

Causation, influence, and effluence

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Causation, says David Lewis now, is to be understood as the ancestral of counterfactual *influence*, where C influences E (roughly) iff little changes in C map onto big changes in E. I argue that the influence account provides neither necessary nor sufficient conditions for causation, and suggest that what is missing is the notion of *effluence*, or physical connection.

1. Influence

Lewis proposes that C causes E iff C stands in the ancestral of counterfactual influence¹ to E. C stands in the ancestral of counterfactual influence to E iff there is a chain of events D1, D2, ... , Dn (for n ≥ 0) such that C influences D1, D1 influences D2, ... , Dn influences E.

Some unpacking: C influences E iff (i) C and E are actual distinct events, and (ii) there is a substantial range C1, C2, ... of different not-too-distant alterations of C and a range E1, E2, ... of different alterations of E, such that if C1 had occurred, E1 would have occurred, if C2 had occurred, E2 would have occurred, ...

Some further unpacking: an *alteration* to an event E is an event much like E, including E itself. It is explicitly left undecided whether an alteration is a *variant* of E, or an *alternative* to it. It is explicitly left vague and intuitive how *substantial* a range of alterations is, and how *distant* a given alteration is. Further, influence is explicitly *degree-based* and *comparative*, in that whether or not C is said to influence E may vary depending on what else is contextually salient. The degree of influence must be comparatively significant.

Some repacking: the influence relation, then, holds that small changes (not-too-distant alterations) to C map onto big changes (a significant range of different alterations) to E. In other words, *wiggle C a little and you wiggle E a lot*.

As illustration, suppose that the sniper fires at the victim while a dog barks in the distance. Clearly, the sniper's firing is a cause of the victim's death, while the dog's barking is not. And indeed, there is a substantial range of not-too-distant alterations to the sniper's firing (including some in which the sniper does not fire at all, some in which he fires at different parts

¹ Terminological note: Lewis usurps 'counterfactual dependence' for the new influence relation. I will retain 'counterfactual dependence' for the old relation of 'had C not occurred, then E would not have occurred', and reserve 'counterfactual influence' to distinguish the new relation.

of the victim or at a different target entirely, and some in which he fires earlier or later, alongside the actual alteration) which maps onto a substantial range of different alterations to the victim's fate. Wiggle the firing a little and you wiggle the victim's death a lot. Moreover, the range of not-too-distant alterations to the dog's barking (including alterations in which the dog does not bark at all, alterations in which he barks in a different way, or at a different time) maps onto an insignificant range of alterations to the victim's death. Perhaps if the bark had been louder it might, at most, have startled the sniper into firing a moment earlier. Wiggle the barking a little and you wiggle the victim's death in negligible ways, if any. So far, so good.

The influence relation, some may object, is explicitly vague and explicitly limited to the deterministic case. I do not consider the vagueness of the analysans too problematic, since the analysandum, causation, strikes me as itself a vague notion. I consider the limitation to the deterministic case, on the other hand, seriously problematic, and consider the account as given to be incomplete.

2. *Button versus switchboard*

The influence account provides neither necessary nor sufficient conditions for causation, even in the deterministic case, as can be brought out in the case of *button versus switchboard*.

The set-up: Pam is locked in a room which contains a single button. Bob is locked in a room which contains a vast switchboard. Vic is covered with electrodes and strapped to a chair.

The story: Pam presses the button. Bob just watches. Vic is electrocuted.

Claims: (1) Pam's pressing the button causes Vic's electrocution, (2) Bob's watching does not cause Vic's electrocution, (3) Pam's pressing does not influence Vic's electrocution (at least not in any significant way) since she only has a button to use, and (4) Bob's watching does influence Vic's electrocution to an arbitrarily high degree, since Bob has all manner of switches, buttons, knobs, and dials at hand. (1) and (3) show that influence is not necessary for causation, and (2) and (4) show that influence is not sufficient for causation.

I will now defend (1)–(4), in order.

3. *Causal buttons*

Starting with claim (1), I take it to be obvious that Pam's pressing the button causes Vic's electrocution. After all, Pam 'did it'. This intuition may be buttressed (though I doubt it needs to be) by noting that a criminal could *predict* Vic's electrocution given Pam's pressing, a detective could *explain* Vic's fate by citing Pam's action, and a judge would certainly *blame* Pam

for Vic's demise. The core epistemic, explanatory, and ethical connotations of causation are here in full force.

In any case, Lewis should be expected to accept (1), as he has always been admirably explicit as to the correct causal verdict in preemption cases, where it is clear who 'did it'.

4. *Non-causal switchboards*

Turning to (2), I say that it is equally obvious that Bob's watching does not cause Vic's electrocution. After all Bob 'didn't do it'. He just watched. He was a mere bystander. This intuition may be buttressed by noting that the epistemic, explanatory, and ethical connotations of causation are not present here. If you tell me that Bob watched (without mentioning Pam) I can neither predict, nor explain, nor blame anyone for, what then befalls Vic.

I would have expected Lewis to accept (2), given his previous stance on preempted backups not being causes. After all, the only difference between innocent bystander Bob and a preempted backup is that *Bob was not even trying to do it*. But Lewis, in the Whitehead Lectures from which (2000) is abridged, sounds as if he may be willing to revise his stance on preempted backups and thereby to reject (2). He considers a preemption case where Suzy and Billy throw rocks at a bottle, and Suzy's rock hits first. Lewis states:

If ... Billy's throw does somehow make roughly as much difference to the effect as Suzy's, that is a good reason to judge that Billy's throw is not after all a mere preempted alternative. Rather it is a joint cause of the shattering. So in this case too we get the right answer. (Unabridged: 13)

I reply that in button versus switchboard, Bob's watching makes no difference at all to Vic's electrocution. The case Lewis has in mind seems to be one where one event (Billy's throw) is *both* a preempted backup and a contributory cause along the main route. If Bob's watching had, for instance, goaded Pam into pressing the button, or lured Vic into the chair, then Bob's watching would have contributed along the main route, and would (I agree) deserve to be counted as a joint cause. But that is no part of this story.

One might claim that Bob's watching does contribute to the main route by *omission*.² For instance, Bob might have a 'foil Pam' switch which he fails to flip. I accept that such contributions by omission are causal (as does Lewis, though the point is debatable), but reply that, even if Bob has such a switch (which he needn't have), his failure to flip it and his watching are

² I thank an anonymous referee for pressing this point.

different events. They are not only logically independent, but they differ causally. Bob's watching, but not his failure to flip, was caused by his state of curiosity, while Bob's failure to flip, but not his watching, was a cause of Vic's electrocution.³ If Bob is to be blamed at all, it isn't because he *watched*, but because he failed to act.

One could always just bite the bullet and accept that Bob's watching causes Vic's electrocution. (Perhaps once one has learned to blame Bob for omitting to stop Pam, the illusion of Bob's innocence is lost, and the counter-intuitiveness of counting his watching as also causal diminishes somewhat.) I reply that this is an exploding bullet: to bite the bullet here is to shatter the ability of the theory to shed light on such notions as *perception*.⁴

A perceptual switchboard case: I am randomly hallucinating a man walking into a neuroscience lab. As luck would have it, the room I am hallucinating looks just like the room where I am being experimented on, and the man I am hallucinating looks just like Bob, who (of course) has actually just walked into the lab. Do I see that Bob is in the lab? Obviously not, even though the scene before my eyes matches my visual experience. I fail to see that Bob is in the lab because this matching is purely *accidental*. There is no causal connection between Bob's being in the lab and my visual experience. But those of us who accept this reasoning had better not accept the influence account of causation. After all, Bob is in the lab where I am being experimented on, and this gives him all sorts of influence over my visual experience. He could easily turn that dial, or remove that electrode, ...

So I conclude that (2) is not just intuitively obvious, and not just supported by the core epistemic, explanatory, and ethical connotations of causation, but is also essential to the theoretical value of causation in helping to understand such notions as perception. Rejecting (2) would be not just desperate, but debilitating.

³ Lewis (1986: 255–58) argues that John's saying 'Hello' and his saying 'Hello' loudly are different events, since they differ causally – the former but not the latter causes Fred to return the greeting, and the latter but not the former was caused by John's state of tension. The same relation holds between Bob's failing to press the button and his watching, which can be thought of as a determinate way in which he fails to press, a failing-watchingly akin to a saying-loudly. (The influence account similarly miscounts John's state of tension as a cause of his saying 'Hello'.)

⁴ For discussion of the causal theory of perception see Alvin Goldman 1977 and Michael Tye 1982. Lewis (1986) proposes that 'if the scene before my eyes causes matching visual experience as part of a suitable pattern of counterfactual dependence, then the subject sees; ...' (281). So *if* Lewis would now have us understand this 'suitable pattern of counterfactual dependence' as influence, then he would be committed to spurious seeing.

5. *Uninfluential buttons*

To continue on to (3), not only does Pam's pressing the button not influence Vic's electrocution in any significant way in the original story, but the story can also be modified so as to drive Pam's influence all the way to *zero*, without ever undermining the motivating intuition that 'she did it'.

Lewis provides an intuitive division of influence into 'whether', 'when', and 'how' influence.⁵ The idea is that how (in what manner) C occurs might influence when (at what time) E occurs, or whether C occurs might influence how E occurs, etc. As things stand, Pam's pressing the button has no 'how-whether', 'how-when', or 'how-how' influence, since however she presses the button, be it with her left forefinger, right thumb, or nose, be it while crying, laughing, or thinking of England, Vic gets electrocuted at just the same time in just the same way. This was the point of only giving Pam a button.

As things stand, Pam's pressing has 'when-when' influence, since if she hastens or delays pressing the button, then Vic's electrocution gets hastened or delayed. But Pam's pressing has no 'when-whether' or 'when-how' influence, since the set-up stays the same for the whole near-in time interval. And one can modify the story to drive the 'when-when' influence near zero, by adding that (a) Bob is in fact a preempted backup who will jump in if Pam delays for even a millisecond (this leaves Pam's pressing with a 1 msec hastening influence), and (b) Pam's wiring was only just set up at the time she actually pressed, so that had she hastened even a millisecond her button would not have worked and Bob would then have done the deed at the time and in the manner Pam actually did.

Finally, as things stand, Pam's pressing the button has 'whether-whether' influence (though no 'whether-when' or 'whether-how' influence), though by adding that Bob is a preempted backup as per (a) one can eliminate this influence too.

So if one adds (a) that Bob is a preempted backup, and (b) that Pam's button would not have worked earlier, then Pam's already meagre influence is driven all the way down to 1 msec of 'when-when' dependence. And of course neither (a) nor (b) changes the motivating intuition that Pam still 'did it' in any way.

Mapping onto either the actual electrocution or a 1 msec delaying thereof does not constitute 'significant influence' in any intuitive way in which I can understand the term. Indeed, the comparative nature of 'significant influence' makes things if anything worse, because now Pam's

⁵ 'Whether', 'when', and 'how' influence are only supposed to be intuitive ladders, kicked away in the ultimate account, because 'whether' presupposes saying what it is for an event not to occur, which is a manner of speaking that Lewis now wants to be rid of.

meagre influence will have to compare with that of the other character in our story, namely Bob with his massive switchboard.

Really, Pam's meagre influence (a 1 msec hastening) is no greater than that of the dog barking in the distance, who scares the sniper into firing 1 msec early (see §1). On the influence account, the status of Pam's pressing is no greater than that of a paradigmatically spurious cause.

Might it help to look to intermediate events (presumably the state of the current in the wire) between Pam's pressing the button and Vic's electrocution, for ancestral influence? No, it couldn't help. First, for any intermediate event slated, the same moves will drive its influence to a mere 1 msec hastening too (what holds for Pam holds for her intermediaries as well). One need only set things up so that Bob's backup process is underway, but trailing by a millisecond, and so that any hastening or alteration in manner of the intermediaries on Pam's process short-circuits her process entirely, leaving it to Bob's process to roll in 1 msec later. Second, if one is willing to consider more fantastic cases, one can just be rid of this complication entirely, by stipulating that Pam's button is *magical*. Pressing the magic button, like pointing the magic wand, directly cause Vic's electrocution. Now there simply are no relevant intermediary events to work with.⁶

If this weren't bad enough, even Pam's 1-msec-hastening influence can be eliminated, if we move to a case of *trumping preemption*. Pam presses her magic button at noon and at 6pm Bob sets his magic switchboard to achieve just the same end. Vic is electrocuted at midnight. It is a law of magic that the first spell cast on a given day matches the enchantment that midnight. Now since Pam's pressing is first, it satisfies the antecedent of the magic law, and so counts as a cause of the consequent, namely the electrocution of Vic. Pam still 'did it'.

But now Pam has zero 'how' influence, as she only has a magic button (and so no not-too-distant alterations involving different enchantments); she has zero 'whether' influence, since, if she doesn't press, then Bob's spell takes over as first that day and so produces exactly the same effect; and she has zero 'when' influence, since the enchantment takes places at midnight no matter what.⁷ (Since the case is magical, no intermediaries could help.)

⁶ Earlier I added that Pam's button wouldn't have worked earlier because her wiring was only just set up. In the magical case this should be revised to: Pam's button was only just enchanted.

⁷ From this case one can see that the influence solution to trumping turns on accidental features of the original case, namely that Merlin (who is the first spellcaster in the original story) has alternative spells available as not-too-distant alterations. Where the trumper holds a *one-trump hand* the influence solution will not work. (John Collins (2000: 231) raises an example of this sort.)

So I conclude that Pam's influence, low enough already, can be driven to a mere 1-msec-hastening, and even to zero, without undermining the motivating intuition that she 'did it'. Influence is not necessary for causation.⁸

6. *Influential switchboards*

Finally, moving to (4), Bob's watching does influence Vic's electrocution in a substantial way. It is true that Bob's watching does not have 'whether' influence on Vic's electrocution, since (holding Pam's behaviour fixed of course) whether or not Bob watches, Pam will still press.⁹ But Bob's watching has vast 'how-how' influence, since he has a full switchboard at his fingertips. Bob could contribute his own current, amplify Pam's, redistribute the shock through the electrodes in any of many ways, etc. (though of course he does not actually do any of this).

One might claim that playing with the switchboard is a 'too-distant' alteration to Bob's watching. I reply, first, that this claim is ad hoc. Second, since we want to consider the alteration to Pam's pressing in which she doesn't press but just stands around and watches, by parity of reasoning one should consider the reverse concerning Bob. And third, one can make these alterations as 'near-in' as you like by replacing the instruments with motion detectors or whatnot, so that all Bob needs to do is raise his hand, or stick out his tongue, or *move in any of whichever many ways this object will count as not-too-distant*. (Bob still 'didn't do it'.)

One might claim that 'how' influence alone, no matter how high, just cannot be significant. I reply, first, that this claim is ad hoc given that 'how', 'whether', and 'when' are merely supposed to be intuitive crutches (see fn. 5). For the real theory these all count equally as alterations. Second, comparatively speaking, this 'how' influence is surely much greater than the influence of any other events in the story, such as Pam's pressing. And third, Lewis's treatment of trumping in fact commits him to 'how' influence alone being sufficient for significance. The reason why Merlin (the trumping spellcaster) is now said to be a cause is because how he casts his spell, as 'prince to frog', 'king to dog', or 'queen to hog', influences how the enchantment takes place that midnight, though it does not influence 'when' or 'whether'.

So I conclude that Bob's watching does influence Vic's electrocution in a significant way. And note that we needn't bother with the ancestral, since

⁸ L. A. Paul has suggested conjoining influence with lawful sufficiency, in order to exclude the influential preempted backups that Lewis now must include as causes (2000: 249–51). The button is also a counterexample to Paul's account.

⁹ For this reason the old counterfactual dependence account was never in trouble here.

Bob's watching itself *directly* influences Vic's electrocution. Influence is not sufficient for causation.

7. *Effluence*

To summarize: influence is neither necessary nor sufficient for causation, as can be brought out in button versus switchboard.

Without entering into an entirely new argument, I would like to suggest a moral. What's going on in button versus switchboard, including the preemption variant thereof, and what is going on in all the preemption cases that have so long bedevilled counterfactual approaches to causation, has to do with process connections. *Effluence*, not influence.¹⁰

Vic is electrocuted by a process that traces back to Pam's hand, and not to Bob's. The bottle shatters by a process that traces back to the preempter's hand, and not to the backup's. The button-versus-switchboard asymmetry, and the preemption asymmetry, are both asymmetries of effluence.

I suggest that what is missing from both Lewis's counterfactual dependence and influence accounts is some notion of effluence. I do not exclude that effluence can be analyzed in counterfactual terms,¹¹ and I do not insist that causation be identified with effluence.¹² But I draw the morale that, somewhere and somehow, accounts of causation need to invoke effluence.¹³

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References

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¹⁰ The point that preemption is about effluence is hardly original here. See, for instance, David Fair (1979), Peter Menzies (1996), and Douglas Ehring (1997).

¹¹ Michael McDermott (1995), Murali Ramachandran (1998), and Paul Noordhof (1999) have attempted counterfactual definitions of *process*. I think, drawing on David Armstrong 1999, that *process* is best analyzed in terms of sequences of events pairwise-subsumed under fundamental dynamic laws, of which energy-momentum flows are a this-worldly instance. See my 'Processes as lawful sequences' (unpublished).

¹² Rather I would say that causation is effluence-dependence: C causes E iff an E-process depends on C. See my (2001). This view allows omissions to be causal.

¹³ Thanks to Chris Hitchcock, Igal Kvart, Michael McDermott, and L. A. Paul for discussion. Special thanks to David Lewis.