

Two Concepts of Causation, At Least One Kind

Jared Lafer

Brown University

1. Introduction

In the classic paper “Two Concepts of Causation,” Ned Hall argues that we have two concepts of causation: dependence and production. His argument appeals to several theses that describe aspects of our ideas of causation; he shows that a fraction of these theses are exclusively consistent with productive causation and that a fraction of these theses are exclusively consistent with dependence causation. Since there is no overall consistent concept of causation, Hall concludes that we have two concepts of causation. In the first part of this paper I will present Hall’s analysis as background and motivation for my project. Now, I think the idea that we have two concepts of causation is true but then Hall makes an extra claim: dependence and production causation are distinct kinds of causation. I will argue that we should be hesitant to conclude that dependence is a unique kind of causation because we cannot identify dependence by anything but its sufficient conditions, which does not justify claiming uniqueness for it. I will argue instead that an exchange of a conserved quantity is both sufficient and necessary for productive causation. Accordingly, I will attempt to show that productive causation is clearly identifiable as a unique kind of causation that can account for most conceivable causal phenomena. My purpose is not to give a complete analysis of productive causation, but to merely show that productive causation – unlike dependence causation – is promising enough to warrant such an analysis.

Causation is a relation between causes and effects. What counts as a cause and effect is not a trivial matter to determine though in Hall’s analysis, causal relata are

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events. We shall keep to this practice until later in the paper when the issue rears its head in an attack on against my thesis. Hall presents five theses about causation:

Dependence thesis: counterfactual dependence between two events is a sufficient condition for causation. So, if it is the case that had *c* not occurred, *e* would not have occurred, then *c* is a cause of *e*.

Transitivity: If event *c* is a cause of event *d*, and *d* is a cause of *e*, then *c* is a cause of *e*.

Locality: Causes are connected to their effects via spatiotemporally continuous sequences of causal intermediates.

Intrinsicness: The causal structure of a process is determined by its intrinsic, non-causal character (together with the laws). Specifically, Hall says:

Suppose an event *e* occurs at some time *t'*. Consider the structure of events *S* that consists of *e*, together with all of its causes back to some arbitrary earlier time *t*. Then any possible structure of events that exists in a world with the same laws, and that has the same intrinsic character as *S*, also has the same causal character, at least with respect to the causal generation of *e*. (Hall, 12)

Omissions: Omissions can both cause and be caused. An example of an omission as a cause is the following: Mary's forgetting to water the plants caused the plants to die.

Hall believes that all of these theses are true so if there is only one form of causation, it must be consistent with all of these theses. Two kinds of causation have been introduced by the philosophical community:

- 1) In **dependence causation**, if *e* counterfactually depends on *c*, then *c* causes effect *e*. So, had *c* not occurred, *e* would not have occurred.
- 2) In **productive causation**, *c* causes *e* when *c* helps brings about (or

generate) **e**. A widely-regarded view developed by Phil Dowe holds that for **c** to bring about **e** there must be a

3) *causal interaction*, i.e., an change in the conserved quantities of the participating objects (e.g. momentum, energy) from **c** to **e**.¹

According to Hall, neither of these kinds of causation is consistent with all of the five theses listed above. Dependence, he argues, is only compatible with the thesis of dependence and omissions, while production is only compatible with transitivity, locality, and intrinsicness. Thus, in the very least, we have two distinct concepts of causation.

1. The Limitations of Dependence

Why is dependence not compatible with locality, intrinsicness, and transitivity? Let us consider the locality case first. Hall considers the following example: Suzy and Billy are fighter pilots and Suzy is on a mission to bomb a base. An enemy fighter is gunning to intercept Suzy but Billy reaches the enemy first and shoots the enemy down – the bombing proceeds as planned. If Billy had not shot down the enemy fighter, the enemy would have shot down Suzy and the bombing would not have occurred. So Billy’s shooting down the enemy fighter was a cause of the bombing. Here we have a case of “double prevention” where Billy’s shooting down the enemy prevented the enemy from shooting down Suzy, which prevented the enemy from preventing the bomb. Let us now assume that Billy shot down the enemy fighter hundreds of miles from Suzy, i.e., in such a way as to have no physical effect on Suzy. Hall argues that it is counterintuitive to claim that Billy had an impact on what happens between the enemy and Suzy but the fact nevertheless remains that Suzy’s bombing depended on Billy shooting down the enemy. We

¹ Cf. Dowe (2007).

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accordingly seem to have two contrary intuitions about impact in the case of double prevention.

These contrary intuitions are understandable for when Billy causes the bombing from very far away we effectively have action at a distance which contradicts the thesis of locality.² But action at a distance is a rare phenomenon in this world (the only possible case I can think of is when particles are entangled), and if Billy's prevention counts as a cause then action at a distance would be a very common occurrence. It would seem that all laws that hold through physical changes (e.g. the laws of physics) permit action at a distance, which means that dependence is compatible with locality only when trivial laws (e.g. laws which only hold when there are no physical changes) are involved. So dependence and locality should not be jointly espoused.

Let us move on to the thesis of intrinsicness. We will modify our story about Suzy, Billy and the enemy as follows: imagine that the enemy would have received instructions to shoot down Suzy if Billy had not shot him down. But Billy shoots down the enemy and so the base never sends the instructions to the enemy to shoot down Suzy.

The structure **S** of this causal sequence consists in such events as Billy firing his gun, the bullets hitting the enemy, the destruction of the enemy, etc. But, Hall argues, the intrinsic character of **S** fails to determine, together with the laws, that there are no other factors that (i) would stop Enemy, if Billy somehow failed to; (ii) and would do so in a way that implies that Billy's action is not a cause of the bombing. (Hall, 12)

For example, we imagine that the enemy's craft had been sabotaged with a bomb that would have exploded even if Billy hadn't shot down the enemy. We can

² Action at a distance: "when at least one of the effects of a cause is not connected to that cause by a spatiotemporally continuous causal chain" (Hall, 11).

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very easily find a causal structure S^* identical to S consistent with this new scenario for should Billy shoot down the enemy, the causal structure will trivially be the same. But then (i) and (ii) are the case, for Suzy's bombing's dependence on Billy's shooting the enemy is a fact extrinsic to S . Should we conclude that Suzy's bombing did not depend on Billy's action, then we must either abandon the intrinsicness thesis or yield that S did not fully describe the causal history the relevant sequence of events. Hall argues that the latter is absurd (I will not discuss the specifics), which forces us to give up intrinsicness.

Finally, we now discuss the thesis of transitivity. Let us again revise our example with Billy and Suzy. Imagine that the enemy set his alarm early in the morning. If his alarm had not gone off, then he would have missed his scheduled departure time and Billy would not have shot him down. We know that if Billy had not shot down the enemy, the bombing would not have happened. Thus, by transitivity, if the enemy's alarm had not gone off, then the bombing would not have happened. So the alarm going off is a cause of the bombing. Indeed, anything that the enemy's being shot down depends on is, in effect, a cause of the bombing. This sort of messiness is unwanted in a theory of causation, and so transitivity is not compatible with cases of dependence.

One noteworthy objection is that Hall has not shown that we have two concepts of causation – he has shown that we have two kinds of causation. This does not strike me so much as being an objection but a strengthening of Hall's argument, for having two kinds of causation certainly implies having two concepts of causation. Indeed, Hall does say: "I am quite content to agree that I have (merely) shown that there are two kinds of causation – as long as those who insist on this rendering of my thesis agree that the two kinds answer to very different criteria, and consequently require very different analyses" (Hall, 19). I believe strengthening Hall's conclusion like this is too hasty, and I will spend the rest of this paper

explaining why.

Having shown that dependence is incompatible with locality, and intrinsicness, and transitivity, Hall discusses the thesis of omissions. I will not engage this topic, but note that his conclusion is that the thesis of omissions is incompatible with the theses of locality, intrinsicness, and transitivity, and compatible with the thesis of dependence.

2. Misdiagnosing Dependence as a Kind of Causation

Hall thinks there are two distinct concepts of causation: dependence and production. I do not object to this conclusion for both concepts seem to succeed in giving accounts of certain causal phenomena. He argues that it would be wrong to object to this result simply because it means the concept of causation is not univocal, and I am inclined to agree. However, when it comes to ontology I admit to having a bias in favor of simplicity; I cannot shake the feeling that having two kinds of causation would be ontologically messy. Fortunately, I believe all causation is productive and I am now prepared to do some work towards demonstrating this.

To push this view I will attempt to do three things: 1) argue that to identify a kind of causation minimally requires identifying the necessary conditions for its existence; 2) argue that productive causation satisfies this criterion while dependence causation does not; 3) show that productive causation can account for most conceivable cases of causation.

The complete set of sufficient conditions **S** for a kind of causation **K** describes the conditions for **K**'s obtaining. So if $s \in \mathbf{S}$, and s obtains, then we can infer that **K** obtains. The complete set of necessary conditions **N** for **K**, on the other hand, determines what is implied when **K** obtains. Therefore, whenever **K** obtains, every $n \in \mathbf{N}$ obtains. Identifying **S** is important because it allows us to identify

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under what circumstances we have a case of proper causation. But it is equally important to identify **N**, for then we know what it metaphysically means for **K** to obtain, which is to say that we know what makes **K** a unique kind of causation.³ For example, suppose that we have two distinct kinds of causation **K**₁ and **K**₂, with sufficient conditions **S**₁ and **S**₂ and necessary conditions **N**₁ and **N**₂. Suppose further that **S**₁ ≠ **S**₂ while **N**₁ = **N**₂. Unless **K**₁ and **K**₂ obtain in different – perhaps very unique – circumstances (given by the elements of **S**₁ and **S**₂ respectively), we would have no way of telling **K**₁ and **K**₂ apart if **N**₁ = **N**₂. In other words, for **K**₁ and **K**₂ to obtain would mean exactly the same thing metaphysically. The circumstances in which **K**₁ and **K**₂ obtain might be exactly the same, in which case we might have a hard time distinguishing **K**₁ and **K**₂. After all, it would certainly seem arbitrary to individuate **K**₁ and **K**₂ by their sufficient conditions. Thus, it is largely the necessary conditions that make a form of causation unique and without knowing them we should be hesitant to claim that we have identified a distinct form of causation at all. Accordingly, in the general case **K**, both **S** and **N** must be identified if we are to be satisfied that we have given a full account of a kind of causation; thus identifying **N** is crucial for the claim that **K** is unique.

Of course, identifying the complete set of necessary conditions for **K** to obtain is often impossible. Fortunately, assuming **K**₁ and **K**₂ exist, all that is required to determine that two types of causation **K**₁ and **K**₂ are distinct from each other is that we find $a \in \mathbf{N}_1$ such that $a \notin \mathbf{N}_2$. However, in practice, this is only possible under a certain circumstance: unless a is an observable condition in the actual world, we could not make a strong case that **K**₁ and **K**₂ are distinct. Any attempt at doing so would be unmotivated and the case most likely contrived. However, despite asserting

³ Note that $\mathbf{S} \subset \mathbf{N}$.

that dependence and productive causation exist, Ned Hall does not identify an observable $a \in N_d$ such that $a \notin N_p$, where N_d is the complete set of necessary conditions for dependence causation and N_p is the complete set of necessary conditions for productive causation. Moreover, I cannot conceive of any such observable a , and I challenge the reader to try. In the dependence thesis we certainly have a sufficient condition for dependence causation but nothing else that lends itself to identifying dependence as a unique kind of causation.

Let me clarify this with an example. Suppose the following counterfactual is true: Had Suzy not bombed the base, then the base would not have exploded. By the dependence thesis, Suzy's bombing the base caused the base to explode. But in what sense did Suzy cause the base to explode? The base exploding certainly depended on Suzy's dropping the bomb but we would have a lot of trouble making the case that this relation implies that a unique kind of causation was occurring because there is nothing identifiably unique about dependence causation. Indeed, I would argue that the kind of causation involved was productive which I will elaborate on in the next section. In any case, as currently formulated, I find the view that dependence is a unique kind of causation unacceptable.

3. Productive Causation

Hall says that production seems to capture essentially what we mean when we say **c** causes **e**: a productive relation between causes and effects strikes me as being both sufficient and necessary for causation (while a dependence relation does not). In other words, I assert the truth of the following biconditional: **c** causes **e** if and only if **c** helps bring about **e** (through the causal interaction of **c** and **e**). To see this let us consider the following classic example: the cue ball collided with the eight ball and pushed the eight ball into the pool pocket. There was clearly a causal

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interaction between the cue ball and the eight ball for we observe that momentum – in the very least – was exchanged between them. Moreover, it goes without saying that this conserved quantity exchange helped bring it about that the eight ball went into the pocket. Knowing only that this conserved quantity exchange brought about the eight ball going into the pocket certainly strikes me as sufficient to say that the cue ball caused the eight ball to go into the pool pocket. On the other hand, knowing that the cue ball caused the eight ball to go into the pocket seems to imply that there was an exchange of a conserved quantity from the cue ball to the eight ball. By the same analysis the biconditional holds for other causal interactions.

Because we know the necessary condition for causation of the productive kind, i.e., that there was a causal interaction such that **c** brought about **e**, we know what it means for **c** to cause **e**. In the billiard ball case, the cue ball causing the eight ball to go into the pocket means that there was an exchange of a conserved quantity from the cue ball to the eight ball. In this sense, we essentially capture what it means to say **c** causes **e**. Moreover, we are well aware that an exchange of a conserved quantity is sufficient for causation. I am therefore completely satisfied with the claim that production is a unique kind of causation.⁴ What is more, I believe that all causation is productive, and I will do some work to that end by answering some objections to this view.

To champion a completely productive account of causation requires rejecting the thesis of dependence and the thesis of omissions, which one might argue is problematic. But rejecting these is not the end of the world. Productive causation has its own sufficient conditions so the loss of the dependence thesis does not suddenly mean that we cannot evaluate the causal sufficiency of events. Moreover, unless we

⁴ Agent causation can even be explained in terms of productive causation. In agent causation, we have an uncaused event of the form agent **S** causes event **e** (O'Connor, 5). If we assume that agent causation is carried out by physical processes, then the idea of an exchange of a conserved quantity from the bodies involved is perfectly reasonable.

have observable conditions that are necessary for dependence causation, we have no reason to treat true cases of dependence as anything more than a “byproduct” of certain instances of productive causation. This sort of status would account for the lingering intuition that dependence relations are somehow related to causal relations. I can think of two situations where dependence obtains essentially as a byproduct of **K**. For the first, let dependence be a necessary condition for certain cases **K** of productive causation. Then, **K**'s obtaining would always involve the existence of counterfactual dependence between **K**'s relata. For the second, assume for certain instances of causation **K** that there exists some $a \in \mathbf{S}$ that is both a sufficient condition for both **K** and for the counterfactual dependence of the relata of **K** so when **K** obtains, it would merely coincide with the existence of counterfactual dependence between **K**'s relata.

On the other hand, the only sense in which omissions seemed to participate in causation was that events seemed to depend on omissions, or *vice versa*. Certainly, omissions do not participate in causation productively for there cannot be an exchange of a conserved quantity from the objects featured in an omission to the objects featured in an event, or vice versa. But, per the previous analysis, we do not know what it means for dependence causation to occur, hence we do not know what it means for an omission to cause or be caused. So I do not see the motivation for admitting omissions as relata in causal interactions in the first place. Thus, we need not count omissions as causal relata at all.

A second objection brings us back to the assumption that only events can serve as causal relata. First, note that admitting non-events as causal relata is consistent with dependence causation. For example, it is perfectly acceptable counterfactual analysis to say that had the rose not been red, Suzy would not have picked it – accordingly, the rose's redness contributed causally to her picking it.

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Perhaps Suzy only liked roses because they were red and in a world where roses were not red, *mutatis mutandis*, Suzy would not have picked the rose. Consider another causal relation: the fact that it was curfew caused Billy to go to sleep. Again, it is consistent with dependence to say that if it were not curfew, then Billy would not have gone to sleep (suppose that Billy were very serious about obeying rules).

However, admitting non-events as causal relata is inconsistent with productive causation and so damaging to our project. It does not make any sense to say that the rose's redness caused Suzy to pick the rose for the rose's redness did not transfer a conserved quantity to an event. Likewise, there is no transfer of a conserved quantity from curfew to Billy's going to sleep and so it would be bizarre to say that curfew caused Billy to go to sleep in the productive sense. In a causally closed world, conserved quantities can only be exchanged through physical processes and physical processes are reducible to events. Hence, in productive causation only events can serve as relata in causal processes.

Since I am attempting to demonstrate the robustness of productive causation, I am of course prepared with a solution to this problem. The issue of the causation of nonevents is solved merely by adopting the view that non-events do not enter into causal relationships. Consider the following example: suppose that the rose's redness caused Mary to pick the rose. The structure of this causal process is fully accounted for by events (we might need to assume causal closure for this view to work) and thus can be described productively: Mary's eyes observing the reflected red light from the rose caused a chain of events in her mind that caused her to pick the rose. This sort of analysis can be applied to any of the cases of non-event causation I can imagine and I challenge the reader to provide counterexamples. Certainly, the productive kind of causation does not completely explain why a non-event *c* caused *e* but if the instances of non-events in a causal structure are reduced to events, non-event causation can be completely described by production.

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Now if I am right, I have shown that it is possible to have two concepts of causation and only one kind of causation. One might wonder how this is possible. This is possible because whenever we conceptualize causation as dependence – to the extent that our concept is about what actually occurs in the real world – our concept is about productive causation. Indeed, I submit that we can always conceptualize a case of causation as productive even if doing so is not as obvious as conceptualizing it as dependence.⁵ This situation is analogous to situations when we have two proper names – each with different senses – that have the same referent. For example, we might know the “author of *The Adventures of Tom Sawyer*” as either Samuel Clemens or Mark Twain even though these names have the same referent. Likewise, we might conceptualize a case of causation as either production or dependence, even though the concepts are really about the same case of productive causation.

4. Conclusion

In this paper I have done my best to represent Hall’s views in “Two Concepts of Causation.” I have argued that he too quickly diagnoses dependence as a unique kind of causation without realizing that there is nothing uniquely identifiable about it. Indeed, I have made the case that while dependence is likely a distinct concept of causation, there are no grounds for the claim that dependence is a unique kind of causation. Moreover, it seems the only motivation for proposing dependence causation is that it can explain omissions and non-events; I have tried to demonstrate that productive causation is identifiable as a unique and robust kind of causation which leaves dependence totally un-motivated. Of course, I have not given a complete analysis of productive causation but I think I have demonstrated that, in the

⁵ Of course, there are certain cases of causation that we cannot conceptualize as dependence at all such as certain cases of double-prevention.

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very least, there is a solid basis for such a project.

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