Problems with late preemption

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In response to counterexamples involving late preemption, David Lewis (1986) revised his original (1973) counterfactual analysis of causation to include the notion of quasi-dependence. Jonardon Ganeri, Paul Noordhof and Murali Ramachandran (1998) argue that their 'PCA*-analysis' of causation solves the problem of late preemption and is superior to Lewis's analysis.

I show that neither quasi-dependence nor the PCA*-analysis solves the problem of late preemption.

1. Lewis's Analysis.

David Lewis's original (1973) counterfactual analysis of causation states that *e* counterfactually depends on *c* iff, if *c* had not occurred, *e* would not have occurred. Causation is taken as the ancestral of counterfactual dependence. The analysis is vulnerable to counterexamples, in particular those involving a commonplace variety of late preemption. (Byrne and Hall 1998: 38, Fig. 1)

Consider an example: a showdown at high noon, where Quickdraw McGraw and Slow Joe face off against Billy the Kid. At a few seconds before noon, McGraw and Joe see Billy and begin to draw their guns virtually simultaneously. However, McGraw's draw is a bit faster than Joe's, so McGraw fires first, and as a result, his bullet gets there first. As it happens, McGraw shoots Billy dead at 12:00:00. Billy dies instantly from the bullet wound (imagine it complete with entry hole in the chest and exit hole out the back.) Without McGraw's act, he would have died that same day, but at 12:00:01, by the hand of Slow Joe (we'll say that Joe would have shot him in exactly the same place on his chest). So if Billy had not died at 12:00:00, he would have died at 12:00:01; the preempted process begun with Joe's draw is doomed only by the occurrence of the effect (the death) itself. Assuming that the event of the death at 12:00:00 is close enough in relevant respects to the death at 12:00:01 to call them the same event, Billy's death is not counterfactually dependent on McGraw's acts (for without McGraw's actions of drawing and shooting his gun, Joe's drawing and shooting would have killed Billy). Counterintuitively, McGraw's acts, if we follow the original analysis, do not qualify as causes of Billy's death.

To solve the problem, Lewis modified his account to include *quasi-dependence*. The idea is to combine an assessment of the intrinsic character

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of the 'process' between the two events in question (the cause *c* and the effect *e*) which occurs in the 'relevant' spatiotemporal region together with the relevant laws in order to decide whether *c* causes *e*. Even though *e* may not be counterfactually dependent on *c*, the intrinsic character of the process which occurs in that region may be just like the intrinsic character of processes that occur in other relevant regions with the same laws.[1] (Lewis 1986: 205–7) If enough of the processes in the other relevant regions exhibit the proper counterfactual dependence, *e* quasi-depends on *c*. Thus: *e* causally depends on *c* iff *e* counterfactually depends or quasi-depends on *c*. As with counterfactual dependence, we take the ancestral of the quasi-dependence relation and accept quasi-dependence as a kind of causation.

In the case with Quickdraw McGraw, take the relevant process to be the chain of events that runs from Quickdraw's shooting to the death of Billy, and compare it to processes with the same intrinsic character in regions of other possible worlds (with the same laws), but where Slow Joe isn't around. (Pretend, for the sake of simplicity, that our example is set in the actual world.) Since in all those processes Billy's death depends counterfactually upon, and so is caused by, McGraw's shooting, in our example Billy's death quasi-depends upon, and so is caused by, McGraw's shooting.

But if we look at the relevant regions with processes with the same intrinsic character as the process in the region of the actual world where Slow Joe's draw (and shot) occurs and Billy's death occurs (except that McGraw was nowhere to be found), it seems, *prima facie*, that Billy's death would depend counterfactually in these worlds upon Joe's acts. But then Billy's death would quasi-depend on Joe's shooting, and Joe's shooting would also be counted among the causes of Billy's death.

How can Lewis avoid this result? Presumably by denying, for the processes with the same intrinsic character as the process in the region of the actual world where Slow Joe's draw (and shot) and Billy's death occur, that Billy's death depends counterfactually upon Joe's acts. Although it is not perfectly clear what Lewis means by 'intrinsic character', there is a fairly obvious way to interpret his view. As the story was told, there was an interrupted chain of events between Joe's shot and Billy's death, since one or more events, such as the impact of Joe's bullet with the skin of Billy's (untouched) chest, did not occur. (By hypothesis, Joe would have hit the same spot as McGraw did, but by the time Joe's bullet arrives, there's already a big hole there.) Lewis defines processes as 'courses of events,

[1] A relevant region is a region of the same world or of different possible worlds with the same laws where what goes on is just like what goes on in the region with the events between *c* and *e*. Events that are not part of the process being evaluated are classed as irrelevant and are not included.

which may or may not be causally connected.' (Lewis 1986: 205) Therefore, in the processes with the same intrinsic character as the actual process (of the example) between Joe's shot and Billy's death, there are one or more events missing in the chain that are needed in order for Billy's death to depend counterfactually upon Joe's acts.[2] Billy's death does not quasi-depend on Joe's acts, so Joe's acts are not a cause of Billy's death.

2. *The PCA*-analysis.*

Ganeri, Noordhof and Ramachandran (1998) argue that their PCA*-analysis of causation is superior to Lewis's quasi-dependence analysis.[3] They claim to provide a solution to the problem of late preemption (for deterministic causation) that avoids reliance on 'intrinsic similarity', captures Lewis's initial intentions and lends itself to a simpler formal semantics. (Ganeri, Noordhof and Ramachandran 1996: 224)

Ganeri, Noordhof and Ramachandran assume that cases like the one with Quickdraw McGraw and Slow Joe exemplify the basic structure of all cases of late preemption. They argue that the best way to understand the claim that Joe's acts did not cause Billy's death to is recognize that crucial events are missing in the process from Joe's draw to Billy's death, and construct their PCA*-analysis on this insight. Since their analysis is based on what they take to be a necessary part of all cases of late preemption, that there will be events missing from the preempted chain, they avoid reliance on poorly understood notions such as 'intrinsic character'.

The PCA*-analysis reads:

> (PCA*) For any actual, distinct events c and e, c *causes* e iff there is a (possibly empty) set of possible events Σ such that
> (i) c is a Σ-ancestor of e, and
> (ii) every Σ-ancestor of e is an actual event.

To make sense of this, we need two definitions. First, for any events x and y and any set of events Σ, y Σ-*depends* on x iff: if neither x nor any of the events in Σ were to occur, then y would not occur, and if x were to occur without any of the events in Σ, then y might occur. Second, for any events x and y, and any set of events Σ, x is a Σ-ancestor of y iff there is a chain of events z_1, …, z_n, such that z_1 Σ-depends on x, …, and e Σ-depends on z_n. (Ganeri, Noordhof and Ramachandran, 1998: 46)

[2] This is the interpretation given to Lewis by Ganeri, Noordhof and Ramachandran (1996) and Ramachandran (1997).

[3] The PCA*-analysis was revised from an earlier version (Ganeri, Noordhof and Ramachandran, 1996) in light of counterexamples put forward in Byrne and Hall (1998). The problems for the PCA*-analysis presented here are problems for the PCA-analysis as well.

In the case above with Quickdraw McGraw and Slow Joe, the PCA*-analysis gives the same answer as the quasi-dependence analysis, and for much the same reasons. McGraw's shooting is a cause of Billy's death because the shooting is a Σ-ancestor of Billy's death (there is an uninterrupted chain of Σ-dependent events running from McGraw's acts to the death of Billy), and every event in the chain between McGraw's acts and Billy's death is 'actual' (occurred in the actual world). Joe's shot is not a cause of Billy's death, because there is no uninterrupted chain of Σ-dependent *actual* events running from Joe's acts to the death of Billy. Events such as the impact of Joe's bullet with the skin of Billy's untouched chest did not occur.

3. *Counterexamples*

Both quasi-dependence and the PCA*-analysis work well when we consider examples such as the one above. But both fail in many other cases – for the simple reason that *late preemption does not require that events in the preempted causal process leading up to (but not including) the final effect be prevented*. As the examples I present below show, all that is required for late preemption is that the effect of the preempting cause occurs earlier than it would have if the effect had been caused by the preempted cause. The problem for the PCA*-analysis is particularly acute, as the assumption that in cases of late preemption there will be nonactual events in the chain from preempted cause to effect seems to play an essential role in the analysis.

I will examine two cases. The first case, involving action at a distance, makes the inadequacy of quasi-dependence and the PCA*-analysis for problems involving late preemption particularly obvious.[4]

Case 1. Return to our showdown, and recall that Quickdraw McGraw and Slow Joe begin to draw at virtually the same time, but Joe's draw is a little slower, so McGraw's shot occurs first, so his bullet hits Billy's chest first. This time, imagine that McGraw uses a gun that works the regular way. However, Joe (who would have caused the death, had Billy not been killed exactly at noon) has a special gun that works by action at a distance: he aims the gun and shoots at a victim, and after a short time (about as long as a regular gun takes), the victim dies (in exactly the same gory fashion that he would have died had he been shot by a regular gun; holes in his

[4] Lewis (1986) parries action at a distance examples; he claims they are too far-fetched for us to have reliable intuitions about them. One could disagree, and argue that our intuitions about such cases are clear and easy enough to assess. At any rate, the example is useful as it presents a clear case that shows how the prevention of the occurrence of events other than the later occurrence of the final effect is not necessary for late preemption.

back and chest open up, etc.)[5] By definition, there are no events in between the shooting of the gun and the death of the victim – a standard action at a distance scenario. Now, in our example, Billy is killed at 12:00:00 by McGraw's gun, but if he hadn't been killed at 12:00:00, he'd have been killed at 12:00:01 by Joe's special gun. So the causal process originating with Slow Joe's act is preempted by Quickdraw McGraw's act. However, *no events in the preempted causal process are prevented from occurring*.[6]

The unacceptable conclusion is immediate. The PCA*-analysis tells us that both McGraw's acts *and* Joe's acts count as causes, since both McGraw's and Joe's acts are Σ-ancestors of Billy's death, and every Σ-ancestor of Billy's death in both causal processes (the process from McGraw's act and the process from Joe's act) is an actual event. The quasi-dependence analysis also tells us that Slow Joe's act as a genuine cause of Billy's death, since in the processes with the same intrinsic character as the process in the region of the actual world where Slow Joe's draw (and shot) occurs and Billy's death occurs, except that McGraw was nowhere to be found, Billy's death would depend counterfactually upon Joe's acts.

Case 2. The same problem returns when we consider slightly more complicated cases that do not involve action at a distance. All we have to do to get the wrong answer is to try and determine the cause of an event early enough in the sequence of events. Return to our original showdown case, where McGraw and Joe had the same sort of gun, but Joe's draw was a little slower. As the case was told, several events in the causal process from Joe's acts to the death of Billy are prevented from occurring. One such was, as we noted above, the event of Joe's bullet making a hole in the skin of Billy's chest.

This time, change the focus from Billy's death to an effect that happens a bit earlier: ask what the cause was of the hole in Billy's chest, or earlier

[5] We've been pretending that this is the actual world. If you think that it is too far of a departure from the actual world to imagine this scenario as part of it, pretend that it occurs in a possible world that is the same in as many respects as possible to our world, except that action at a distance is commonplace there.

[6] One might want to claim that a slightly later occurrence of the effect is a different event from the earlier occurrence of the effect. So the death of Billy at time t is a different event from the (otherwise qualitatively identical) death of Billy at time $t + n$, where n is a fraction of a moment. Such a solution involves what Lewis (1986) calls 'fragility' of the event. Under this conception of events, any difference in when or how an effect occurs changes the essence of the event. 'Call an event *fragile* if, or to the extent that, it could not have occurred at a different time, or in a different manner.' (Lewis 1986: 196). (See Lewis 1986: 197–98 for further discussion.) Lewis rejects fragility solutions (as do I): they lead to counterintuitive restrictions on events. Fragility is no help to the PCA*-analysis either, since adopting this solution solves the problem of late preemption outright.

yet, what the cause was of the initial impact of a bullet with Billy's chest. When we do this, we see that we again have two causal processes, a preempting process (McGraw's drawing and shooting to the impact) and a preempted process (Joe's drawing and shooting to the impact). Of course we want to say that it is McGraw's shot and not Joe's that caused the initial impact of a bullet with Billy's chest.

Again the PCA*-analysis and quasi-dependence wrongly count both McGraw's acts and Joe's acts as causes of Billy's death, since again, no events that are part of the causal process from Joe's act to the effect in question (the impact on Billy's chest) were prevented from occurring.[7] Such cases show the inadequacy of both quasi-dependence and the PCA*-analysis in addressing the problem of late preemption.[8,9]

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References

Byrne, A. and N. Hall. 1998. Against the PCA-analysis. *Analysis*, this issue.

Ganeri, J., P. Noordhof and M. Ramachandran. 1996. Counterfactuals and Preemptive Causation. *Analysis* 56.4: 219–25.

Ganeri, J., P. Noordhof and M. Ramachandran. 1998. For a (revised) PCA-Analysis. *Analysis*, this issue.

Lewis, D. 1973. Causation. *Journal of Philosophy* 70, 556–67. Reprinted in his *Philosophical Papers*, Volume 2. New York: Oxford University Press, 159–72.

Lewis, D. 1986. Postscript to 'Causation'. *Philosophical Papers*, Volume 2. New York: Oxford University Press, 172–213.

Ramachandran, M. 1997. A counterfactual analysis of causation. *Mind* 106, 263–77.

[7] If you still find yourself worrying about events in Joe's causal process being prevented, take an even earlier event: the presence of a bullet in the space directly in front of Billy's chest, the disturbance of the air molecules in this general area; whatever you please. The way the case has been set up, there will be some initial event that the first bullet causes and that the second bullet would have caused. Whatever that event is, ask what caused it – McGraw's acts or Joe's?

Alternatively, you might want to claim that the event of the initial impact of a bullet with Billy's chest is different depending on whether or not the bullet was McGraw's or Joe's. Such a solution relies too heavily on fragility to be of use here.

[8] These examples also show the insufficiency of Ramachandran's (1997) M-set analysis of causation.

[9] Thanks to David Lewis for discussion, and to Alex Byrne, Jonardon Ganeri, Ned Hall, Paul Noordhof and Murali Ramachandran for permission to read and cite their papers before publication.