Causality

HUL256 Critical Thinking

Term Paper

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Introduction

For doing a "critical" analysis of any problem statement, it is necessary to analyze it from all perspectives, from all angles. One of the most fundamental questions to address in doing so is "what *causes* it?" It is here that one talks of **Causality**, a very old and mysterious philosophical subject.

However, Causality is very different from other discourses in philosophy in it being much more than an "arm-chair science". It is often used science and mathematics, where scientists look for the cause-effect pairs and trace the causal event chain of phenomenon to completely explain the world around us. To talk of causality in science is just to use it as a tool to explain other "larger" physical phenomenon. However, within philosophy causality itself comes under the "microscope of reason".

I have written this paper to explore the various domains in which causality finds its significance, both as an entity in itself and the role it plays out in other theories like Cartesian dualism, Libertarianism, etc.

I start by discussing the metaphysics of causation, their reality and necessary and sufficient conditions that are taken for granted. This is followed by a critical analysis of the role played by causation in various other theories.

For convenience I have used the first few capital English letters to abbreviate arbitrary events. (A,B) represents the causal relation between the cause A and effect B, both events.

Definition

The idea and essence of causality are generally accepted and well understood. To talk of causality, is to talk of a certain kind of a *relationship* between two or more *events*. Though this relationship can vary in its nature, it is commonly understood to be between any two events that happen in succession relative to a unique space-time. The first event is called a *cause*, while the second is called its *effect*.

Types of causes

There are many ways to classify causes. Aristotle's four causes have been discussed as a separate topic. The most commonly used classification is:

- <u>Necessary</u>: x is a necessary cause of y, when non-occurrence of x will always mean nonoccurrence of y. Hence, y needs x to happen, and in this happening get caused by it. However, occurring of x may not ensure y.
- <u>Sufficient</u>: x is sufficient for y to happen. However, if indeed y has happened, it may have happened due to other causes and not x in particular.

The Reality and Nature of this Relationship

The only way to test the reality of any theory or idea is to experience it happening in the physical world around us. Causal pairs i.e. cause-effect event pairs can be found in abundance in the world around us. However, in most cases we would find that attributing a valid reason as to why they qualify as causal pairs is difficult to find, if not impossible.

Take the case of a boy clapping his hands. Rational thought employs us to agree that it is the collision between his two hands that causes the sound of the clap. Hence we are driven to believe that the joining of the hands causes the sound. However, what convinces us of the reality of this causation? With an objective view, we are merely looking at two independent events happen in perfect synchronization over and over again. Is mere synchronization in space and time enough to

prove a real causation from an illusion? I feel that we must attribute a stronger pre-requisite for events to become causally related. This relation must at least follow the following rules:

- Symmetric. If event A causes event B, then B is caused by A.
- Reflexive. All events in space time are trivially caused by themselves.
- Transitive. If (A,B) and (B,C) then (A,C).
- Connection. Cause and Effect events should be connected (within each other's field of influence) or must be causally connected by intermediate events.
- Direction. Time, forking, over determination or some other factor.

Aristotle's four causes

Aristotle, one of the greatest thinkers of all times, viewed causality as a means to attach more information to events by answering the question "Why?" This question was put in 4 contexts popularly known as Aristotle's four causes. They are:

- **Material Cause:** describes the material out of which something is composed, it is the substance which can potentially become a particular type of thing
- **Formal Cause:** a term describing the pattern or form which when present makes substance into a particular type of thing, which we recognize as being of that particular type.
- Efficient Cause: the thing that brings something about.
- Final Cause: defined as the purpose, end, aim, or goal of something.

Aristotle believed that knowledge was true and real only when one had the proper knowledge of the cause i.e. the knowledge of why. Since Aristotle obviously conceives of a causal investigation as the search for an answer to the question "why?", and a why-question is a request for an explanation, it can be useful to think of a cause as a certain type of explanation.

Modern philosophers view causes in natural science to be of either the Efficient or Material category. The four types of causes are useful to explain causes appearing in discussions as diverse as mind-body and human nature to free will.

Leibnitz on Causality: Pre-established Harmony

Leibniz's account of causation was in terms of his famous doctrine of the pre-established harmony. This doctrine contains three main postulates:

- (1) No state of a created substance has as a real cause some state of another created substance
- (2) Every non-initial, non-miraculous, state of a created substance has as a real cause some previous state of that very substance
- (3) Each created substance is programmed at creation such that all its natural states and actions are carried out in conformity with—in *pre-established harmony* with—all the natural states and actions of every other created substance.

Hence one can clearly see that Leibnitz was convinced that causality in its ultimate sense was not a real entity. He was a proponent of the idea of pre-programmed beings, that every individual was a mere actor acting out his/her script. All events happening in space-time are supposed to happen that way and have no relation whatsoever between them. Hence, they are mere synchronized occurrences without being cause-effect pairs. This idea reinforces the deterministic school of thought and tries to defeat the idea of free will. If we are to act the way we are programmed to, there is no question of us causing something and hence no will of our own.

Other theories: Physical Influx and Occasionalism

The theory of physical influx or influence claims a physical "movement" of material from cause to effect. Hence, it strengthens the relationship between cause-effect pairs in it being like a transport mechanism to shift some of the properties of the cause to the effect. Infact, it even hints at the idea that the effect is created in-situ due to the properties transported by the cause. Hence there is a heavy dependence of the cause, which isn't fixed on the corresponding effect. Though the same event as an effect can have multiple causes, each causes leads to a different nature of the same event.

According to occasionalism, God is the only truly causally efficacious being in the universe. This theory presupposes the existence of God to explain that the various causal interactions in the universe. Though, cause-effect pairs are abundant in the world, the reason why they are cause-effect rather than merely synchronized events can only be explained by God. God alone can set what events are causally related.

Leibnitz had firmly refuted both of these theories at that time, in hope of a unified theory of causal binding. We are playing out a chain of causal events but have no role to play in moving from one state to another, be it a mental or a physical state. Starting from an arbitrary position, the universe has been determined causally.

The cause and it's agency to cause

While talking of a cause of an event, the cause is attributed the role of a doer in the sentence. Hence, there is an inevitable question of whether the cause which is merely an event, has the agency to bring about the change which is the event seen as the effect. If such an agency can't be attached to this particular event, then it fails to be a true cause and hence we need to look further.

For example, if I pour water on a piece of paper, it gets wet. We would say that the event of pouring water has caused the paper to get wet. However, isn't it the disposition of paper to get wet in the first place which even allows for such causation? Shouldn't we incorporate this property of paper as one of the causes? Infact, water didn't fall spontaneously on the paper. Since I poured it, shouldn't I be part of the causal chain?

Causality and time

There is an inherent notion of time while talking of causality. According to Sowa(2000), "Antecedence postulates that the cause must be prior to, or at least simultaneous with, the effect". Hence, cause-effects must be separated as events in space-time and in some sense a cause happens *before* the corresponding effect. While looking for a cause of an effect, it is necessary to clearly define the time after which we are looking for the causes leading up to the effect itself.

Different events have very different causes. However, looking at the bigger picture, *everything* was caused by the Big Bang. Hence, considering different times, we get different events as the causes. Adjusting the time is analogous to adjusting the resolution of description of the cause. The farther back it is, the more generic and somewhat irrelevant.

For example, consider the case of a ceiling fan circulating air in a room. It is due to the mechanical movement of the fan blades that air circulates throughout. However, there existed a time in the past when the fan was not moving. It started moving only when electricity started to flow through it. Hence only the flow of electricity could have caused the air circulation in the room in a more ultimate sense. This causal chain can be extended in the reverse direction.

Hence to talk of a cause, is to talk of a cause at time t, considering everything that this cause will do up to the actual result (effect) in question happens.

Circular causation and the endless loop

The chicken and the egg argument, also known as the circularity argument is probably the most recurring argument of logic, and the most useful if you want to defeat someone. In many real life situations, we are given to believe that two events are so closely linked that they are their own cause-effect pairs. That is to say that they reinforce each other and it is unclear as to which happened "first".

In most cases, it is our ignorance of the basic underlying principles that lead us to remark that these two events sustain and cause each other. Within the classical view of causality where the effect and cause must happen have distinct space-time values, the view of mutual causation is paradoxical. Although such a self loop in itself not impossible, but if these two events have no other cause, there arises the question of "what started it all?" which needs to be addressed.

Such causal loops leads to interesting paradoxes in time travel which question the very construct of space-time and its consistency under transformation. One such paradox, known as predestination paradox, argues that if a time traveler has the ability to influence the past, he could among other things, disturb the very events that caused him to exist. This can break the consistency in time flow. I have talked more about this paradox later.

The bigger question is of the ultimate reality of such causal loops. If they are taken to be real, even for selective cases, we can in principle construct absurd, paradoxical examples. If they are given to be false, we need to examine what properties of a causal relation inhibit it to become of a mutual nature. The most important of these could be that an effect is constrained to happen in a space-time which follows that of the cause.

Causality in religion – the concept of *karma* and beyond

The idea of causality is a recurring theme in many religious discourses for the primary reason that it serves as a means to emphasize that a human is responsible for all the actions he does (causes). It is also to explain how the world comes into being in its present state, as a result of events in the past.

The idea of karma is to propose that our present actions cause our state of being, either as a human or an animal, as rich or poor, as healthy or diseased and so on. No action goes unnoticed, and has an equal causal bearing on the future. Some religions, most notably Hinduism, go on to preach that there is a universal measuring scale that can weigh out all the actions performed by each and every living entity. This weight for every action of every entity is recorded against it and the cumulative sum since eternity is used to judge the entity's "next life".

Causal direction

Direction of causation is innately attached to any causal relation. However, on what basis should one convince herself of this direction of the causation? Between any two events, which of these is to be called a cause and effect, and if at all they are to be considered causal effect pairs. The following are a set of theories proposed to resolve this issue.

• <u>Bilking:</u> The main argument for the causal order being the temporal order is the bilking argument (Black 1956). The argument has been presented in various settings, but it basically tries to negate the possibility of backward causation. If backwards causation was possible, then with human intervention, one can change the effect without altering the cause. If the two events are actual physical events, then there needs to be a physical occurrence of the cause before which no kind of initiation of the effect can happen.

This argument has been criticized on account of its incoherent mix of determinism and indeterminism in the world.

• <u>Time travel</u>: The consistency of causality is put under serious test when we consider the fascinating domain of time travel. Time travel allows for backwards causation as now time is equivalent to a point in space which can be arrived at arbitrarily from anywhere. If we disassociate the inherent direction from time, we can just as well question the causal directions of commonly occurring causal pairs.

There are three main replies to the time travel argument.

The first reply is that time travel is *incoherent*. A variety of incoherencies might be alleged here, including the incoherency of changing what is already fixed (causing the past), of being both able and unable to kill one's own ancestors, or of generating a causal loop and thus a reflexive relation of 'self-causation', or of generating inconsistent probability assignments (Mellor 1995).

The second reply to the time travel argument is that time travel may still take place through *locally* forward causal steps.

The third reply to the time travel argument is that any alleged case of time travel is open to forward *redescription*. Instead of the time traveler entering the machine at t_1 and exiting at t_0 , the same situation may be redescribed in terms of the spontaneous creation at t_0 of one individual, and the spontaneous disappearance at t_1 of another, with merely coincidental correlations between their belief states.

- <u>Simultaneous causation</u>: There are situations where the cause and effect have the temporal values. This puts a question on the need of the cause to be temporally prior to the effect.
- <u>Joint causation</u>: This idea suggests that mere ordering in the time domain doesn't lead to a cause-effect pair. If an event, 'A' causes events 'B' and 'C' at different times; there is an illusion of a causal relation between 'B' and 'C'. However, this is incorrect as they actually are independent.

I feel that attributing the temporal direction to causal relations is the most reliable for deducing the validity of causal relations.

Questionable cause

This involves the process of deductive reasoning to claim or disclaim whether two events have a causal relation. It is called upon when an event is misattributed as a cause just because it occurs regularly with another event. This fallacy involves drawing the conclusion that A is the cause of B simply because A and B are in regular conjunction (and there is not a common cause that is actually the cause of A and B). The mistake being made is that the causal conclusion is being drawn without adequate justification. One factor that makes causal reasoning complicated is that cause and effect are not completely disjoint and independent. This is particularly true when A and B cause each other by way of system feedback, where cycles tend to reinforce each other. Individual perception of causality can be clouded by emotions and ideologies. Errors of causality logic can be avoided by a careful study of the temporal sequence of events.

Causality and Free Will

Libertarianism and determinism are the two broad theories addressing the problem of Free Will. Where Libertarianism seeks to attribute total, almost divine freedom to beings, Determinism proposes a model based on fixed outcomes and no freedom. Causal interactions under both these ideas take different forms.

Complete freedom, i.e. to have the disposition to control one's own will, results in a person to be the ultimate originator of his/her actions. There appears to be no other cause but ourselves of the actions we do. All non-initial, non-miraculous events need to have a cause. Hence, if we attribute the cause of our action to our agency, we need to specify what causes our agency to behave that way. If we assume that a being is completely self-determined, we will get stuck in an endless loop. Hence, there must be an ultimate cause of our action outside our own existence. Maybe, this includes the forces that form our character, our disposition to will i.e. will to will to do something. This need for an external ultimate cause of our action hints at the fact that Libertarianism is inconsistent.

Determinism appears to be much more coherent with the usual theories of causality. Determinism literally means that all events in the world, including our choices are fixed and hence we have no freedom. I present below two divergent views on how determinism is possibly realized in the world.

The first assumes the reality of causal determination. This is to say that the reality of an event A and the causality A=>B, will lead to a real event B. In fact, just these two conditions can ensure the occurrence of B. We don't need to lay out how or when B happens explicitly. This causal chain extends along the temporal direction. Under this assumption, we can construct the entire world with the following two rules:

- 1. Clearly define the causal roles between all possible events i.e. if and how they interact
- 2. Give the very first event from which the entire world is generated as a sequence of causeeffect pairs

A diametrically opposite view is to say that causality is an illusion, and all events are independently determined. Hence, for all time values, we have laid out all the events to happen. Hence, what we perceive as causation is merely the succession of events in space-time.

Libertarianism, at least in the incompatibilist sense, is totally rejected if one needs to maintain a notion of causality in the physical world. Determinism can co-exist with causal determination, with the understanding that all the causal information of an event is contained in the events that cause it.

Causality and the Mind-Body problem

The mind-body problem is clearly one of the most deep, elusive and intriguing problem of philosophy. Causality plays a very important role in support or against the various theories proposed till date.

The ability to affect and be affected by our surroundings appears very real to us. However, if we consider "us" (ontologically) different from our surroundings, there arises the question of intersubstantial causality. Can events in "us" (our mental states) trigger changes in our surroundings (the physical domain)?

Even more generally, any causal relation requires a nexus, some interface or connection by means of which the causal relation occurs. If body and mind are considered ontologically distinct, how can we account and think of such a nexus? Dualists argue that a way around this is to assume that something of the mental domain manifests itself in the physical domain. Descartes himself appears to accept such a theory in declaring that "there could be nothing in an effect not present in its total efficient cause". Still since causation involves transference, a Cartesian conception of the mind-body can't account for their interaction.

Further, the property of causal closure of the physical world claims that all events in the physical world have a fixed cause in the physical domain itself. This closure property argues that mind can't be ontologically distinct from the physical domain, since it does causally interact with the body.

The functional theory of mind-body is much more consistent with causation. In fact, the functionalist view of the mind is to talk of only the causal relations it has with the body. Hence, rather than talking of the intrinsic properties, we just talk of the causal relations of the mental states with physical world. Hence, the mental states are completely described by the changes it causes in the physical world.

Hence, causality plays a very important part in deciding the plausibility of any theory to solve the mind-body problem. Modern theories like computer functionalism (Strong AI) give more importance to causality than even classical notions like first person reality, privileged access, privacy, etc.

Causal theories

Many theories have been developed to completely characterize the causal relation between any two general "events" A and B. although most of these aim for a unified goal, they differ in the context and the scope. I have briefly presented a few of these below.

- <u>Counterfactual theory</u>: Looks at every causal relation A =>B via its equivalent form B' =>A'.
- <u>Probabilistic causation:</u> A=>B means that all occurrences of the event A guarantee the occurrence of the event B. However, real life causal relations like "War causes death" don't necessarily follow this property. Hence, we say that occurrence of A increases the probability of B happening, hence talking of some sort of a probability.
- <u>Causal calculus:</u> It is a calculus based on representation of causal relation using mathematical structures like Bayesian graphs, etc.
- <u>Structural learning:</u> It is the process of formulating causal relations between events given a statistical distribution of the occurrences of these events under certain conditions.
- <u>Manipulation theory:</u> This theory equates causality with manipulability. Causal relations are studied under changes produced in cause and effect.
- <u>Process theory</u>: This theory aims to characterize the conditions required when two events can be said to have a causal relation. For example, a ball moving in the air is causal as the current position of the ball and its velocity determines its position later. However, the shadow associated with the ball isn't a causal process, but merely a by-product of the ball.

Conclusion

I chose causality as the topic for my term paper since it appeared to be the most elusive and exciting in philosophy. My interest in causality comes from a strongly determinist view. I feel that causality can exist only in a completely deterministic world. In this paper, I have attempted to highlight popular theories of causality and how these impact events part of other "bigger" theories.

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