

## *Problems for the M-Set Analysis of Causation*

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Murali Ramachandran has put forward the following counterfactual analysis of causation.

### *The M-Set Analysis of Causation.*

For any actual events  $c$  and  $e$ ,  $c$  causes  $e$  if and only if (A)  $c$  belongs to an M-set for  $e$  and (B) there are no M-sets for  $e$ , M and N, such that M contains  $c$  and N differs only in that it has one or more non-actual events in place of  $c$ . (Ramachandran 1997, pp. 273–4)

It faces three problems. First, it cannot deal with cases of preemption that we might call frustration: cases where both an A-process and a B-process are complete but the A-process brings about the effect before the B-process and hence *frustrates* it. Second, contrary to advertisement, it does not accommodate indeterministic causation (see Ramachandran 1997, pp. 272–3). Third, again contrary to advertisement, it loses the asymmetry of counterfactual dependence and hence all the benefits that that brings David Lewis regarding the problem of effects and the problem of epiphenomena (see Lewis 1979, p. 34; Lewis 1973, pp. 170–1; Ramachandran 1997, p. 275). In order to see these things, you need to understand Ramachandran's notion of dependence set and minimal dependence set. You also need to understand why his account gives the right results in the cases it does.

Ramachandran defines a dependence set S for an event  $e$ , where  $e$  is not a member of S, as follows.

- (D) If none of the events in S had occurred, then  $e$  would not have occurred. (Ramachandran 1997, p. 270)

A minimal dependence set, M, for  $e$  is defined as follows.

- (M) No proper subset of S is a D-set for  $e$ .

The intuitive idea behind his account is revealed most clearly, in cases of preemption. The thought is that an A-process is preempted by a B-process because the B-process has stopped the completion of the A-process by

inhibiting an event in that process from occurring—as shown in the diagram below.

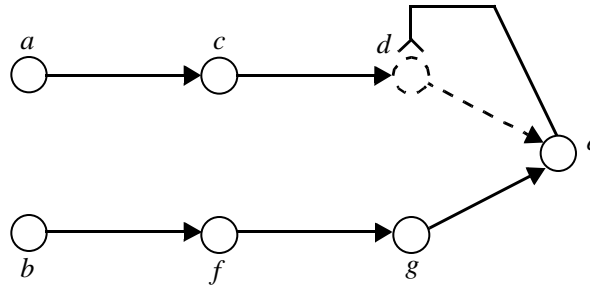


Figure 1

This non-actual event may be substituted in the place of an actual event in the A-process to produce the relevant N-set mentioned in the analysis. By contrast, there will be no non-actual event to substitute in the place of an actual event in the B-process to produce an N-set. That’s why preempting events are causes and the preempted are not. Unfortunately, problems follow swiftly.

### 1. Cases of frustration

The first problem concerns Ramachandran’s characterisation of preemption. I agree that there are some cases of preemption that have the character he has identified but question whether all cases are like that. If his diagnosis of what goes on in preemption is wrong, his account loses its intuitive motivation. Consider the following circuit diagram.

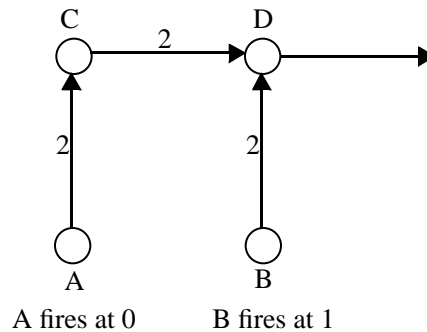


Figure 2

A fires at time 0, B at time 1, D at time 3. It takes two units of time for the current to travel between the nodes of the circuit. We need not consider the links between the nodes, one-step connections but it simplifies the discussion if we do. It seems that there are no non-actual events between A and D. So the A-process is completed. But intuitively the B-process preempts the A-process. It brought about D firing before A would have.<sup>1</sup>

What might Ramachandran say? He might ask about the events between C and D. Perhaps there are some which did not occur by the time that D occurred. Suppose I grant that there are. They won't be non-actual. They will just occur after D occurred. Perhaps it will be argued that there must be some event on the A-chain to D that the B process stops from occurring by bringing about D a full one unit of time before the A-process would have. Suppose D fires. Isn't there an event of D just beginning to fire on the A side which doesn't occur if D has already fired as a result of the B-process? Perhaps—but I do not think that for every case of this type, we can be confident that this is so. Certainly we cannot be as confident as we can be that we have a case of preemption. Any analysis of our concept of causation should not involve us in commitments it is implausible to view us as having.

So it seems that we have a straightforward counterexample to his account. It is not sufficient for causation because it makes A into a cause, when it should not.

## *2. Indeterministic causation*

A standard case of indeterministic causation occurs when we bombard a radioactive isotope of a chemical element (for instance, radium or uranium) with a subatomic particle. The isotope has a probability of decaying by discharging a subatomic particle anyway. But if one bombards the element, the probability of decay is very much higher (for details, see Mellor 1995, pp. 52–3). Suppose that subsequent to the bombardment, a subatomic particle is discharged. Is the bombarding a cause of the discharge or not? Ramachandran's account would say no. The bombarding would not be part of a D-set since a background probability of the discharge of a

<sup>1</sup> In fairness, I ought to note that a counterexample of this general form is offered in a footnote to an article by Byrne and Hall (forthcoming). They offer it as a counterexample to the analysis put forward in Ganeri, Noordhof and Ramachandran (1996). They talk in terms of action at a temporal distance. I think this involves them in unnecessary controversy. The counterexample I am offering does not rely upon this and applies just as much to the Ganeri, Noordhof and Ramachandran analysis.

subatomic particle holds regardless of circumstances (see Ramachandran 1997, pp. 272–3). You can put all the events you like into the D-set and still it might be the case that there is a discharge. But is this right? If one is prepared to concede that an event *a* need not be sufficient for *b* in order to be a cause of *b*, what is the rationale asserting that the non-occurrence of *a* must be sufficient for the non-occurrence of *b* (which is what insisting on causes being necessary comes down to)? Considerations of symmetry suggest that there is no rationale. If Ramachandran is going to rely upon a distinction here, I think he should explain why it is appropriate to do so. Certainly it is debatable whether indeterminism poses no special problem (Ramachandran 1997, p. 276).

Perhaps it might be thought that there have got to be circumstances either outside or within the radioactive isotope on which the probability of discharge depends—circumstances *distinct* from the discharging. But I do not think that an analysis of our concept of causation is entitled to assume that something like this must be the case. Once more it seems that our conviction that there is a case of causation here is independent of whether or not this is so. It looks as if cases of indeterministic causation show that Ramachandran’s account does not provide a necessary condition for causation.

### 3. *Loss of the solutions to the problem of effects and the problem of epiphenomena*

Like David Lewis (1973), Ramachandran appeals to the asymmetry of counterfactual dependence to deal with what Lewis called the *problem of effects* and the *problem of epiphenomena*. Suppose that, given the laws and some of the actual circumstances, *c* could not have failed to cause *e* but that *e* did not cause *c*. There was no causal loop. However, it seems that in the circumstances described, the counterfactual “if *e* had not occurred, *c* would not have occurred” is true. So, if the counterfactual approach to causation is correct, *c* causally depends upon *e* after all—contrary to our original supposition. This is the *problem of effects*. The *problem of epiphenomena* arises when *c* is the common cause of *e* and *f* but where *e* does not cause *f*, or *f*, *e*. It can look as if the counterfactual “if *e* had not occurred, *f* would not have occurred” holds because in these circumstances, *c* would not have occurred either. Lewis deals with both of these problems by denying that the so-called backtracking counterfactuals in these cases are true, in particular that, if *e* had been absent, *c* would have been absent (Lewis 1973, pp. 170–1). Counterfactual dependence is asymmetric.

Lewis provides an explanation of this asymmetry to which Ramachandran appears committed. It is quite important that the explanation of counterfactual asymmetry does not appeal to causal asymmetry, otherwise a reductive analysis of causation becomes out of reach. Ramachandran wants such an analysis (Ramachandran 1997, p. 270). So clearly the issue of what grounds the asymmetry is important to him. He refers to the passages which give Lewis's explanation with approval and without indicating that he has any doubts over whether he might appeal to the same explanation of the asymmetry. These considerations make me think that he believes that he can help himself to the same approach. Unfortunately, Lewis's explanation appears unavailable to Ramachandran.

Lewis explains why backtracking counterfactuals are generally false by the fact that it would take a very big miracle to secure a convergence of the future to circumstances in which the cause did not occur. For instance, to take the example Lewis discusses, the reason why we would not say (as members of the post-holocaust world)

- (1) If the holocaust had not occurred, then Nixon would not have pressed the button

is that a big miracle is needed to cover up all the other consequences of Nixon pressing the button—for instance “the fatal signal, the finger prints, the memories, the tape [preserving the click of the button], the light waves” etc. (Lewis 1979, pp. 48–9). By contrast, a much smaller miracle would be needed if, although the holocaust had not occurred, Nixon had still pressed the button. We might just suppose, for instance, that the fatal signal had vanished “on its way from the button to the rockets” (Lewis 1979, p. 45). According to Lewis, that explains why we can't backtrack. The closest worlds to our world—in which Nixon pressed the button and the holocaust occurred—would thus be ones in which Nixon had still pressed the button.

The problem for Ramachandran is that once he allows the D-set for  $x$  to contain any events such that, if none of them occurred, then  $x$  would not have occurred, backtracking counterfactuals will be available whose truth makes every effect a cause of its cause. To go back to the example, suppose we take as a D-set the fatal signal, the finger prints, the memories, the tape, the light waves, along with the absence of a holocaust. The backtracking conditional “if there were neither the holocaust, nor the finger prints, nor the memories, nor the tape ... Nixon would not have pressed the button” holds.<sup>2</sup> No *additional* cover-up miracle would then be needed. Just the miracles that Lewis allows would have to be present for the conditions mentioned in the antecedent to hold. This D-set seems to be an M-

<sup>2</sup> For similar reasons, Ramachandran could not appeal to Daniel Hausman's proposal for accounting for the asymmetry without appeal to miracles (Hausman 1996, pp. 57–61).

set because no proper subset of these events will ensure the truth of the backtracking conditional—or if one does, then that will be the M-set and I might just recast my point in terms of it. So the holocaust is a cause of the pressing of the button by Ramachandran’s account. The problem that faces Ramachandran is that the very machinery he uses to explain how a certain event can be a cause where a straightforward counterfactual dependence is lacking can be utilised to explain how each effect is a cause of its cause. Hence, given that some effects aren’t causes of their causes, here is another reason for thinking his account does not provide a sufficient condition for causation. And, if he has lost Lewis’s solution for the problem of effects, he has lost it for the problem of epiphenomena too.<sup>3</sup>

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<sup>3</sup> I should point out that the potentially complete ancestor account put forward in Ganeri, Noordhof and Ramachandran (1996) and defended in Ganeri, Noordhof and Ramachandran (forthcoming) faces the same challenge. We might restore the asymmetry to which Lewis appeals in the following fashion.  $e_1$  is a cause of  $e_2$  rather than vice versa because the smallest  $c_1$  that makes  $e_2$  -dependent on  $e_1$  is smaller than the smallest  $c_2$  that makes  $e_1$  -dependent on  $e_2$ . To deal with the problem of epiphenomena where, let us suppose,  $e_1$  and  $e_2$  are common effects of  $e_3$ , we could claim that: It should not be the case that the smallest  $c_1$  that makes  $e_1$  -dependent on  $e_3$  and the smallest  $c_2$  which makes  $e_2$  -dependent on  $e_3$  are both equal to or smaller than the smallest  $c_3$  that makes  $e_2$  -dependent on  $e_1$ . I suspect that similar moves may be available to Ramachandran.

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