every event is causally determined") is necessarily valid but not that a particular causal law can be proved to be universally or necessarily valid, that is, valid for all time and under all circumstances we must say therefore that Kant refuted Hume with regard to the question of the origin and validity of our belief in the causal law only partially and not fully. Kant's argument for causality shows the need for recognising necessity in the succession of ideas. Hume himself had admitted this. Again Kant wants to, in answer to Hume, that in perceiving AB as an objective succession we must presuppose that they are elements in a causal order of succession. Kant's central argument for causality does not infer objectivity from necessity, but urges that objectivity (without which knowledge is impossible) has necessity for its consequence.

While Hume had maintained that we can never be conscious of anything but succession in objects, Kant contends that consciousness of succession is possible only through awareness of a
necessity that determines the order of successive events. This is his famous answer to Hume. As we know that in his earlier discussion, Hume did question the validity of the law of universal causation. But later on he came to recognise it as an article of "animal faith". Kant did not seriously try to explain the nature of the causal relation or causation, but merely sought to prove that causality is necessary and universal. The Inductive principle or the Principle of the Uniformity of Nature is far more important than the Law of Causality which is quite formal without the latter. When Hume asked, "Can we prove the Inductive Principle?" Kant replied, "Yes we can prove the Law of Causality."

B. Russell does not agree with Hume who considered the law of causality to be an instinctive belief grounded in human nature. Russell says that "it is thus the principle of induction rather than the law of causality which is the bottom of all inferences as to the existence of things not immediately given." For "with the principle of induction, all that is wanted for such inferences can be proved; without it, all such inferences are invalid." But inductive principle itself can never be proved or disproved by experience. Hume had already hinted at this but J.S. Mill thought he could prove it and only succeeded in arguing in a circle. The ground of induction cannot itself be the result of induction, and Russell concludes that the inductive principle, if true at all, "must be an absolutely logical law, 14.

15. Ibid.
not capable of being proved or disproved by experience."

Thus from the above we may say that induction is not a modern invention. Of course it is true that the practice of induction was not investigated in detail until modern times. Again all we know that scientific induction means the generalisation on the strength of a causal connection proved by experimental methods. So we may come to the conclusion that there is the importance of the principle of causality in induction and scientific investigation.

16. Ibid., pg. 225.