

**CHAPTER IV**

**LOGICAL VIEW OF CAUSALITY**

## LOGICAL VIEWS OF CAUSALITY

Traditional logicians have recognised the concept of causality. A cause has traditionally been thought of as that which produces something and in terms of which that which is produced, its effect can be explained.

Even at a time when the text of Aristotle was almost or entirely unknown, the general outline of his scheme of causes persisted in tradition. Cause has a wider sense for Aristotle than it has for us to-day. The cause of a genesis or of any other change requires for Aristotle a two-fold analysis — first, a correct analysis of the process of change itself, and second, the identification of the source or sources of the change. Virtually the same account of the doctrine of "the four causes" is found in his Physics and Metaphysics. Two 'causes' have already been identified in the account of substrate and privation. These are matter and form. Two more must be added, the efficient cause and the final cause. All four can be separately identified in Plato's writings, but they do not form a system as they do for Aristotle. Thus Aristotle can actually criticize Plato for operating only with the formal and material causes, just as he criticized most of the pre-socratics for employing only the material cause, although he recognized the emergence of efficient causes in Empedocle's Love and Strife.

In his Philebus Plato has discussed causation somewhat elaborately. He divides all things into four classes, viz., the Infinite or unlimited, the finite or limited, the mixed or the union of the two, and the cause of the union. (Sec. 23). Plato emphasises the dynamic aspect of the causal relation. The cause

is the force, power or agent that produces the effect. This is the efficient cause of Aristotle. David Hume grants that at least according to common notions, the concepts of POWER, FORCE, ENERGY or necessary connection etc. are fundamental for causation. Yet he restores that there are no ideals, which occur in metaphysics, than those of power, force, energy or necessary connection.

Plato insists no less on what Aristotle calls the final cause. We may say that Plato's account of causation is not particularly illuminating. Sometimes he speaks of the cause as a Being or Form, sometimes as a force or power and at other times as an end or purpose. Perhaps he means by this the combination of all these ideas. But it is difficult to combine these ideas for getting a clear and consistent picture of the cause.

It will be seen that in Plato we meet with the counterparts of the Aristotelian formal, efficient and final causes. But there is no mention of the material cause and that for obvious reasons. The Platonic cause then is said to be a changeless, logical entity which may be characterised as a ground, or a substance in the old sense of the term.

Aristotle drawing upon the traditions of his predecessors, distinguished four quite different kinds of causes or explanatory principles. These he called the 'efficient' cause (cause quod), or that by which some change is wrought, the 'final' cause (causa ut) or end or purpose for which a change is produced; the 'material' cause, or that in which a change is wrought; and the 'formal' cause, or that into which something is changed. Thus, for example, a statue is produced by a sculptor (its efficient

cause) by his imposing changes upon a piece of marble (its material cause) for the purpose of possessing a beautiful object (its final cause), the marble thereby acquiring the form, or distinctive properties, of a statue (its formal cause).

The concepts of material and formal causes are archaic and now have little significance outside aesthetic. Final causes have likewise long since been expurgated from physics.

For Aristotle, to know is to know by means of causes, and it is clear that the four Aristotelian causes are necessary elements in things which must be known or understood if full understanding is to be reached, rather than causes in the modern sense. It might seem at first that two of the causes, matter and form, are sited within the object to be explained, and two outside, the efficient and the final causes. This would misrepresent Aristotle's views in two ways. First, it is strictly speaking, not the object, but the process of change by which it comes into existence, that the doctrine of the four causes is intended to explain. Second, Aristotle tells us that in many cases the formal, final and efficient causes ~~are~~ coincide. In the case of living creatures, the form of an object may also be that at which nature was aiming when the object was produced, and in the case of an architect the final cause may be the form as known by the artist or manufacturer. In this last case the formal may be the efficient as well, in that the form as present in the artist's mind and desired by him in the object is the true source of the process of change that results. When applied to objects of different kinds, the doctrine of the four causes is capable of

considerable elaboration and subtlety.

The final cause, says Aristotle, is that for the sake of which the action takes place, as for example it may be for the sake of health that a man takes a walk. Within the restricted field of intelligent action it is easy to see that the object of conscious purpose verifies the notion of final cause. But Aristotle affirms the presence of an end in all causation; his teleology is universal.

This universal teleology is of course a teleology without conscious purpose or deliberation. To refuse to admit such a conception, Aristotle tells us is absurd. It is not, however, too easy to seize its precise meaning.

The efficient cause is described by Aristotle as that which first sets the change going or brings it to rest. Later it is remarked that the efficient cause is often specifically identical with the formal cause, and therefore with the final cause as well. The relation of the material cause to the efficient cause in Aristotle's scheme is not easy to determine precisely. The real problem arises when we take cause in the sense of total determining antecedent and ask what precisely is the relation of cause to effect. Speaking of the efficient cause, Aristotle describes its agency on different occasions by various verbs. The cause produces the effect — and what, Hume will ask, is meant by production? Production does not explain itself but asks for an analysis.

From any point of view this must be the fundamental problem of causality. An antecedent, or set of antecedents, produces a consequent, or set of consequents. The cause necessitates the

effect. What is necessitation ? What sort of necessitation is causation ? How do we come to know instances of it ? These are the questions which came under the disruptive analysis of Hume.

Aristotle's causal theory is of fundamental importance, because it contains all the elements of a common-sense view of causality.

The Aristotelian way of thinking about causality became part of the common stock of European thought. The real attack on causality was to come from the empiricists, whose attitude is in fundamental opposition to that Aristotelian intellectualism which finds typical expression in its causal theory.

Locke maintains that we derive a clear notion of active power from the introspection of our volitions, and, although he is excessively obscure in his account of the apprehension of causal relations in the external world. For Berkeley, since matter has no reality except within mind, real activity can be exercised only by minds, but he does not criticize the general conception of cause. It was reserved for Hume to take this step.

Francis 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 inductive methods is to discover the 'forms' or 'formal causes' of things. He assumes the Aristotelian distinction of material, formal, efficient and final causes, but regards the formal cause alone as giving the real nature of a thing. The knowledge of 'forms' or formal causes not only give us the true knowledge of things but also power over nature.

Bacon, however, does not give us a precise definition of 'form'. In Aristotelian philosophy the 'form' of a thing means its definition, its essence. If we suppose that Bacon uses the term in the same sense it is difficult to understand how the knowledge of the essence of a thing can give us that power to produce it, which is regarded by him as the very end and aim of the scientific method. Bacon maintains that the objects of scientific investigation is to find out the form of the simple quality or nature of a thing. It is however, not clear, as to how Bacon distinguishes between a form and that of which it is the form. But we may also note here that Bacon takes a wrong view on causation. He looks upon causation as static and not as dynamic, that is, he thinks that a thing can be a cause simply by existing, whereas the true doctrine is that a thing can be a cause only if it acts.

Benedictus de Spinoza has maintained that every finite phenomenon is caused by another finite phenomenon which <sup>in</sup> its turn is caused by another and so on to infinity. The causal chain in the phenomenal world is endless, there is no first or ultimate cause among the finite modes. The relation of cause and effect is in fact transformed by Spinoza into the relation of ground and consequent and the world is exhibited as a system of static laws derived from certain primary principles.

Thomas Reid regards the principle of causality as a truth not derived from experience or reasoning but immediate and self-evident.<sup>1</sup> The notion of efficiency will be reduced to this, that it

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1. Cf. Essays on the Intellectual Powers of Man Essay, VI, Ch.6.

is a relation between the cause and the effect, similar to that which is between us and our voluntary actions.<sup>2</sup> Hence he thinks it probable that only beings endowed with understanding and will possess active power.

The central defect of Reid's account, however, is that, although he vindicates the reality and objectivity of the notion of active power, he offers no alternative analysis of it in answer to that of Hume. Mere assertion is not a sufficient reply to Hume's dissection. An alternative method of justifying the notion of causality lies in admitting with Hume that it cannot be got out of the data of sense-experience, but regarding it as an importation on the part of the subject. This of course is Kant's solution. He agrees with Hume that the concepts and principles essential to an intelligible experience cannot be found in the given of experience, but justifies them as necessary presuppositions of knowledge provided by the subject. Thus the notion and principle of causality are indispensable presuppositions of an objective time-order of events in experience.

Thomas Brown, who is an interesting link in the chain between Hume and Mill, admits that experience presents us only with particular instances of temporal succession. But he invokes the principle of the uniformity of nature, which he regards as intuitively certain, and by means of which it is possible to generalise from any sequence of events that the same sequence will recur in the same circumstances.<sup>3</sup> The principle of causality

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2. Essays on the active powers of Man - Reid 1, Ch. 5.

3. Cf. Inquiry into the Relation cause and effect Part III, Sec. 5 — Thomas Brown (1778-1820).

is also intuitively certain. Unfortunately it is not at all clear what Brown means by intrition. Sometimes he seems to regard intrition as merely an irresistible feeling of belief by his declaring Hume's avowal of the psychological necessity of belief in causal laws to be sufficient for his purpose, and blaming Reid for denying that Hume's theory yields any adequate conception of power. On the other hand, he certainly regards causal laws as objectively true and so it would appear that the intuitive principles on which he asserts them to be founded must be objectively evident. But he clearly distinguishes between subjective necessity of belief and objective necessity of self-evidence.

Brown's theory is muddled and incoherent, but he does at least realize that the universal validity of causal laws demands some knowledge which is not merely experience of particulars as such. In this at any rate he has the advantage over J.S. Mill. 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 cause of a phenomenon to be the antecedent, or the concurrence of antecedents, on which it is invariably and unconditionally consequent."<sup>4</sup> 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

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4. *Logic* - Book III, Ch. V §6. — J.S. Mill, Pg. 222

accompanied by B, in 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 not the slightest ground for inferring anything invariable or unconditional.

John Stuart Mill, following Thomas Reid, distinguished efficient causes from what he called "physical" causes, delimiting the former to the causation of a voluntary act by an agent, but he considered the concept of an efficient cause, as thus conceived, to be esoteric — capable of being confirmed only by oneself.

To assert that causation is universal is to assert 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 relations 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, J.S. 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.

J.S. Mill maintained that universality of causation is "coextensive with human experience". 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 to exist or inferred from other causal connection that men have experienced, but they are not experienced.

It seemed to Hume and to J.S. Mill, too, 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 things similar to A are always immediately followed by things similar to B. Mill added the qualification that the two must be "unconditionally" 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 causal relationship.

Many modern philosophers, seeking, like Hume and Mill to analyze the causal relation within a framework of empiricism,

have sought to avoid the foregoing difficulties by appealing to the concept of a law. There is, obviously, a close connection between statements expressing causal connections and those expressing laws of nature, and it is therefore natural to suppose that the former might be explained in terms of the latter.

Laws of Nature were once commonly thought of as necessary or inviolable principles. The formulation of such laws would thus be statements of what must invariably happen, and ordinary people still tend to think of natural laws in this way, as in some sense governing nature.

Of course, it would not be difficult to analyze the causal relation in terms of this conception of a law of nature. One could simply say that a statement of the form "A was the cause of B" means that both A and B occurred and that there is a law of nature according to which, or from which it can be deduced, that whenever A occurs, B must occur also.

Such a conception of causation is considered quite worthless by empiricists and scientists generally, however, for it is obvious that it preserves the very notion of a necessary connection between cause and effect which Hume sought to avoid.

To think of laws of nature as inviolable principles concerning what must happen is simply another way of saying that the things related by those laws are connected by a kind of necessity.

Some philosophers, such as Mill, Mc Taggart, and Russell, endeavour to defend the view that laws of nature are in no

sense inviolable rules but, rather, are mere uniformities expressed statements of what does, as a matter of fact, invariably happen.

Again Mill has introduced the qualification of unconditionality. In order for certain changes or states to be causally connected, it is not enough, Mill said, that they should be invariably conjoined under all imaginable as well as all actual circumstances.

It is evident that with this qualification the fundamental point of the empirical analysis has been abandoned. "Under all imaginable circumstances" obviously means under all circumstance, both actual and possible. Worse than that, it was one of Hume's main arguments. Purporting to show that there is no necessary connection between causes and their effect, that we can always perfectly easily imagine that those de facto sequences that we have discovered should be quite different. The introduction of Mill's unconditionality has the result that there is no such thing as a causal connection, that no changes or states are very causally related; we can always imagine circumstances in which the one occurs and the other does not, which is enough, in Mill's terms, to show that they are not unconditionally conjoined.

J.S. Mill maintained that many events are such that they can be produced in a variety of ways. A match can be ignited by friction but also by being heated, and perhaps in other ways, too. There is some sense in which this claim is obviously true, and it presents a difficulty for defining causes and effects in terms of necessary and sufficient conditions.

David Hume, unlike such writers as J.S. Mill, was not satisfied to analyze the notion of cause and effect into the notions of spatial contiguity, temporal succession and joint occurrence; he fatefully added to these the criterion "necessary connection", and that relation is of much greater importance than any of the other two above mentioned.

Hume has maintained that whenever we find one event following another particular prior event in a uniform manner an association between the ideas of the two events grows up in our mind and we get into the habit of believing that whenever a particular antecedent occurs a particular consequent will follow. We infer necessary connection because we are accustomed to see certain objects uniformly following others in our experience. But we have no real warrant for this inference. We do not infer from cause to effect because we believe that there is necessary connection between them. Hume holds that necessary connection is not an affair of the reason but of imagination. We cannot derive the effect from a cause by any a priori reasoning. Necessity cannot be derived by reason from such a principle as the uniformity of nature, for this principle also is just the effect of custom when taken in its full universality. Hume says, "objects have no discoverable connection together, nor is it from any other principle but custom that we can draw any inference from the appearance of the one to the existence of the other." A cause should therefore be defined as any phenomenon which has been repeatedly observed by us to be followed by another phenomenon.

It is indeed generally recognized today that it is impossible to build on Hume's foundation any but a sceptical theory of causality, that is to say, one which justifies very much less than our common beliefs on the subject. It is clear enough, therefore that, if we are forced to embrace Hume it will be Hume with scepticism. So it is not a matter for surprise that some thinkers have shown a desire to dispense with the notion of cause altogether. This has been a fairly constant attitude of Mr. Bertrand Russell, who declares that "the word "cause" is so inextricably bound up with misleading associations as to make its complete extrusion from the philosophical vocabulary desirable."<sup>5</sup>

A causal law is not necessary in the sense that it has no exceptions. By a "causal law" Russell means "any general proposition in virtue of which it is possible to infer the existence of one thing or event from the existence of another or of a number of others".<sup>6</sup> This is in complete agreement with Hume who also regarded the causal law as a rule of inference. The cause and the effect need not be and usually are not similar to one another.

The supposed lack of symmetry between cause and effect is illusory. This symmetry or sameness does not mean that the same cause and effect are repeated. There is no question of repetitions of the 'same' cause producing the 'same' effect.

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5. *Mysticism and Logic* - B. Russell, Pg. 180

6. *Our knowledge of the external world* - Pg. 216

- Bertrand Russell.

The law of causality stated in the form "every event has a cause" appears far too simple, and is really unintelligible without a clear conception of what a cause is. It is thus the principle of induction rather than the law of causality which is at 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."<sup>7</sup> But the inductive principle itself cannot be proved or disproved by experience. Hume had already hinted at this, but 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 maintains that the inductive principle, if true at all, "must be an a priori logical law, not capable of being proved or disproved by experience."<sup>8</sup> Russell has denied Hume who had regarded the causal relation as one involved in the inference of the existence of absent objects. We may infer the effect from the cause as also the cause from the effect, but this does not mean that the cause may occur either before or after the effect.

The mark of causation for Russell is the same as that for Hume and Mill, viz., unvarying succession, and this in spite of his contention that the effect in some cases precede the effect. Again both Hume and Russell regard cause and effect as contiguous in time. But if it is so, there would be some grounds for denying that there can be any causal laws. For contiguity does

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7. Ibid., Pg. 226

8. Our knowledge of the external world, Pg. 225

not involve continuity. Hume also would not and could not speak of time series as continuous. Unlike Hume, Buddhism in Indian thought speaks of the continuity of the world. The law of universal causation, with its corollary of the eternal continuity of becoming, is the chief contribution of Buddhism. Existence is transformation. All things undergo the changes indicated in *utpāda* (origination), *sṭhiti* (staying), *jarā* (growth), and *norodha* (destruction).

Bradley regards the causal relation as illusory, because it is self-contradictory. For cause and effect, he urges, must be, and yet cannot be, continuous with one another. Bradley's thesis assumes that the cause forces the effect to happen as soon as it is strong enough to do. Bradley says that causation can never be causative. Cause can never be continuous with effect, for in that case the marking out of the cause from the effect becomes impossible. Nor can the cause be discontinuous with the effect, for then the cause has to depend on something else to enable it to produce the effect. But if this third something is sought to make the cause causative, this will also necessitate a fourth something and so on ad infinitum. So cause can neither be continuous nor discontinuous which is a contradiction. But Bradley's difficulty is his own creation. Causality is no doubt a relation, but if we treat it as a term, then we are bound to land in an infinite regress. But as Stebbing very beautifully suggests, we have here not two terms and a relation but only two terms in a relation

Miss Stebbing points out that mere spatio-temporal continuity cannot amount to causation unless it involves a reference to "continuity of change of character of the events" related as cause and effect."<sup>9</sup>

Prof. L.S. Stebbing also speaks of qualitative laws of causal relation between substantive things in defined states to quantitative laws of functional dependence, but she recognizes that each are appropriate to different regions of fact and that the same logical difficulties attach to the establishment of laws of functional variation as to causal laws.<sup>10</sup>

Again H.W.B. Joseph says that "the causal relation which connects A with X connects a cause of the nature A with an effect of the nature X."<sup>11</sup> Hence he maintains that the inductive principle is a consequence of the Law of Identity which declares that A is A. The same cause must always give rise to the same effect, for "it could only act differently if it were different."

In contrast with the currents of thought derived from Hume, there have been many efforts in recent years to return to a common-sense view of causality. For Prof. Whitehead, both in his lectures on Symbolism and in Process and Reality, the mode of causal efficacy is as primitive an element in experience as the mode of presentational immediacy.

From the above discussion it is also appeared that the analysis of the meaning of 'causality' is a most difficult task. The

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9. A Modern Introduction to Logic, Pg. 284 - Stebbing

10. Ibid (esp. Ch. XV, §6; Ch. XVIII, §2; Ch. XIX §1)

11. An Introduction to Logic, Pg. 409 - Joseph.

logician cannot enter upon it, as it is not a task for them. But we must observe that various kinds of order are sometimes confounded as identical with the causal order. Modern logicians have ignored this problem. Only the traditional logicians have discussed this problem.

There is a type of order so familiar that it generally escapes notice. All of us recognise certain things as water, wood etc. why do we signify special names like these? The vague concept of 'thing' denotes, a very elementary type of order. The discovery of this kind of order is fundamental for the discovery of any other kind of physical order.

A type of order frequently recognized is one involving a temporal span or direction. "Iron rusts in moist air" is a kind of order that is generally regarded as causal. The moist air is said to be the cause, of which the rusting iron is the effect. The moist air is said to be the cause because it is believed to produce the rusting.

It is very difficult to make clear what is understood by causes "producing" their effects. When we reflect on the matter, all that we seem capable of discovering in alleged instances of causality, is an instance of an invariable relation between two or more processes. One of the characteristics of the causal relation as generally understood is that it is asymmetrical and temporal in nature.

But common-sense recognizes that the apparent invariability of alleged causal relations is often specious. Iron does not

always rust in moist air. Other factors must be present in these situations. These other factors are then seemed to be necessary for the occurrence of the effects.

There are many uniformities which are expressible by numerical equations. Invariable relations of this type no longer assert a sequence in time, and they are probably never regarded as illustrations of causal order.

Again another type of order is illustrated in such comprehensive theories as the theory of gravitation, or the kinetic theory of matter. In <sup>such</sup> theories, the elements between which the invariable relations are asserted to hold are not directly observable. They are also not confirmable by direct experiment.

The function of such comprehensive theories is that they enable us to show that many numerical as well as qualitative laws which are experimentally confirmable are not isolated from one another. Such laws can often be shown to be the necessary consequences of the more abstract and inclusive order asserted in the theory. Thus the numerical relations between temperature, the volume; the numerical laws connecting the density and the specific heat of gases; the relations between melting point, pressure, volume of solids — these are all derivable by logical methods from the assumptions of the kinetic theory of matter.

If we examine these types of order, we discover that a generic feature of all of them is the assertion of some kind of invariable relation between various kinds of elements.

By the cause of some effect we shall understand, therefore, some appropriate factor invariably related to the effect. If X has fever at time Y is an effect, we shall understand by its cause a certain change A. If A takes place, then X will have fever at time Y, and if A does not take place, then X will not have fever at time Y; and this is true for all values of X, A, and Y, when X is an individual of a certain type, A an event of a certain type, and Y the time.

The search for "causes" may therefore be understood as a search for some invariable order between various sorts of elements or factors. The specific nature of this order will vary with the nature of the subject matter and the purpose of the inquiry. Again, the specific nature of the elements between which the order is sought will also differ for different inquiries. In some cases we already know the invariable order and some of the elements, and then our search is for one or more further elements. In other cases, we may know the elements and search for an invariable order between them.

In the light of these kinds of specific orders and factors which may be the objects of an inquiry, it may seem to believe that any general rules can be stated which will enable us to find satisfactory answers to all possible problems.