

Mellor's facts and chances of causation

GONZALO RODRIGUEZ-PEREYRA

1. In his book *The Facts of Causation* (1995) D. H. Mellor presents a comprehensive metaphysics of causation. Among other things, he argues that all causation, whether deterministic or not, is such that causes raise their effects' chances. That causes raise their effects' chances is expressed by him in the following way, which I shall call (Ch), where ' $ch_C(E)$ ' stands for the chance of the effect given the cause and ' $ch_{\sim C}(E)$ ' for the chance of the effect in the absence of the cause and where chances receive an objective interpretation:

$$(Ch) \quad ch_C(E) > ch_{\sim C}(E)$$

Mellor makes a vigorous case for the claim that causes raise their effects' chances, deriving it from three 'connotations' of causation, by which he means conditions that follow from our concept of causation (1995: 58), namely

- (a) causes and effects are *evidence* for each other,
- (b) causes *explain* their effects, and
- (c) causes are *means* of bringing about their effects.¹

Since according to Mellor the connotations are necessary conditions of causation and they entail (Ch), (Ch) is also a necessary condition of causation. This is the fundamental thesis of that part of his metaphysics of causation dealing with the consequences and implications of causation and which I shall call Mellor's *chance theory of causation*. Another important thesis of it is, of course, the claim that the connotations above entail that causes raise their effects' chances as (Ch) say they do.

Besides his chance theory the other major component of Mellor's theory of causation is his ontology of it, according to which causation links facts rather than particulars. How are these two components of Mellor's metaphysics of causation related? Do they require each other, or are they

¹ Mellor recognizes two other major connotations of causation: that causes precede their effects and are contiguous to their immediate effects. But these, as he acknowledges, are more controversial than the three listed in the text (1995: 60–61).

independent pieces of a comprehensive but uncohesive metaphysics of causation?

Mellor is not explicit about this but his chance theory depends in a sense on his ontology. For if it is essential to causation that causes raise their effects' chances, particulars, e.g. events, cannot be causes and effects, as they do not have chances. Certainly, that a particular exists has chances, but that a particular exists is not itself a particular but a fact. Indeed if causation is about raising chances then it seems that causes and effects must be entities corresponding to true sentences or propositions, i.e. facts, rather than entities corresponding to singular terms. But then, if causation does not link facts, Mellor's chance theory of causation must be abandoned, or at least suffer considerable revision.²

On the other hand Mellor strongly suggests that his ontology of causation is independent of his chance theory of causation. For as part of his case for the thesis that causation links facts Mellor takes up Davidson's (1980: 152–53) causal version of the Slingshot – which tries to show that if causation links any two facts then it links all facts and therefore, since this is absurd, it links none – and argues that it fails. Mellor claims that, although he does not need (Ch) to show *that* the Slingshot fails, nothing else can explain *why* it fails. This, as Mellor says, reinforces his case for 'making causation conform' to (Ch) (1995: 119). But notice that if Mellor is right and (Ch) is not necessary to stop the Slingshot, then his causal ontology is independent of his chance theory, for one may admit that causation links facts while denying that it entails (Ch).

Some might think that this independence is a merit, for if Mellor needs his chance theory to stop the Slingshot then that theory loses the support it gains by explaining *why* the Slingshot fails, given *that* it fails. But Mellor's case that (Ch) is essential to causation is strong enough already and needs no such support. So it would be better for Mellor if only his chance theory could stop the Slingshot, thereby forcing those willing to allow causation to relate facts to buy it. And that is in fact Mellor's situation. For (a) Mellor's own argument fails to stop the Slingshot and (b) he can stop it only by invoking his chance theory. Mellor's causal ontology is therefore not independent of his chance theory of causation, but requires it. There is thus an interdependence between the two major components of Mellor's metaphysics of causation.

² The problem is similar to that of Lewis (1986: 166), who has a counterfactual theory of causation and takes causation to link events. Lewis then has to say that the *occurrence of event c* causes the *occurrence of event e* and give his (counterfactual) analysis of this. Similarly Mellor might say that the *occurrence of event c* raises the chance of the *occurrence of event e*.

2. The Slingshot proceeds on the following two assumptions:

- (i) a true 'E because C' cannot be falsified by replacing 'C' or 'E' by logically equivalent sentences.
- (ii) a true 'E because C' cannot be falsified by replacing a referring term in it by a co-referring one.

Then the argument runs as follows, in Mellor's version, where 'R' and 'Q' are any true sentences (1995: 114):

- (1) E because C.
- (2) $\{x:x=x \ \& \ E\} = \{x:x=x\}$ because $\{x:x=x \ \& \ C\} = \{x:x=x\}$.
- (3) $\{x:x=x \ \& \ R\} = \{x:x=x\}$ because $\{x:x=x \ \& \ Q\} = \{x:x=x\}$.
- (4) R because Q.

Premiss (1) must be acceptable to anyone who believes that causation links facts, and (2) follows from it. For $\{x:x=x\}$ is the set of entities that are self-identical and $\{x:x=x \ \& \ E\}$ is the set of entities that are self-identical and such that 'E' is true; so, necessarily, $\{x:x=x \ \& \ E\} = \{x:x=x\}$ if and only if 'E' is true, and so they are logically equivalent. Similarly for $\{x:x=x \ \& \ C\} = \{x:x=x\}$. Since 'R' and 'Q' are true, (3) follows from (2) by (ii), as the referring terms ' $\{x:x=x \ \& \ R\}$ ' and ' $\{x:x=x \ \& \ Q\}$ ' refer to the same entity, namely $\{x:x=x\}$. Finally, (4) follows from (3) by (i) for the same reason that (2) follows from (1). Thus, as Mellor says, 'on assumptions (i) and (ii), any true causal "E because C" entails "R because Q" for all true "Q" and "R"' (1995: 114). So, if causation links any facts it links all facts; but, since this is absurd, it links none. The Slingshot, if successful, is thus a devastating argument for the view that causation links (some) facts.

3. What is Mellor's reply to the Slingshot? As Neale (1995: 803) points out, the most common reply to Slingshot arguments is to deny the assumption about substitution of logically equivalent sentences. But Mellor accepts assumption (i), as there is no way in which 'E' can be true and a logically equivalent 'E' false, and so any chance $ch(E)$ that E is a fact must equal the chance $ch(E')$ that E' is a fact (1995: 115).

According to Mellor the Slingshot fails because assumption (ii) is false, i.e. because a true 'E because C' *can* be falsified by replacing a referring term in it by a co-referring one (1995: 115). Mellor distinguishes (ii) from (ii') below, in which 'C causes E' is definitionally equivalent to 'E because C' but in which 'C' and 'E' are used as singular terms abbreviating 'the fact that C' and 'the fact that E':

- (ii') 'C causes E' is always transparent for C and E.

Not only does Mellor distinguish between (ii) and (ii'), he also argues that (ii') is true (1995: 116). But (ii') does not entail (ii), for the latter says that

'E because C' is transparent not only for the facts C and E but also for any particular referred to within the sentences 'C' and 'E'.

To establish the falsity of (ii) Mellor argues that some true causal instances of 'E because C' are falsified by replacing referring terms within 'C' and 'E' by co-referring terms. He invites us to imagine a situation in which several climbers fall off Castle Rock but Don falls first because he has the weakest rope, so that (5) below is true:

(5) Don's fall is the first because his rope is the weakest.

Now, since (5) entails that Don's rope is the weakest and that Don's fall is the first, if (ii) is true it follows that (6) and (7) are also true:

(6) Don's fall is Don's fall because his rope is the weakest.

(7) Don's fall is the first because his rope is his rope.

But, as Mellor says, (6) and (7) are false, for the 'necessary fact that Don's fall is Don's fall does not depend, causally or otherwise, on the contingency of his having the weakest rope. And Don's falling first is not caused by the necessary fact that his rope is his rope' (1995: 117).

Furthermore, Mellor can explain *why* this is so, by invoking his thesis that (Ch) is essential to causation. For nothing can raise the chance of a necessary fact, which in any circumstances has the highest chance, i.e. 1: this is why (6) is false. And no necessary fact can be a cause for, Mellor says, of no necessary fact C can it be true, for any E, that $ch_C(E) > ch_{\sim C}(E)$: for if C is necessary, then $ch_{\sim C}(E)$ does not exist and so has no value, and in particular no value less than $ch_C(E)$, thereby falsifying $ch_C(E) > ch_{\sim C}(E)$: this is why (7) is false. So what makes (5) opaque for Don's fall and his rope is that it is an instance of 'E because C' in which 'C' or 'E' is an identity statement. For whenever 'C' or 'E' is a true identity statement of the form 'a is the K' or 'the K is the K', 'it can always be turned into a necessary truth by replacing "the K" with the co-referring term "a" or "the K"' (or *vice versa*), thus making $ch_C(E) > ch_{\sim C}(E)$ false.' (1995: 118).

This, Mellor says, is what stops the Slingshot: assumption (ii) fails just when the argument needs it. For if (2) entailed (3) then it would also entail (8) and (9):

(8) $\{x:x=x\} = \{x:x=x\}$ because $\{x:x=x \ \& \ Q\} = \{x:x=x\}$.

(9) $\{x:x=x \ \& \ R\} = \{x:x=x\}$ because $\{x:x=x\} = \{x:x=x\}$.

But (8) and (9) are false for the same reasons (6) and (7) are false, namely 'because when C or E is a fact of identity the " $ch_C(E) > ch_{\sim C}(E)$ " which "E because C" entails is opaque' (1995: 119). But whatever the reasons for their falsity, their falsity is evident, and this, Mellor says, 'is enough to demolish the case against causation linking facts' (1995: 119).

4. What should we make of this? Mellor has convincingly shown that assumption (ii) is false, by showing that whenever 'E' or 'C' is an identity statement a true 'E because C' can be falsified by replacing a referring term in it by a co-referring one. For such an identity statement can always be turned into a statement stating a necessary fact which, Mellor says, can have neither causes nor effects. But what Mellor has said allows him to show more than this, namely that a true 'E because C' can be falsified by replacing a referring term in it by a co-referring one, *whenever the replacement results in a 'E' because C' in which 'E' or 'C' is a necessary statement, whether or not 'E' or 'C' is an identity statement*. This is important, for one can work out versions of the Slingshot which, like the following (10) to (13), do not involve any 'E because C' in which 'C' or 'E' is an identity statement:

(10) E because C.

(11) $\emptyset \subset \{x:x=x \ \& \ E\}$ because $\emptyset \subset \{x:x=x \ \& \ C\}$.

(12) $\emptyset \subset \{x:x=x \ \& \ R\}$ because $\emptyset \subset \{x:x=x \ \& \ Q\}$.

(13) R because Q.

Here (11) says that the empty set is a proper subset of the set of entities that are self-identical and such that 'E' is true because the empty set is a proper subset of the set of entities that are self-identical and such that 'C' is true. Similarly (12) says that the empty set is a proper subset of the set of entities that are self-identical and such that 'R' is true because the empty set is a proper subset of the set of entities that are self-identical and such that 'Q' is true. To this argument Mellor could object that (12) cannot be derived from (11) by assumption (ii), for otherwise (14) and (15) could also be so derived:

(14) $\emptyset \subset \{x:x=x\}$ because $\emptyset \subset \{x:x=x \ \& \ C\}$.

(15) $\emptyset \subset \{x:x=x \ \& \ R\}$ because $\emptyset \subset \{x:x=x\}$.

But (14) and (15) are false, Mellor would say, since the antecedent of (14) and the consequent of (15) state necessary facts.

All this is fine, but the problem with Mellor's answer to the Slingshot is that all he has shown is that a true 'E because C' is falsified by replacing a referring term in it by a co-referring one *whenever the replacement results in necessary statements 'E' or 'C'*. In particular, Mellor has not shown that (3) falsifies (2), nor has he given any reasons to take (12) as falsifying (11), for neither (3) nor (12) need have components stating necessary facts. Granted, by showing that a true 'E because C' is falsified by replacing a referring term in it by a co-referring one whenever the replacement results in necessary statements 'E' or 'C', Mellor has shown that assumption (ii) is false and thereby has stopped (3) and (12) being derived from (2) and (11) by assumption (ii). But nothing Mellor has said prevents his opponents

from deriving (3) from (2) and (12) from (11) on the following weaker assumption (ii''):

- (ii'') a true 'E because C' cannot be falsified by replacing a referring term in it by a co-referring one, *provided the replacement results in an 'E' because C' in which 'E' and 'C' state contingent facts.*

Once assumption (ii) is replaced by (ii'') the Slingshot is as powerful as ever and its lesson remains untouched: if causation links any facts then it links all of them, which is absurd; therefore it links none. In conclusion, showing that (ii) is false, as Mellor has done, is not enough to demolish the case against causation linking facts.

5. Mellor's attempt to stop the Slingshot fails, but does this mean that the Slingshot is unstoppable and, consequently, that one must deny that causation links facts rather than particulars? Can Mellor show that no true 'E because C' entails 'R because Q' for all contingently true 'Q' and 'R' and, if so, how?

To show this Mellor needs a necessary condition of causation that holds only of some pairs of contingent facts, not of all of them. Thus he can invoke what he thinks the three connotations listed at the beginning of this paper entail: that causes raise the chances of their effects as (Ch) says they do. So, assuming that Don falls (D) because his rope is weak (R) we obtain, given (i), the following:

- (16) $\{x:x=x \ \& \ D\} = \{x:x=x\}$ because $\{x:x=x \ \& \ R\} = \{x:x=x\}$.

But this is falsified, among others, by any of the following two replacements of co-referring terms, where 'G' stands for 'Grass is green' and 'B' for 'Blood is red':

- (17) $\{x:x=x \ \& \ G\} = \{x:x=x\}$ because $\{x:x=x \ \& \ B\} = \{x:x=x\}$.

- (18) $\{x:x=x \ \& \ R\} = \{x:x=x\}$ because $\{x:x=x \ \& \ D\} = \{x:x=x\}$.

(17) and (18) are false because they do not conform to (Ch), for the fact that blood is red does not raise the chance of the fact that grass is green, and the fact that Don falls does not raise the chance of the fact that his rope is weak. Consequently the fact that $\{x:x=x \ \& \ B\} = \{x:x=x\}$ does not raise the chance of the fact that $\{x:x=x \ \& \ G\} = \{x:x=x\}$, and the fact that $\{x:x=x \ \& \ D\} = \{x:x=x\}$ does not raise the chance of the fact that $\{x:x=x \ \& \ R\} = \{x:x=x\}$. Yet neither ' $\{x:x=x \ \& \ G\} = \{x:x=x\}$ ', nor ' $\{x:x=x \ \& \ B\} = \{x:x=x\}$ ', nor ' $\{x:x=x \ \& \ R\} = \{x:x=x\}$ ' nor ' $\{x:x=x \ \& \ D\} = \{x:x=x\}$ ' are necessary statements.

Indeed Mellor's chance theory of causation ensures that a true 'E because C' *can* be falsified by replacement of co-referring terms, even if the result of the replacement is an 'E' because C' in which 'E' and 'C' is a

contingent statement. For by replacing co-referring terms in the sentences 'C' or 'E' we get 'C'' or 'E'', which state facts that need not be identical to those stated by 'C' or 'E'. But if C and C' and E and E' are different facts then 'E because C' does not entail 'E' because C'', for $ch_C(E) > ch_{\sim C}(E)$ does not entail $ch_{C'}(E') > ch_{\sim C'}(E')$, since different facts often have different chances. And so, as Mellor says, 'it is because causes must raise the chances of their effects that causation can and does link some facts without linking all of them' (1995: 119). Thus Mellor can stop the Slingshot, but to do so he has to invoke his chance theory of causation.

6. We have seen that Mellor can stop the Slingshot, but by invoking his chance theory of causation. This means that Mellor's ontology of causation is not independent of his chance theory of causation, but requires it. And so, since chances are chances of facts rather than of particulars his chance theory of causation requires his ontology of causation, the two major components of Mellor's metaphysics of causation are more intimately linked than he suggests: they stand or fall together.³

Churchill College
Cambridge, CB3 0DS, UK
gjr21@cam.ac.uk

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