CHAPTER 1
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THE PROBLEM

One of the recurrent themes in the history of ideas has been to locate the position of man in the entire universe, that is, man's place and relationship with the surroundings. This constitutes the fundamental basis for an understanding - understanding of both the self and the non-self. One can roughly say that any understanding demands a kind of relationship between two generic entities - one is to be understood in terms of the other. In other words, a unique particular, unless it is subsumed under a generic type, can neither be understood nor can be used for an understanding. However, this is only a theoretical point of concern. Since any attempt at understanding begins only through a characterisation of an entity through language and use of language not only makes the entity public but also subsumes the entity under some generic type.
Plato taught us so. Knowledge can only be of universals. Bare particulars can never be an object of systematic study.

One of the roost important ways of understanding the happenings in nature is supposed to be through the causal terminology. Some, even, are of the opinion that proper scientific understanding must be a causal one. The problem of causality and that of causal relations have been intriguing problems throughout the history of philosophy. The notion of cause and that of causality plays a prominent role in the understanding of nature. The philosophy of nature, throughout the history of philosophy, has been much interested in an understanding of the nature of the causal relations. Causal relations display some interesting properties like irreflexivity and asymmetry.

The problem of 'causal asymmetry' has been
occupying a central stage in the arena of philosophical debate for the last few decades. Roughly, the problem of understanding the difference between causes and effects is the problem of 'causal asymmetry'. The difference between them seems obvious, but it is not so easy to state in any general and informative way what this difference is. It is usually believed that causal asymmetry is to be determined in terms of temporal asymmetry. But it is argued that the temporal asymmetry is not sufficient to characterize the causal asymmetry.

Many recent philosophers have pointed out that if any connection between cause and effect is granted, the connection must be accepted in both directions - from cause to effect and also effect to cause. The state of a particular thing (effect) at a particular time determines also its past states (cause). Thus just as we can infer future states
from the present states, we can also infer past states from the present ones. This however, points to the symmetry of explanation and prediction. That is to say that once the causal connection is established, we may move either backward or forward epistemologically. But what happens at the ontological level? However, this problem is not, satisfactorily resolved. The nature of time is also intricately related to the notion of causal asymmetry. By far, time may be considered either as a continuous or as a discontinuous medium.

what ever may be the nature of time, if the cause item is earlier than the effect item, then there must be something in between. Our problem is: how to understand the nature of this 'something'. If we accept that the direction of causation is necessitated both ways then we cannot avoid the absurdity that a stone in becoming heated makes the
sun shine upon it in the same way in which the shining sun makes the stone heated,

This absurdity is due to the lack of proper distinction between the generic causal links and the singular causal situations. At the generic level, the problem of causal asymmetry remains in the background, while in the singular causal situations it comes to a sharp focus and becomes unavoidable. This dissertation, is interested in finding answers to the questions; "what is and how to determine causal asymmetry ?" This may not be the final answer, this only an attempt. Nevertheless, it is a search for an answer in some plausible directions.
HISTORICAL BACKGROUND

Often one is pushed to an embarrassing corner by a series of "whats" from a child. The situation is further thickened by a barrage of "whys". These what-questions and why-questions stem from the child's spontaneous urge to locate his/her place amidst the bizarre surroundings upon which he/she opened his/her eyes. We feel embarrassed sometimes due to our ignorance and often our social stigma forbids us to reveal what we know. We usually try to satisfy the enquiring infant mind with an answer in terms of some human purpose often stipulating some spiritual agent. Nevertheless, these why-questions and what-questions form the most significant entrance to the garden of "science". Our primitive ancestors had to ask these questions to themselves and seek their answers on their own.

Human beings occupy both a marginal as well as a central position. Since the human species constitute only a small fragment of the total universe, one can
easily dismiss the human existence as insignificant and the place occupied by them as marginal. It may be true that absolute extinction of the human specie is not going to make any effective difference in the folding and unfolding of the universe. However, if the ultimate aim of "science" is to clarify the relationship that human beings have with the universe, they must be placed at the central niche in the universe. This tension-Marginality versus centrality—has resulted in the construction of different "models" at the different stages of human history for an understanding of both man and nature, self and other.

During the hunting stages of human civilization "Science" was limited only to observation and sporadic discoveries of some generalization of very elementary form. They are primarily concerned with what-questions. Here and there, through trial and error and mostly by chance, they stumbled upon some correlations between
events. The data so accumulated were used to be transmitted, through social memory, to the next generations. With the advancement of time, the Information content inflated, while people learnt to exploit land and sufficiently mastered the techniques of agriculture. As a consequence, society could generate surplus. During this transition of human society from hunting stages to agrarian one, first primitive attempts were made to find an order, to find a cosmos from the chaos. Host primitive world - views (Weltanschauung) were formulated.

The perceptible objects of the world presented to the naive primitive human beings either as similar or as dissimilar, as animate or as inanimate. Animate objects, like plants and beasts, were easy to understand. They all have a purpose, to live and go on living in their progeny, even at the cost of individual death and annihilation. Its purpose explains the
very being. The being makes sense only through the purpose it has. We have enormous evidence to this effect. Trees and beasts as objects of worship are too common among the early human societies. The inanimate objects, like rocks, mountains, rivers, the sky, the stars, the rains-around our primitive ancestor were also assumed to have purpose of their own, may be with some initial difficulty. The world's strangeness was thus resolved. The world became a home rather than a guest house. No inanimate objects could really exist, for such an existence would have been incomprehensible. In river's depths, on mountain tops, it was assumed, more subtle spirits pursue vaster and more impregnable design than the visible ones replicating beasts and human beings. In nature's forms and events, our ancestors saw action of forces either benign or hostile but never totally indifferent, never totally alien.

Such animistic beliefs consist essentially in a
projection of man's awareness of the intensively
telco-nomic functioning of his own nervous system
on-to the functioning of inanimate objects of nature.
It is the hypothesis that any phenomena, inducing
the natural ones, can and must be explained in the
same manner, by the same laws, as subjective human
activity-conscious and purposive. Primitive human
society formulated this animistic hypothesis with
complete candour, frankness and precision, populating
nature with gracious and awe-inspiring myths and
mythological figures which for centuries nourished
art and poetry and proved to be the recurring source
of inspiration for the development of culture.

Available historical documents point towards
the nappy coincidence of simultaneity regarding the
birth of philosophy in Greece, India and China,
Between the seventh and fifth centuries before the
Christian era, the three great traditions of philosophy
were set up under three different geographically
separated locations. However, it seems that despite geographical differences, all of them overtly advocated animistic beliefs in some form or other. Nature for them was characterised not merely by ceaseless motion and change but by an effort or tendency - a tendency to change in certain definite directions. Nature to them was not only constituted of ceaseless motion but by a beautiful design as a consequence of which there is order and regularity. They thought that nature is not only a huge animal with a body of its own but a rational animal with a mind of its own. This ancient philosophical view of nature was obviously based on an analogy between nature and the individual human being.

Human beings found that they have power to make things happen, they then see causation as a matter of powers in nature making things happen. With the advancement of human knowledge, the concept of

"causation" like any other concept has undergone changes in its meaning depending upon the "model" employed for understanding. To the Greeks, anything that provided an answer to the question beginning with the word 'why' is a cause. The Greek counterpart of our 'cause' is called aitia. The word aitia comes from the courts of law; it means culpability, responsibility, change, accusation and blame. 'To hold guilty', 'to accuse of a thing', 'to impute the fault to one' and 'to acquit of fault' - are Greek expressions using aitia. The Finish counterpart the word syy has exactly the same double meaning as that of aitia.²

Early Greek thinkers regarded cause as the world-stuff, that is, 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. The first explicit reference

to the law of causality occurs in Parmenides, who did not, however, regard it as the principle of change or becoming, but of being. It was Leucippus, who associated it with change which indeed is a case of causation. According to him, "nothing happens without a cause, everything has a cause and is necessary". Heracleitus claimed that all change is subject to law and thus enunciated the inductive principle which is a necessary supplement of the law of causation. Empedocles traced motion to moving forces and is therefore the father of the activity view of causation. Plato distinguished between various forms of causes but true causes in his view were logical entities devoid of motion. Aristotle said that the cause is always a compound containing four factors, each of which, may be considered, by itself, as a cause. He brought to focus the previous speculations on causation, and set forth the famous four-fold view of causation. These four causes are - material, formal, efficient, and final. Aristotle invented the four causes
to understand change and process in nature. The material cause is the matter from which something arises, e.g. the marble of which a statue is made. The formal cause is the shape, the form the statue receives. These 'internal' causes have as 'external' companions the efficient and the final cause, e.g. the sculptor who makes the statue and the likeness of the man represented by it. Nature her self is a cause in all four senses of the term or, rather, the nature being, in virtue of its matter, form, efficiency or finality. Aristotle also sowed the relation between the categories of substance and causation. According to him, the cause being a bottom of substance, is not static but efficient. Even the term efficient, for Aristotle, is not an event, but a substance, that is, the seat of power. In other words, the efficient cause of a new organism is not the event or act of generation but the parent which did the act, who performed the act. For centuries, thereafter, the Aristotelian theory of
causation was accepted as gospel truth and discussed with varying shades of emphasis on its different aspects.

First Galileo attacked the Aristotelian doctrine of four causes. He says\(^3\):

"...only that may properly be called the cause which is always followed by the effect..."

Thus it seems that Galileo has put forward a linguistic recommendation. He intends to narrow down the concept of 'cause'. The tendency to change in a definite way was supposed to be due to some external agency as opposed to the Greek view of nature as an intelligent being which, in itself, has the capacity to change in certain definite ways. The nature was supposed to be a huge machine - a machine in the proper and literal sense of the word - an arrangement of bodily

\(^3\) Quoted in Lyon, A-"Causality", The British Journal for the Philosophy of Science, Vol.28 (1968), pp. 1-20.
parts, designed and put together and set going. Bodies and objects in nature are immobile. They change their state due to some external force. Consequently, causal relations were supposed to hold between the states - between the successive states of a system.\(^4\)

The French mathematician, Laplace, identified the necessary relation between the states of a system with the causal relations - the present state of a system being the causal consequence of its preceding state and the cause of its subsequent state. He believed that the necessary relation between the states of a system is applicable not only to the universe as a whole but also to the finite system - any system that we can think of. According to this view, events follow each other with iron necessity - they are determined and even, in a way, preaeterninded. One and the same series of states of a system arise out of one and the same set of external

\(^4\) The term 'system' is to be used cautiously. Since the development of cybernetic systems, the notion of system has undergone change. For details see Blauberg, I.V., et.al - System. Theory, Progress Publishers Moscow, (1977).
conditions. The necessity between the cause and the effect, however, becomes even more iron clad when the phenomena described by it are more abstract. There is even the suggestion that there exists a single causal chain so that everything that happens at one moment in the universe is connected with what happens at the next moment. This view is also known as the Laplacean determinism after the name of one of the greatest champions of this view.

Coming down to the modern age we find Bacon offering a queer view of causality and exulting over the discovery of a new method for scientific inquiry into causes. Scientists like Galileo and Kepler spoke of causes as forces verified in the motions they generate. Quantitative determination come to be associated with the mathematical use of the causal relation. Descartes declared that the cause must be equal to or more than the effect in respect of "reality". Spinoza took up the geometrical method
in right earnest and reduced causation to the
timeless relation of ground and consequence.
Newton freely admitted "forces" as causes of all
motion. Hobbes looked askance at the notion of
force which is unobservable, and regarded causation
as a relation between motions or moving particles.
Leibnitz identified cause with spiritual energy
and re-introduced into causality purpose, which
was ignored by scientists ana condemned by spinoza.
Locke ana Berkeley, though subscribed to the
dynamic theory of causation, grew suspicious of
it at least in the sphere of physical things.
Hume subjected the popular view of his day to
merciless criticism and dismissed force or power
as an unobservable banished substance from both
the physical and the mental world, and reduced
the supposed objective necessity in the causal
relation to the subjective necessity of expectation
of regular sequence. According to Hume, causation
is nothing more than invariable sequence, and
therefore, the cause is merely the invariable antecedent and the effect is merely the invariable consequent. It is a matter of "custom" or "habit", according to Hume. All certainty vanished from the world of concrete existence.

By Hume's brilliant suggestion, Kant awoke from his "dogmatic slumber" and tried to give necessity a fresh lease of life by basing it on the category of substance supposed to be involved in all knowledge of objects. But the necessity that he could or would prove relates to the employment of the causal principle and, not to the nature of causal relation. Hume had traced the belief in causality to an animal faith and shown the causal relation to be a spatio-temporal contiguity between specific, objects. Kant tried to justify our belief in causality, but ignored the other point urged by Hume. He came to recognise, however, that causation is more than contiguity re-inforced by regularity; it is a continuity between two events which are spatio-temporal in character. Kant's successors did little
to clarify the idea of causation, and this remark applies equally to Fichte, Schelling, Hegel, Schopenhauer and others.

Mill reverted to the Humean tradition, but tried to do justice to the element of necessity by introducing it through the backdoor in the name of unconditionality. According to Mill, the cause is an "invariable unconditional antecedent". He means that group of conditions which without any further condition, is followed by the event in question. But it (the concept of unconditionally) leads us to widen everything as cause into the whole state of the universe at a particular moment, when properly understood. Thus in practice Kill forgot his definition of cause as the unconditional antecedent, and based his inductive methods on the invariable character of the causal relation. But Russell pointed out that a causal law should be regarded as almost unvarying, for otherwise
the cause should embrace a state of the universe and become useless for both scientific and practical purposes. He declared that "the law of causality, like much that passes muster among philosophers, is a relic of a bygone age, surviving, like monarchy, only because it is erroneously supposed to do harm".

Scientific method itself is not absolute and it changes with science. Similarly our theory of causation is chancing with the progress of science. The progress in science meant triumph for mechanistic world-view and the mechanistic method came to be hailed as the only scientific method. The mechanistic philosophy of nature which started out with such brilliant prospects during the time of Newton, ran into a series of difficult problems. Even during the greatest triumphs of the mechanistic philosophy of nature, physics began to develop in new directions tending to lead away from the general conceptual framework that had been associated with the mechanistic philosophy. The most important of these developments were the formulations
of the basic laws of electro-magnetic field, the elaboration of the Kinetic theory of gases and the initiation of the statistical laws of thermodynamics and other microscopic properties of matter. Although none of these developments stood in complete contradiction with them mechanistic point of view, each of them showed the need of progressive enrichment of the basic concepts which were required for expressing the lows of nature as a whole. Physicists made various adjustments, compromises and extensions of their concepts to accommodate their finding, within the general conceptual framework of the mechanistic philosophy. The essential characteristic, however, remained very much the same. The assumption is that at least in, everything would finally be reducible, completely and perfectly, to an ultimate set of purely quantitative laws, involving perhaps mass points alone, perhaps mass points and fields, perhaps fields alone, was retained. The various qualitative changes occurring in matter as well as the existence of various levels would one day be seen
to be merely a result that follows perfectly and completely from the fundamental quantitative laws. A proper algorithm can and must be found in order to explicate the functioning of nature.

The problem of causality was discussed, specially with keen interest, after the advent of quantum physics. Eminent quantum physicists like Neils Bohr, Werner Heisenbery, Max Born and many others, demonstrated that, generally speaking, it is impossible to give an unambiguous account of the behaviour of the individual micro entities within the framework of mechanistic philosophy of nature. Heisenberg's principle of Indeterminacy expresses the fact that we cannot determine with equal accuracy both the position and the velocity of a planetary electron at any moment. Some thinkers think that this limitation is logical; while some others think, this limitation is to be a consequence of the interaction between the observer and the phenomena.


Gradually, however, quantum physics has established its place, though grumbling of discontent can still be heard. It was difficult to conceive the universal causal chain breaking to pieces where it was the central core of scientific enquiry for some four hundred years. Nevertheless, the link of the causal chain had to be cut in the light of modern scientific discoveries. After all, nature could not be described as a rigid mechanism of cause and effect.

With the advent of quantum physics the very foundation of the Leplacean determinism was shaken. In the light of quantum physics, it was difficult to see how the very assumptions of the Laplacean determinism could be retained. A host of philosophers and scientists alike exerted their brains on the nature of causality. There was a strong objection by many to the results concerning the uncertainty principle which seemed to be the central thesis of quantum physics. Some philosophers of our time even tried to dispense with

the very idea of causality as it is loaded with metaphysical flavour.\(^8\) Russell suggests that the causal notions are the concepts of a "bygone era" and are in the process of being replaced by the notion of function.\(^9\) Causal notion seemed to him, to be absent from the advanced disciplines of theoretical sciences. But the idea of cause-effect has taken a very powerful hold of our minds. Even when we are thinking through scientific problems with conscious care, we fall back on it at every turn. This has become our natural way of looking at all problems. The Greek idea of a rational universe, of cosmos, is still within us, causal explanations still occupy a high niche in the temple of scientific enquiry.

we all are familiar with the word 'cause' and its allied terms like 'produce', 'generate', 'to bring about' etc. These causal terms imply an interference of an active agent with a system. The system then experiences the


effect. In nature nearly everything that happens is the outcome of a multiplicity of influences bearing upon a complex of causal mechanisms. Causes always are against more or less permanent background conditions. Causes are operative in a causal field. Scientists are concerned with the discovery and description of the causal mechanisms which must stand the test of experiments. In an experiment a typical procedure requires the stabilization of the conditions and changing of only one of the relevant factors. The concept of 'cause' is intrinsically related with the experimental aspect of science. Experiments are always designed on the basis of causal principles. That is one of the reasons why we still find the concept of cause being so frequently used in the applied branches of science like engineering end medicine.

Causal statements perform many functions.11 Sometimes the causal statements are used as an explanation of some


phenomena while sometimes predictions are made on the basis of causal principles. Some are of the opinion that 'explanation' and 'prediction' are structurally similar processes of scientific enquiry, differing only in the time perspective."\textsuperscript{12} - other things being equal, if one derives a description of an event prior to its occurrence, the event has been \textit{predicted} while if the description of the event has been derived after the event has taken place, the occurrence of the event has been \textit{explained}. The alleged symmetry between 'explanation' and 'prediction' holds pretty well so far as the \textit{deductive} \textit{momelogical} model (DR-Model) of explanation is applicable. By a DN-Model of explanation,\textsuperscript{13} we shall understand that to explain an event, a set of law statements are taken into consideration such that the event in question is related with another event in terms of the law statements. According to Hemple, a full


\textsuperscript{13} The name 'DN-Model' of explanation was coined by one of the critics of theory Dray, W.H. Laws and explanation in \textbf{History}, Oxford. (1957) .
statement of the explanation will have the following form:

1) Whenever events of the type A occur, events of the type B occur. (Statement of law).

   ii) A occurred (statement of fact).

Therefore, B occurred (statement of event for which explanation is sought).

We can put this more formally. Let there be an event e which demands an explanation. To explain the event e, we refer to another event, say d. That is, we explain the event e by referring to the event d, i.e. e because d'. This is possible only when there is a set of true law statements, like 'L_1, L_2 ... etc.' such that the conjunction of the law statements with the description of the event d entails the description of the event e. It was noted that the deductive-nomological model of explanation was originally thought of as a generalization of the ideas associated with causal
explanations. One should not confuse between causal analysis and causal explanation, causal explanations are different from the causal analysis or the analysis of causality. Causal analysis is concerned with the discovery of condition relationships among the states of affairs within a given system. In any causal explanation, an individual event is given and we try to construct an appropriate system in terms of which we are able to relate the given event with some other event or a set of events.

There is a large list or important philosophical issues that circle round the problem of causality. Any adequate analysis of any one of them should take some stand on every other issue. However, this thesis, due to want of space, would confine its attention only to the problem of causal asymmetry and would take a somewhat dogmatic stand on the other issues like ontological framework, semantical framework, causes and conditions, counter actual Dependence, etc., in the next chapter.