CRITICAL NOTICE

Causation, Probability, and Chance

PAUL NOORDHOF

The Facts of Causation, by D. H. Mellor. London and New York: Routledge, 1995. Pp. xii + 251. H/b £35.00, P/b £16.99.

It is only to be expected that Hugh Mellor's book on causation is a highly sophisticated, densely written, technical piece of philosophy. It is hard to think of anybody who could afford not to read it. It has the great virtue of gathering together in one place and developing Mellor's thoughts on causation and issues related to it. But it does have a flaw. It is not gentle with the reader. The reader is expected to construct Mellor's full theory for him or herself; there is no final summary statement. The reader is also expected to generate his or her own understanding of how Mellor's theory relates to other theories in the field and their respective virtues. Also there are some surprising omissions. For instance, I would consider a theory of causation's treatment of the possibility of pre-emption to be a good indication of whether it was successful overall. Mellor's book does not discuss pre-emption, as a quick glance at the index will show. It may be that Mellor has realised that pre-emption is not a problem for his theory so it would distract from its articulation if he discussed it. But the reader may not have realised this. It would have been helpful to have indicated how the theory can deal with such a problematic area, thereby revealing the theory's strength relative to other theories.

I will try to give a feel for the bones of Mellor's theory by identifying its main components, discussing their motivation and relating the various dialectical moves Mellor makes. Let me begin with a quick sketch of the whole theory. Mellor holds that

  (I) The fundamental kind of causal statement concerns facts (true propositions) rather than events.

He thinks that all causal statements concerning events can be cashed out as causal statements concerning facts. Therefore, in a weak sense, facts are the fundamental causal relata. But when Mellor goes on to consider what the truth-makers of causal statements are, he concludes that

  (II) Neither causation nor laws are relations.

So the ultimate position is that there are no causal relata. He maintains that what make causal statements true are fact-like genuine entities which he dubs "facta" (pp. 161–2). Moving on to the nature of causation, he holds that

   (III) Causes raise the chances of their effects.

He believes that an appeal to chance-raising gives him an acceptable account of causal necessity and sufficiency. The truth-makers of laws are non-relational facta whose structure remains unknown to us and which hold at every spatio-temporal position. He takes these facta to be logically independent from each other and thereby concludes that

   (IV) There can be no backward causation.

By these means, he explains why causes precede their effects rather than vice versa. This enables him to knit together the three crucial connotations of our notion of cause that distinguish it from effects: causes are means to ends, causes are explanatory, and causes are invariably temporally prior to their effects (pp. 219–20). He closes by noting that our sense of the direction of time comes from the causal order of our experiences. We experience *e as before f* because our experience of *f* is affected by our prior experience of *e* (pp. 237–43).

1. The analysis of causal statements and the relata of the causal relations

Although, later in the book, Mellor makes it clear that he does not believe that what makes causal statements true includes a causal relation—so, strictly speaking, there are no causal relata—he does believe that some considerations can be offered for holding that facts are the fundamental relata *if any are*. These considerations are worthy of independent comment.

His procedure has two components. He begins by giving examples of causal statements in which the relata must be facts. This is meant to show that fact causation cannot be reduced to event causation. He then goes on to show that event causation can be derived from fact causation.

Two types of cases convince Mellor that not every case of fact causation can be reduced to event causation. First, there is the matter of iterated causation (pp. 106–9). Statements such as

   (1) Don's fall causes his death *because* his bones are brittle

seem to be genuine causal statements yet "his bones are brittle" does not refer to an event but a fact. So we have a reason to think that *some* causal

statements must relate facts. However, I am not clear that this consideration is forceful. One might rewrite (1) as

> (2) The brittleness of Don's bones causes Don's fall's causation of his death.

The phrases on either side of the "causes" do not seem to be "fact-like or propositional" (cf. p. 109). The phrase "Don's fall's causation of his death" is perhaps the most grammatical way one can describe the event related to the fact that Don's fall caused his death (cf. Bennett 1988, pp. 4–7). It sounds awkward but not awkward enough to rule out events as causal relata even here. So it does not seem that we have to use causal statements relating facts (rather than events) to capture what we need to say in cases of iterated causation. Perhaps there are other examples, but as long as one's ear is not too sensitive to decent English, I suspect similar manoeuvres are available.

The second consideration that Mellor offers concerns negative facts and events (pp. 131–5). He suggests that the supporter of events as relata will be embarrassed by such sentences as

> Bill does not die because he does not get cancer.

The worry is that there are no negative events, so they cannot be what is related by such a sentence. The obvious thing to do is to take "Bill does not die" to be made true by an event such as the persistence of the vital functions of Bill's body, and "Bill does not get cancer" to be made true by an event such as the cell growth of Bill's body continuing to function in ways that do not include the production of cancerous cells. One could then argue that the truth of the negative causal statement concerning facts supervenes on the truth of a positive causal statement concerning events such as:

> The cell growth of Bill's body continuing to function in ways that do not include the production of cancerous cells *causes* the persistence of (whatever are) the vital functions of Bill's body.

Once again, I recognise that this is not going to win awards for elegant English, but I take it that this is a different matter from the question of whether event or fact causal statements are fundamental.

Mellor deals with this kind of strategy in a rather puzzling way. In effect, he presents it with a dilemma. *Either* the events I have just identified are, in fact, negative events which exist by definition just in case some positive events—namely Bill dying and Bill getting cancer—don't exist. *Or*, if I persist in thinking that the events I have identified are positive, then he can run the case in reverse. He can invite me to consider the statement

> Bill dies because he gets cancer

and now I will have to concede that it requires negative events to be true. But there aren't any negative events. So I am forced to admit the primacy of causal statements concerning facts (p. 134).

The reason I don't think the dilemma is genuine is that I don't think that the pairs of events

(3) the persistence of (whatever are) the vital functions of Bill's body and the death of Bill

(4) the cell growth of Bill's body continuing to function ways that does not include the production of cancerous cells and the onset of Bill's cancer

constitute pairs of positive and negative events, one defined in terms of the absence of the other. It is a matter of law rather than definition that the end of certain vital functions constitutes the death of Bill. Likewise, it is a matter of law rather than definition that certain types of cell growth in Bill's body are cancerous and others are not. Admittedly, I have characterised the ways as *ways which are not cancerous* and the functions as *vital*. But this is just a result of my ignorance. It should be possible to characterise them in a way which did not mention what was cancerous and what was non-cancerous cell growth and what were vital and non-vital functions *as such*. In abstract, my claim is that it is not legitimate to suggest that if *f causes g* is a causal statement relating positive events, then what makes not-*f* cause not-*g* are two negative events: non-occurrence of *f* and the non-occurrence of *g*. Rather there are various positive events each of which— given the laws which hold—would make the negative causal statement true and one of which, in fact, did make it true in the circumstances.

If there are positive events which play the role indicated, then there is an obvious way to reply to Mellor's application of Ramsey's argument against negative particulars. Mellor's line of thought was that, if a negative event makes "Bill does not die" true, then the negative event would have to have inconsistent properties. It would have to be both a slow non-death and a fast non-death to capture the fact that "Bill does not die" implies that "Bill does not die slowly" and "Bill does not die quickly" and hence be both slow and fast. But since nothing can have inconsistent properties, there are no such events. If there are no such events, then "Bill does not die because he does not get cancer" cannot be about a relation between two events (pp. 133–4). However, if one takes seriously the idea that statements apparently concerning negative events can be made true by positive events, then it can be argued that "Bill does not die" is true in virtue of *the persistence of (whatever are) the vital functions of Bill's body*. Given the laws which hold, the event would also make true the claims that Bill does not die slowly and that he does not die quickly.

   This is one point where the strategy of dividing the book into two components—one focusing on what is the fundamental kind of causal statement, the other focusing on what are the truth-makers of causal statements—is apt to give rise to confusion in the reader's mind. For the moment, Mellor is working with a thin notion of fact—just whatever is a true proposition—and a substantial notion of event. It is this that enables him to raise the concern that there can be no negative events. But aren't there two separate issues? First, are causal statements in terms of events or facts primary? To deal with this issue both notions should be thinly understood so that events (as opposed to "eventa"!) are those things referred to by the characteristic phrases used to pick out events in true sentences. Second, what are the truth-makers of causal statements of either kind? The friend of eventa will want to know why facta perform better as truth-makers. But having had their cousins dismissed for underperforming against facts, they don't really get a look in. Facta reign supreme.

   In the light of the discussion so far, our preliminary conclusion should be that it is open to us to claim that either statements of fact causation or statements of event causation may be primary. It is in this light that we might look at Mellor's attempt to derive statements of event causation from statements of fact causation. He suggests that this may be done in the following way. Take the basic case of fact causation to be

   (i) $(\exists x)(Kx)$ causes $(\exists x)(Lx)$.

Let c and e stand for events. If there are descriptions of these events such that in the context they are definite—i.e.

   (ii) $c = (\imath x)(Kx)$.

   (iii) $e = (\imath x)(Lx)$,

then, from (i) to (iii), we get

   (iv) c causes e (pp. 135–9).

Mellor considers two problems that face this derivation. First, there is the distinction between *causing* and *affecting* (p. 140). *Causing* something brings it into existence whereas *affecting* something just alters its properties. The problem is that, strictly speaking, (iv) should have read "c causes or affects e". In talking about the particulars c and e, the question of whether (i) involves a causing or affecting between particulars has not been settled. So his derivation of causal statements concerning particulars is not complete. Mellor deals with this by remarking that whether something is a case of causing or affecting depends upon whether the property expressed in the definite description *the L* is an essential or accidental property of the event in question. If it is essential, then the existence of the event was brought about and we have a case of c causes e. If it is accidental, then the existence of the event is not brought about and we have a case

of *c* affects *e*. But the distinction between essential and accidental properties is no part of the theory of causation. Hence, he does not have to account for the difference between causing and affecting in his theory (pp. 140–4).

The second problem concerns the relationship between statements of causation that reveal *how* one particular causes another of the form

   (v) *Le* because *Kc*

and statements of fact causation such as "($\exists x$)(*Lx*) because ($\exists x$)(*Kx*)" (which he takes to be interchangeable with (i)). For Mellor's programme to be complete, he needs to show how the statements of existential fact causation are fundamental. One difficulty that arises in this context is that it is unclear how (v) relates to the derivation for "*c* causes or affects *e*" since the latter context is transparent whereas (v) is opaque (e.g. "Don's fall is the first because his rope is the weakest" might be true whereas "Don's fall is the first because his rope is his rope" is false even though his rope = the weakest rope). Mellor circumvents the latter problem by suggesting that we stipulate that "*c*" and "*e*" are rigid designators (p. 153). This is an acceptable manoeuvre bearing in mind that taking them in that way does not undermine the function of (v), which is to show the way in which particulars (however described) cause or affect each other. He then suggests that (v) is entailed by (i)–(iii)—given this understanding of "*c*" and "*e*" (p. 154). Moreover, since the entailment is mutual, this shows that, on the transparent reading of (v), (v) entails that *c* causes or affects *e* (p. 154).

I think that Mellor is largely successful in his treatment of these difficulties, but his discussion throws up a related difficulty that I think is more threatening for his approach. He denies that (iv) implies (i) on the grounds that there are descriptions of *c* and *e*, say the *S* and the *T*, such that "There is a *T* because there is an *S*" is false. Intuitively, the grounds for making this claim are that *S* and *T* do not pick out the causally relevant properties. For instance, Mellor gives the example of "Don dies because he falls" and invites us to consider the possibility that Don's death would be picked out by "there is a most newsworthy event". It would not follow that "there is the most newsworthy event because there is a fall" because, Mellor suggests, the chance of there being a most newsworthy event would have been no less if there had not been a fall. Hence the fall did not raise the chances of the effect (p. 138).

This claim raises two issues. First, why should the descriptions which uniquely pick out the events in the context they occur be descriptions that pick out the events by their causally relevant properties? If this connection cannot be established, then it will not be true that there will be a case of existential fact causation for the descriptions which uniquely identify the

events in the context, and the derivation fails. Second, Mellor's derivation presumes that there could be no brute singular causation between events—that is a one-off causal relation between events that does not hold in virtue of the properties of these events. If there were, then there would be no definite descriptions that pick out the two events for which there is an appropriate case of existential fact causation understood in the way that Mellor wishes.

These points have quite serious consequences for Mellor's position. I have tried to indicate how Mellor's positive arguments for taking the relata of the causal relation to be facts aren't fully convincing. So the derivation might be read as reducing event causation to fact causation or vice versa. If anything, the last two points swing the balance in favour of reducing fact causation to event causation and the causal relevance of properties. First, in cases of brute singular causation, there is going to be no true existential fact causal statement. Second, in standard cases, the reliance of fact causal statements on being able to identify events uniquely by their causally relevant properties is damaging. It seems that there may be few statements of fact causation which entail that a causal relationship holds between two particular events—as opposed to between some two events or other. Of course, the point about causally relevant properties failing to pick out the events shows that the derivation of fact causation from event causation cannot be via (ii) and (iii). But since there is no need to identify particulars in this way because we are working up from statements concerning them, there is no problem. Instead, I suggest we use

  (ii)* *c* is *K*,

 (iii)* *e* is *L*,

  (vi) The possession of *K* is causally relevant to the possession of *L*.

From (iv), (ii)* and (iii)*, we would get

  (v) *Le* because *Kc*.

One could then derive (i) by existential generalisation.[1]

---

[1] In later work, Mellor suggests that facts are tropes or property instances—where these are not thought to have particulars or properties as constituents (see Mellor and Oliver 1997, pp. 17–9). I have two concerns about this idea. First, it becomes increasingly unclear to me what the issue is between those who emphasise that causation holds between events and those who emphasise that it holds between facts. Second, taking tropes to be facts fails to capture the idea of causal relevance behind statements of the form "*Le* because *Kc*" and "($x(Kx)$ causes ($x)(Lx)$)". There may be two properties sharing the same trope only one of which is causally relevant. For instance, the property of being over 90 decibels and that of meaning I love you may have the same property instance—a certain note—but only being over 90 decibels was causally relevant to the glass shattering (see Noordhof 1998 and Noordhof (forthcoming) for further discussion).

2. Causes raise the chance of their effects and the preemption problem.

The second component of Mellor's theory is his characterisation of causation. He holds that causes raise the chances of their effects. That is

C causes E iff $\text{ch}_C(E) > \text{ch}_{\neg C}(E)$.

Here the $\text{ch}_C(E)$ stands for the chance of E against a background of circumstances G which includes all the facts causally relevant to E including C, and $\text{ch}_{\neg C}(E)$ is the chance of E against the same background of circumstances G save that C is not the case (pp. 24–7, 67–8). There are prima facie counterexamples to this proposal. In considering one, we will get a better grip on Mellor's theory and, in particular, his view about the truth-makers of causal statements.

Suppose that we have two processes beginning with a firing and b firing respectively and resulting in e. Let the b-chain be less reliable than the a-chain and let b preempt the a-chain (cf. Menzies 1996, p. 88).
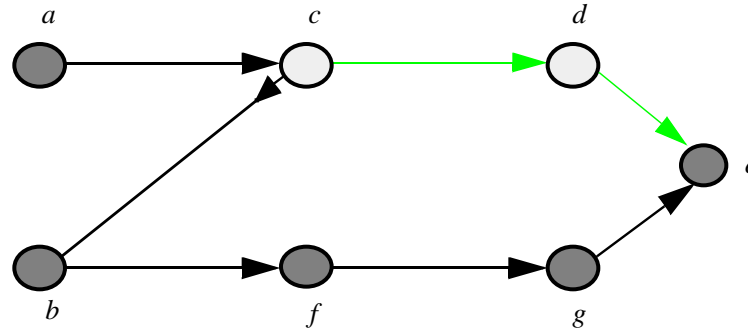

Figure 1

a's firing raises $\text{ch}(E)$ (where E stands for "e fires"). Hence *prima facie* a's firing is a cause of e's firing by Mellor's theory. b's firing lowers the $\text{ch}(E)$ by inhibiting the a-chain. David Lewis avoids the outcome that b's firing is not a cause of e's firing by taking the ancestral of the probabilistic counterfactual dependence relation (cf. Lewis 1986, p. 200). Mellor does not. So is he faced with the result that b's firing is not a cause of e's firing?

Mellor's reason why a's firing is not a cause appears to rest on the requirement that there is no unmediated action at a distance. There must be a chain of contiguous causes and effects (pp. 229–34). a's firing is not a cause of e's firing because there is a gap in the causal chain from a's firing to e's firing. In contrast, there is no gap between b's firing and e's firing. However, we still don't get the result that b's firing is a cause. I presume that to do this one must include, in the circumstances against

which *b*'s firing raised the chances of *e*'s firing, the fact that certain events in the *a*-chain did not occur. So the idea appears to be that

> a fact *C* is a cause of *E* if (i) it raises the chances of *E* against *some* background or other, *G*, and (ii) there is a chain of contiguous causes between *C* and *E*.

The requirement that immediate causes are contiguous with their effects appears to differentiate causes from facts which might have the other connotations of causation which Mellor identifies. These connotations are that causes are evidence for their effects, explain their effects, are means to ends (their effects) and are temporally prior to their effects (p. 60). As we have seen, a fact may have all these connotations yet not be a cause because it is not linked by a series of causes the last of which is spatiotemporally contiguous with the putative effect *E*. A peculiarity of the situation just described is that the firing of *b* (itself) was a cause of the non-occurrence of the requisite events in the *a*-chain. It is not obvious that we can bracket this fact when we consider the circumstances against which *b*'s firing may have the connotations of causation—but let that pass.

The suggested solution also does not sit particularly happily with Mellor's requirement that the causal circumstances are those which "have more or less the same location" as the cause (p. 24). The fact that a certain event did not occur in the *a*-chain may be located at some distance from the cause. However, I take it that we might loosen this requirement somewhat. Failing that, I suppose it is possible that Mellor could deny that *b*'s firing is a cause. He might argue that the fact that there was a firing raised the chances of *e* firing but that was despite the firing being a firing of *b* (pp. 67–8). The strategy appears to work in the example Mellor discusses: Sue's hole in one. Here we might agree that her *pulling* of the drive wasn't cause since it lowered her chances of getting a hole in one—although in fact she did get a hole in one because the ball bounced off a tree and into the hole. This agreement is obtained because we are offered another closely related fact as a cause, namely her driving the ball. But what fact about *b* firing can be cited to play an analogous role to massage our intuitions into accepting that the firing of *b* was not a cause of *e* firing? There appears to be no answer.

3. Chance, Counterfactuals and Causal Necessity.

Mellor rejects a theory of causation that merely appeals to counterfactuals because, he argues, it cannot capture the notion of causal sufficiency. He uses this to motivate the idea that we need objective chance (pp. 28–30).

However, somewhat surprisingly, he does go on to appeal to counterfactuals in characterising his own approach. I think that this gives him a version of the same difficulty that he believes to infect the counterfactual account. Moreover, some of the means by which he appears to escape the difficulty seem to be available to the counterfactual theorist. So this motivation for appealing to objective chance appears flawed.

The counterfactual theory appeals to sentences of the form "If c were to occur, then e would occur" to capture our notion of causal sufficiency. Such sentences are true (according to the Lewis semantics for counterfactuals) if the sentences "c occurs" and "e occurs" are true. Mellor argues that that would make any two facts causally sufficient for each other.

To see what is wrong with this objection, consider what the counterfactual theorist should say if he or she were asked "Suppose if c were to occur, e would occur. Does it follow that c is causally sufficient for e?" Arguably not. The counterfactual theorist should say "It depends upon whether, if c were not to occur, then e would not occur". Mellor points out that by itself this second counterfactual is no better placed to capture our intuitive notion of causal necessity. One might rewrite "if c were not to occur, then e would not occur" as "if not-c were to occur, then not-e would occur". The latter would no more capture the sufficiency of not-c to bring about not-e—intuitively the idea behind causes being necessary in the circumstances for their effects—than the first conditional would capture the sufficiency of c to bring about e (pp. 29–30). But that just shows that these two conditionals are not meant to be read individually. They are meant to be read together. The counterfactual theorist should argue that it is the joint truth of these two conditionals that captures the distinctive nature of causality. The individual conditionals only capture causal sufficiency and necessity *if* they jointly hold (see Lewis 1973, pp. 166–7). Perhaps it would be better to say that, in such circumstances, they capture the only sense of causal sufficiency and necessity that a denier of necessary connections like David Lewis will allow (Lewis 1986, pp. ix–xiii).

Let us turn now to what Mellor thinks will capture the necessity and sufficiency of the cause. He holds that

(1) C is sufficient for E iff $C \quad \text{ch}(E) = 1$

and

(2) C is necessary for E iff $\neg C \quad \text{ch}(E) = 0$ (p. 29).

But we seem to be only a little way forward here. The "   " is meant to stand for a counterfactual conditional. What was supposed to be wrong with the appeal to such conditionals is that they made a fact sufficient for any other fact. We don't get that with Mellor's emendation. But what we do get is that one fact is sufficient for any other fact whose probability is 1.

I think Mellor now faces a dilemma. He could make the same move that I identified for the counterfactual theorist. I don't think that this would be that damaging. He would lose his motivation for introducing objective chance. But there is still ample motivation for so doing to characterise causation in an indeterministic world. His theory would, more clearly, take the form of a version of the counterfactual theory but perhaps this should not worry him too much. However, in fact, Mellor appears to take a different line.

There are two components to it. First, Mellor would say that *C* is a cause of *E* rather than some other fact *F* such that ch(*F*) = 1 because the latter chance is not a property of the background circumstances, *G* (of *C*), together with *C* whereas ch(*E*) is. The obvious question now is what is the relationship between circumstances of type *G* with *C* and ch(*E*)? Let *C* be the fact that c is *K* and *E* be the fact that e is *L*. Then Mellor suggests (as a preliminary answer) that there is a law (*x*) (*Gx* & *Kx*   ch(*Lx*) = 1) (pp. 173–4, 200).[2] But, by itself, this is not enough. It would still have as a consequence that if *all F*-events had chance 1, there would be a law between any kind of event and *F*-type events. This would mean that the chances of any fact concerning events meeting this condition would be properties of *G* and *C* and if determinism were true, the chances of *every* fact would be properties of *G* and *C*.

Mellor holds that laws of the form given above have truth-makers—facta—of the form *N at s at t* (where *s*, *t* are space and time points respectively) which occur at each space-time point. So it might be thought that he could appeal to this to explain why a fact *Kc* is not a cause of all facts whose chance is 1. But I am not sure how this could help. For one thing, we have found that "(*x*) (*Gx* & *Kx*   ch(*Lx*) = 1)" is true just in case all *L*-type events have chance 1 and "*Ga* and *Ka*" is the case. So there is no need for an extra factum *N* at each spacetime point to make the law statement true. That means that all we require to be the truth-maker for "(*x*) (*Gx* & *Kx*   ch(*Lx*) = 1)" cannot explain how it is that ch(*e*) = 1 is specifically a property of *G* and *C*. For another, since he holds that every nomic factum of the laws of this world is instantiated at every point in space-time, it is not clear how ch(*E*) would become a property of only one particular space-time region—the locale of the intuitive cause of *e* (pp. 214–5). Finally, Mellor appears to accept that what binds chances to the space-time location is something like the causal necessitation of ch(*E*) when *Ga* and *C*. I presume that this type of causal necessitation is not to be understood in terms of chance otherwise the same questions posed a moment

---

[2] In addition, Mellor argues that $ch_c(E)$ can only be a property of *c* and *G* if there is no factum *D* in the locale such that *c* & *D*   ch(not-*G*) = *p* (*p*>0), and so on. But this complication does not seem to touch the considerations offered here (see Mellor, pp. 177–9).

ago would arise again. But then it appears that right at the heart of Mellor's account of the facts of causation are non-chance-like necessitations (p. 67). If here, why not everywhere?

The second component of Mellor's reply to the question of what makes *c* a cause of some particular, *e*, deals with what makes *c* a cause of the *L*-type event *e rather than other L-type events*. Clearly, an appeal to laws won't help. Instead, his answer is that it is the *L*-type event contiguous with *c* which is caused by *c* (p. 233).

However, it seems to me that this doesn't deal with the issue of what makes a *K*-type event, c_i, sufficient for e_1 rather than for some other L-type event, e_2, close by whose probability is also 1. For instance, suppose we have a set up where c_1 has spatiotemporally contiguous to it to the left e_1 and to the right e_2. Suppose that c_2 is spatiotemporally contiguous by being to the right of e_2.
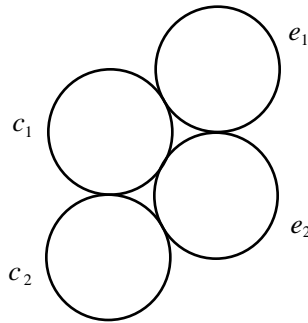

Figure 2

Let the circles be firing nodes and let both e_1 and e_2 have chance 1 of occurring but because of c_1 and c_2 respectively. How does Mellor capture this fact by appeal to spatiotemporal contiguity? It does not seem that he can.

Another concern is that even when contiguity provides a way of sorting between that fact for which a cause is sufficient and those for which it is not, it hardly seems to capture our intuitive idea of sufficiency. It is one thing to settle which is the most proximate cause on a causal chain. It is quite another to settle which things are causally related and which are not by these means. I also think one should be wary of ruling out action at a distance on such grounds. However unattractive action at a distance appears to be, it also appears to be coherent. That suggests that our intuitive idea of causal sufficiency does not require contiguity. If we are led to revise this because we have adopted a theory of causal sufficiency that suggests this belief should be revised in order for the theory to work, one

may legitimately wonder whether the theory, in fact, captures what it set out to capture.

4. There are no causal relations

One of the most distinctive theses of Mellor's book is his claim that although causal statements are true, they are not made true by causal or nomic relations. In the next two sections, I shall explain why I do not think that the reasons he offers for this view are compelling.

The first consideration against the existence of causal relations stems from his conclusions about causal statements concerning particulars. He argues that, in the case of particulars, there would have to be a single relation which makes the disjunctive statement "*c* causes or affects *e*" true. But, he continues, what makes statements of the form "*c* causes or affects *e*" true are the existential fact causation statements mentioned earlier. He thinks that these particulars inherit the causal link between the facts. He seems to think that it follows that there is no causal relation between the particulars (p. 161).

What I can't see is why we should have to conclude that there is no causal relation between particulars rather than that the causal relation which does hold between particulars holds because of facts concerning these particulars. It is a familiar thought that relations of various kinds may hold between things because of the properties that they have. I don't see why we could not say the same in this case. This would be an issue worth pursuing further if Mellor thought that there was a causal relation between the facta in virtue of which the causal relations between particulars might hold. But since he does not think that this is true either, I shall turn to that matter.

His argument that there are no causal relations between facta partly rests upon the consideration of a particular type of case, an example of which is

> Kim has no children because she uses contraception.

Mellor claims that there is no positive or negative property of Kim such that the predicate "—has no children" applies to her. Rather the application is made true by the fact that no particulars of a certain kind exist: children of Kim (p. 165). I don't see why it follows from this that there are *no* causally related facta in virtue of which this statement is true. We might concede that some causal statements of this form can be true without there being a causal relation between the *facta* cited. We should say that the truth of such causal statements supervenes upon the truth of other causal

statements whose truth-makers do include causal relations between the facta they cite—for instance, ingesting a contraceptive and an alteration of the chemical condition of the womb so that an egg won't be fertilised.

The second line of argument Mellor offers for his position is that, even if there were relata which might fit the bill of being facta for causal statements, they might not be related as cause to effect. Mellor suggests that this would be the case if the cause does not raise the probability of the effect. To illustrate this, Mellor considers once more the example of Sue pulling her drive and so holing out in one. He suggests that Sue pulling her drive cannot be the cause of her holing out in one because pulling her drive actually lowered the probability of her holing out in one. Hence even the factum which might be cited as making true the apparently causal component of the sentence could not be counted as a cause (p. 165).

Even if this type of case is correctly described by Mellor, it would not show that there were no causal relations, but only that the present statement was not made true by a causal relation between the two facta to which reference is apparently made. It seems plausible that the causal statement is made true by two sets of facta which *are* causally related, namely pulling one's drive and hitting the tree, and hitting the tree and holing out in one. Indeed, it is worth remembering that Mellor suggested that Sue driving the ball was a cause of her getting a hole in one. What is to stop the fact that Sue drove the ball from being a factum standing in a causal relation to her getting a hole in one?

To get past manoeuvres like this, Mellor asserts that if the causal relation exists then, by definition, it stands between the facta for *C* and *E* that make *any* statement of the form "*E* because *C*" true (p. 165). The points that he has made show that this is not the case. But it seems to me that this additional requirement is not motivated by his approach. As I have already noted, he identifies five connotations of causation: (a) temporal priority, (b) explanatory, (c) contiguity, (d) evidence, and (e) means-end (pp. 60, 79–80). If there is any relation that makes one of its relata have the connotations mentioned, then we have a causal relation by Mellor's lights. All that we have discovered so far is that not all true causal statements imply that there is a causal relation between the facta to which they apparently refer—a surprising and interesting result but not the one advertised.

Mellor offers a final consideration to reinforce his position which I think might be the basis for a stronger argument (pp. 167–8). He argues that the same facta may make

$$\mathrm{ch}C(E) > \mathrm{ch}_{\neg C}(E)$$

and

$$\mathrm{ch}_{\neg C}(\neg E) > \mathrm{ch}_C(\neg E)$$

the two probability relations that make *C* a cause of *E* and not *C* a cause of not *E* respectively. If causal facta were relations, this would imply the existence of the relata. Hence it cannot be the case that what makes these two things true is a causal relation. As it stands, this seems to me to be a dubious argument. It is clear that if there is a causal relation, then there have to be some relata. It is not clear to me that there have to be the same relata in each case. If we let "*R*" stand for the facta of the causal relation, we might say that what makes these chance inequalities hold is that: $R(C, E)$ and $R(A_i, B_i)$ where A_i and B_i stand for any facta that, in the circumstances, imply not-*C* and not-*E* respectively. But it is at this point that Mellor may fairly claim that causal relations are an ontological excrescence. The truth-maker of "*E* because *C*" could just as easily be the facta corresponding to *C* and *E*, and a non-relational factum *N*. One could claim that *R* supervenes upon these other facta (indeed that is what I would be inclined to say). Those with a more austere ontological vision might take the supervenience claim as suggesting excrescence in this case.

5. Dispositional properties and nomic facta

Mellor introduces an important development to his position on the character of properties. As before, he holds that all properties are dispositions and that they are defined to be that which makes the laws in which they figure apply to the object which possesses them (p. 172). However, he denies that the claim that all properties are dispositions implies that laws and causal relations are metaphysically necessary (cf. Mellor 1974, pp. 121–2). One reason he offers for laws not being metaphysically necessary is reasonably straightforward. It is that for a property like mass, there may be a possible world in which none of the laws governing its interactions in our world hold. He thinks that in that possible world, mass would not be instantiated. The second reason is that it is not essential to properties that they figure in all the laws in which they figure in the actual world. So it is possible that mass could be instantiated without $F = MA$ holding for it. As a result, one cannot view dispositional properties as fixing the laws that hold in a world (see Noordhof (1997) for further discussion of this view). Instead nomic facta are needed to fix what causal relations hold (p. 173).

It is not clear why Mellor felt constrained to adopt the position he did. An alternative would have been to claim that the modal claims concerning mass are de dicto—reflecting the meaning of "mass" rather than the nature of the property picked out by "mass". Properties could then be taken as constituting laws rather than being constituted by laws (pp. 195–

6). I think that the failure to consider this option results in his problem concerning nomic facta (pp. 203–4). Instead of taking properties as law fixers, he has to look elsewhere. The first thing he rules out is that laws can be second order universals. He rejects Armstrong's idea that they are dyadic second order relations on the grounds that there are no complex properties (Armstrong 1983; cf. Mellor, pp. 196–9, 204–7). If there were, then, for instance, apparently triadic laws could be made dyadic, for example, $F = MA$. According to Mellor, such laws are genuinely triadic *if anything*. However, he rejects the natural revision to Armstrong's view, namely that laws are polyadic or multigrade relations. His reason for this seems inadequate. He suggests that all polyadic relations should be analysed into dyadic relations (pp. 207–8). But this seems clearly false. Consider the relation of getting on well together. It is a peculiar fact that A, B and C can get on well together without A getting on with B, or B getting on with C by themselves. Even if I am wrong about this case, it seems strange to reject the idea that laws are multigrade relations for this kind of reason. One might think that if, Mellor has shown that complex properties don't exist, we have some kind of proof that there are multigrade relations. On the other hand, if there is a proof that there are no multigrade relations, one might begin to look more favourably on the existence of complex properties (in particular, conjunctions of properties). Having rejected both the account that properties fix laws, and that laws are relations between properties, Mellor suggests that the character of nomic facta is obscure to us (p. 213). This in itself might give one pause concerning the path which was taken in rejecting the alternative accounts of their structure.

In previous work, Mellor endorsed the principle of instantiation for universals, namely a universal does not exist unless it is instantiated (Mellor 1980, pp. 152–3). However, he now argues that universals can exist without being instantiated (pp. 201–3). This enables him to deal with "uninstantiated laws". These have corresponding nomic facta at each point in space-time which, I take it, implies that the universals that they concern exist. The universals which exist are determined by the laws which hold. Yet—and this is what makes the laws uninstantiated—there are no *instances* of the universals they concern (pp. 203–4, 217–8).

Although this picture presents an attractive middle position, I am not convinced that Mellor has dealt with the original worry about uninstantiated universals. His motivation for supposing that universals could not exist without being instantiated was the danger of regress. Suppose that particulars and universals were independent entities. For a particular d to have universal J it seems as if there must be the relation of possession between the particular and the universal. But then one might ask what makes this relation of possession, the possession *by d* of *J*? After all, if d

can exist independently of *J* and vice versa, then the relation of possession itself might hold or not hold between *d* and *J*. So perhaps we should postulate a holding relation, and so on towards regress since the very same questions can be asked of the holding relation.

Mellor still thinks that this reason has some force. But he feels that he can meet it, not as he did by taking particulars and universals to be only definable as parts of facta, but rather by taking just particulars to be definable only as parts of facta. Particulars are those things which distinguish one instantiation of a universal from another (pp. 202–3). The problem with this proposal is that the same line of argument appears to run for the instantiation relation. The question now is what makes it the case that *J* is instantiated in *d* rather than *c*, given that *J* might have been instantiated in either or neither? If the answer is that *J* is related by the relation of instantiation to *d*, then it appears that we now must ask what makes it the case that the instantiation relation is a relation to *d* (rather than *c*). It is not clear what answer is available other than the one which led to regress. So there may still be a problem with uninstantiated laws.

6. Causal asymmetry and backward causation

Mellor presents an argument to show that causes must precede their effects and hence that backward causation is impossible. If this argument were successful, then it would be a significant result. It would not only show that the intuitive cases of backward causation in the literature are in fact groundless and that time travel is impossible. It would also establish the connection between the temporal priority of causes and their other distinctive connotations: the explanatory and the means-end. This would be highly attractive since it is with regard to this connection that many accounts of causal asymmetry fail to satisfy.

As in previous work, Mellor argues for this result by showing the impossibility of causal loops (Mellor 1981, pp. 177–87, pp. 224–9). An obvious example of a causal loop is travelling back in time and shooting your grandmother before she had children. Most philosophers have wanted to say that this is impossible. But this has not been thought sufficient to establish that there could be no cases of backward causation. We could just concede that causal loops are impossible but say that backward causation is possible whenever there isn't a loop. I could go back in time and plant a tree in a remote spot in Greenland that nobody ever visits today. As a result, there would be a tree today that nobody sees and nobody fells. I am never told about it and I never sit on a chair made from it. Haven't we got a case of backward causation which involves no causal loop?

Mellor's argument against backward causation rests on showing that it is not just causal loops that are unacceptable, it is the possibility of causal loops which is unacceptable. He begins by arguing that any two spatio-temporally coincident facts could interact immediately (pp. 224–5). If one thinks of all the space and time between the tree and me, then it is full of objects that could interact with each other. So there could be a causal loop, it is just that in fact there isn't one. However, there would be a loop of "causability" which he defines as follows

> P is causable by Q iff $ch_Q(P)$ and $ch_{\neg Q}(P)$ exist in circumstances S.

There does seem to be a loop of causability between the tree and me since planting the tree raised the probability ($ch_Q(P)$) of my sitting on a chair composed from its wood. Likewise, enjoying the comfort of the chair (or even just being more likely to enjoy the comfort of such a chair) raised the probability my planting a tree back then ($ch_P(Q)$).

Given that the chances just identified hold as a result of nomic facta at space-time points, Mellor argues these chances should be logically independent of each other (p. 227). But in a loop of causability, that is precisely what we do not find (pp. 227–9). Applying his reasoning to the case I have been considering, suppose there are a very large number of potential time travelling tree planters and the following hold:

(a1) If potential time traveller has sat in a chair made from one of the trees, ch (Time traveller goes back to plant one) = 0.4.

(b1) If potential time traveller has not sat in a chair made from one of the trees, ch (Time traveller goes back to plant one) = 0.1.

Then one would expect that

(a2) If a time traveller has gone back to plant a tree, the *probability* of him or her having sat on a chair made from one of the trees = 0.8.

(b2) If a time traveller has not gone back to plant a tree, the *probability* of him or her having sat on a chair made from one of the trees = 0.4.[3]

But these probabilities can't be Mellor's chances because, Mellor claims, his chances are logically independent of each other whereas (a2) and (b2) are implied by (a1) and (b1) given standard assumptions. If they are not chances, then, since causes are chance-raisers the probability raising that (a2) and (b2) indicate is not causal. If one did try to assign chances in the

---

[3] These probabilities are obtained by (in the case of (a2)) considering the proportion of treeplanters who had sat on chairs and (in the case of (b2)) considering the proportion of non-treeplanters who had sat on chairs. Suppose like Mellor we consider a population of $20 \times (10$ to the power of $10^{100})$—20 Gs (G for googolplex)—divided 50/50 between chair sitters and non-chair sitters. Then the expected number of treeplanters = 4Gs + 1G and the number of non-treeplanters = 6Gs + 9Gs (given the chances above). These envisaged populations enable us to derive near certain estimations of the probabilities detailed in (a2) and (b2).

for the forward case—captured by (a2) and (b2)—then the values would be quite independent of the values of (a1) and (b1). If they were, then the two sets of expected frequencies (and the probabilities estimated from these) may be inconsistent (p. 229).

Mellor's argument seems to be a version of the bilking argument except that his current argument builds the legitimacy of bilking into the nomological structure of the world. The standard bilking argument trades on the idea that, if there is supposed to be a backward causal correlation between *A*s and *B*s (*A*s causing *B*s), then we could always set things up so that, knowing that *B*s have occurred, we ensure that *A*s don't, so undermining the causal correlation. Mellor has just applied this thought to chances. By requiring that chances are logically independent of each other he has set things up so that, if there were backward causation, later chances could upset the probabilities of earlier events given later events, determined by the earlier chances (or vice versa).

However, I am not clear why we should accept that chances should be logically independent *in this case*. There would be a certain force to the requirement of logical independence if Mellor had sketched a metaphysical picture in which the facta of chances were always logically independent of each other. But Mellor does not seem to have done this. Consider the facta that might make

$$(x)\, (Gx \,\&\, Kx \quad \mathrm{ch}(Lx) = 1)$$

and

$$(x)\, (Gx \,\&\, Kx \quad \mathrm{ch}(Lx) = 0)$$

true. Clearly, these facta cannot be copresent in the world. The laws in this world must be consistent. Mellor recognises the same requirement for the temporal ordering that laws give space-time points (pp. 236–7). He denies that different laws could set up different orderings. Also he thinks that laws must be instantiated at every point in space-time (pp. 214–6). So the facta for these laws cannot just be instantiated in a proper subset of these points. It seems to me that all of these requirements severely qualify the claim that the facta of chances are logically independent of each other. If we found out that backward causation is possible, we would just be recognising another constraint upon the facta of chances, namely that those which make chances $\mathrm{ch}_Q(P)$ and $\mathrm{ch}_P(Q)$ have values x and y respectively are not logically independent of each other.

The situation seems to be this. There may be good metaphysical reasons to adopt constraints on the logical independence of the facta of chances in the cases just described which do not hold in the case of backward causation. But we need to be clearer about what these reasons are.

I have clearly found a few things with which to disagree in the argumentation of the book. This is inevitable given the book's ambition and

importance. However, I want to end the review by underlining that point. This is a compelling work that displays a distinctive metaphysical vision. Perhaps the best argument for the position in the book is its coherence and plausibility. To coin a phrase (p. 5—well almost): here it is—read it.[4]

Department of Philosophy   PAUL NOORDHOF
University of Nottingham
University Park
Nottingham NG7 2RD
UK
Paul.Noordhof@nottingham.ac.uk

REFERENCES

Armstrong, David 1983: *What is a Law of Nature?* Cambridge: Cambridge University Press.

Bennett, Jonathan 1988: *Events and their Names*. Oxford: Oxford University Press.

Lewis, David 1973: "Causation" in his 1986, pp. 159–213. Originally published in 1973 in *Journal of Philosophy,* 70.

  1986: *Philosophical Papers*, Volume 2. Oxford: Oxford University Press.

Mellor, D. H. 1974: "In Defence of Dispositions". in his 1991, pp. 104–22 Originally published in 1974 in *The Philosophical Review*, 83.

  1980, "Necessities and Universals in Natural Laws", in his 1991, pp. 136–53. Originally published in 1980 in his *Science, Belief and Behaviour*. Cambridge: Cambridge University Press..

  1981: *Real Time.* Cambridge: Cambridge University Press.

  1988: "On Raising the Chances of Effects," in his 1991, pp. 225–34. Originally published in 1988 in J. Fetzer (ed.), *Probability and Causality.*

  1991: *Matters of Metaphysics*. Cambridge: Cambridge University Press,

Mellor, D. H. and Oliver, A. 1997: "Introduction", in their *Properties*. Oxford: Oxford University Press, pp. 1–33.

Menzies, Peter 1996: "Probabilistic Causation and the Pre-emption Problem". *Mind*, 105, pp. 85–117.

Noordhof, Paul 1997: "Making the Change, the Functionalist's Way". *British Journal for the Philosophy of Science*, 48, pp. 233–50.

——1998: "Do Tropes Resolve the Problem of Mental Causation?". *Philosophical Quarterly*, 48, pp. 221–6.

——forthcoming: "Causation by Content?". *Mind and Language*.