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CAUSE AND ESSENCE*

ABSTRACT. Essence and causation are fundamental in metaphysics, but little is said about their relations.¹ Some essential properties are of course causal, as it is essential to footprints to have been caused by feet. But I am interested less in causation's role in essence than the reverse: the bearing a thing's essence has on its causal powers. That essence *might* make a causal contribution is hinted already by the counterfactual element in causation; and the hint is confirmed by the explanation essence offers of something otherwise mysterious, namely, how events exactly alike in every ordinary respect, like the bolt's *suddenly* snapping and its snapping *per se*, manage to disagree in what they cause. Some prior difference must exist between these events to make their causal powers unlike. Paradoxically, though, it can only be in point of a property, suddenness, which both events possess in common. Only by postulating a difference in the *manner* – essential or accidental – of the property's possession is the paradox resolved. Next we need an account of causation in which essence plays an explicit determinative role. That account, based on the idea that causes should be *commensurate* with their effects, is that *x* causes *y* only if nothing essentially poorer would have done, and nothing essentially richer was needed.

1. COMMENSURATION

“What *kind* of thing is a cause, or an effect? And supposing that *x* and *y* are of the right kind, what should they be like *specifically*, for *x* actually to cause *y*?”. This paper considers both questions in the belief that their answers are connected. Among other things, it argues that causes and effects have *essences*; that causal properties are *hypothetical* rather than categorical; and that how a thing is essentially is *relevant* to its causal properties.² All of this is supposed to follow on a determined application of the principle that causes are (in a sense to be explained) ‘commensurate’ with their effects.

Of our two questions, the first, about the type of thing *apt* to stand in causal relations, is relatively recent.³ Traditionally, causal theorists concentrated on the second, namely, what makes one thing of that type the cause of another? Hume and Mill, for example, address it in the form: Must the cause take in *everything* required for the occurrence of its effect, or can it comprise just a selection out of that material? In saying that “we must reject the distinction between *cause* and *occasion*,

when suppos'd to signify anything essentially different from each other",⁴ Hume hints at an affirmative answer, an answer explicit in Mill's thesis that the true cause is seldom "a single antecedent" of the effect, but rather "the sum of several antecedents; the concurrence of all of them being requisite to produce, that is, to be certain of being followed by [the effect]".⁵ Both philosophers also ask whether the cause can include anything *not* needed for the effect. Again, they tend to agree that it cannot. Thus Hume:

In almost all kinds of causes there is a complication of circumstances of which some are essential, and others superfluous; some are absolutely requisite to the production of the effect, and others are conjoin'd only by accident.⁶

By means of his "rules by which to judge of causes and effects", he says,

we learn to distinguish the accidental circumstances from the efficacious causes; and when we find that an effect can be produc'd without the concurrence of any particular circumstance, we conclude that that circumstance makes not a part of the efficacious cause, however frequently conjoined with it.⁷

Mill, of course, credits his famous "methods of experimental enquiry" with a similar capability. On the Hume/Mill theory, then, the cause includes all, and only, factors required for the effect's occurrence.⁸

Probably Hume and Mill went too far in imposing so rigorous a condition on causes. Few would deny that my slamming the door startled the hamsters on the ground, e.g., that it was enough that the door got slammed, irrelevant that it was me who slammed it. But even if they were wrong in their specific thesis that the cause comprises all and only what the effect requires, they were surely onto a correct general principle: *nothing causes an effect that leaves out too many relevant factors, or brings in too many irrelevant ones*. True causes, as I will put it, are *commensurate* with their effects.

2. SIZE AND STRENGTH

Two related issues are tangled up in the idea of commensuration: one about the cause's *size* or *extent* in space and time; and another about the cause's reach along a quite separate axis. Take size first, concerning which Mill has a good example:

When the decision of a legislative assembly has been determined by the casting vote of

the chairman, we sometimes say that this one person was the cause of all the effects which resulted from the enactment. Yet we do not really suppose that his single vote contributed more to the result than that of any other person who voted in the affirmative.⁹

Because votes cast *elsewhere*, and presumably *earlier*, contributed to the effect, the alleged cause is *extensively* incomplete. Obviously a complementary possibility is that it should be extensively excessive. According to Mill, what causes the coming of day is “the existence of the sun . . . and there being no opaque medium in a straight line between that body and the part of the earth where we are situated”, and this “without the addition of any superfluous circumstance”.¹⁰ Since it *is* superfluous that night obtained earlier, the given conditions *plus* the fact of recent night are rejected as involving more than the effect needed.

That causes should arrange themselves along spatiotemporal lines is not surprising, nor is it surprising that they should be comparable in spatiotemporal extent. In Davidson’s well-known discussion of Mill’s strictures on causation, he introduces, inadvertently I think, a new dimension of comparison:

‘The cause of this match’s lighting is that it was struck. – Yes, but that was only *part* of the cause; it had to be a dry match, there had to be adequate oxygen in the atmosphere, it had to be struck hard enough, etc.’ We ought now to appreciate that the ‘Yes, but’ comment does not have the force we thought. It cannot be that the striking of this match was only part of the cause, for this match was in fact dry, in adequate oxygen, and the striking was hard enough.¹¹

What I find troubling here is the absurdity of the misapprehension that Davidson’s bland reminders seem aimed at correcting, *viz.*, that what is partial about the striking *per se* is that it *lacks* the causally important properties mentioned. To think *that* would be to think that the striking *per se* was a lackadaisical striking of a wet match in a vacuum, or, even more incredibly, that it was somehow indeterminate on all these points.

Well, what else could the ‘yes, but’ comment be getting at? Another of Davidson’s examples has a bridge’s collapse said so be caused, not by the bolt’s snapping *as such*, but by its snapping so *suddenly*.¹² Taking our inspiration from the match example we might protest as follows:

How does the first snapping fall short of the second? From their descriptions it seems that there is to be a distinction in point of suddenness. But *both* are sudden (there is no

non-sudden snapping here in question). So the problem is the same as before: to explain how things can differ on a property which, manifestly, they both possess.

Is this really so mysterious, though? If things both of which possess a property are to differ in point of that very property, their difference can only lie in the *manner* of its possession. To give this difference a name, only one of the two occurrences has the property *constitutively*. If the bolt's suddenly snapping does better than its snapping per se at causing the bridge's collapse, that is because it is *constitutively* sudden, whereas the other is sudden just as a matter of fact.

3. PROBLEMS FOR CONSTITUTIONALISM

With this we pass from a rather familiar position on our second question – that causes should be commensurate with their effects – to a rather unorthodox position on the first – that causes have some of their properties constitutively and others not. To repeat the steps: commensuration presupposes that causes are proportionable to their effects; for that, they must be comparable in size and strength; but to be comparable in strength, they must be of such a type as to show an inherent preference for certain of their properties over others. The view that they do show such a preference I will call *constitutionalism* about causes.

By comparison with the more usual view that causes are *concrete*, in the sense of possessing all of their properties on a par,¹³ constitutionalism has a lot of explaining to do. What are constitutions, that things with different of them can still be overwhelmingly similar in other respects? How can things as similar as *that* still differ in what they cause? And of what possible relevance can their constitutions be to their ability to influence events?

All of these are understandable concerns, but I suspect that it is the last that mainly accounts for constitutionalism's continuing unpopularity. Hume and Mill are again a good place to start. Both lay great stress on what I have been calling commensuration, sizewise and strengthwise, too.¹⁴ Yet, although this *sounds* like a situation tailor-made for the constitutional approach, and although both occasionally 'talk the talk',¹⁵ they seem in the end not to approve of the invidious distinctions that constitutionalism requires.¹⁶ They had reasons from elsewhere in their philosophies for disliking such distinctions, of course, and questions of causal ontology were not in any case foremost in their minds.¹⁷

But another factor in their neglect of constitutionalism might have been simply this: that they did not see what *help* it would be in the quest for commensurate causes. For how can a thing's preferences among its properties affect its causal powers?

Whether precisely this difficulty occurred to Hume and Mill or not, in Davidson's critique of Mill it comes up often:

How could Smith's actual fall, with Smith weighing, as he did, twelve stone, be any more efficacious in killing him than Smith's actual fall?¹⁸

By emphasising Smith's weight we might improve our *explanation* of his death, but to think that the *cause* could be improved by a similar emphasis is just a confusion. Here is Jonathan Bennett in the same spirit: if "what got him down was not (so much) her refusing him but (more) her refusing him rudely", and if these "differ only in their constitutions, not in their characters", then

the refusal that did not get him down (so much) was just as rude as the other, but it lacked the other's depressive powers because rudeness was not in its constitution That, however, should make us suspicious. All the popular theories of event causation . . . agree with clamorous common sense that the causal powers of any event depend upon what it is like, what properties it has, what its character [as opposed to its constitution] is.¹⁹

To answer this would be to explain how a thing's constitution can be relevant to what it causes. But first we need to say something about constitution itself.

4. ESSENCE²⁰

By essentialism, I mean the view that things have some significant quota of their properties essentially, the rest only accidentally.²¹ So understood, essentialism has a surprising consequence for identity: things exactly alike in every ordinary respect (location, shape, size, mass, microphysical makeup, etc.) may nevertheless fail to be numerically the same. That will be the case, whenever *x* and *y* agree in their ordinary properties but differ in which of those properties they possess essentially.

For the most part, essentialists concede this result,²² but try to mitigate it by postulating intimate identity-*like* relations compatible with strict distinctness: composition, instantiation, generation, comprisal, and the like. But, not to minimise these relations' importance, their

differences distract us from a more fundamental relation they imply in common. Suppose we use the term *categorical* for properties whose possession by a thing x is a matter of x 's actual condition, as opposed to what it would or could have been like (other properties, e.g., dispositional and modal properties, are *hypothetical*).²³ Then the relation I am thinking of is this: x is *coincident* with y iff they have their categorical properties in common.

Beware of reading the categorical/hypothetical distinction as just a paraphrase of the accidental/essential distinction. For one thing, properties are accidental only in relation to specified particulars and worlds, but they are categorical *simpliciter*. More revealingly, for P to be accidental to x at w is partly a matter of how x is at w (x must have P at w) and partly a matter of how it is at other worlds (x must lack P in at least one such). But, P is categorical if its attaching to x at a world is *wholly* a matter of how x is at that world, absolutely without regard to its otherworldly behaviour. Thus it should come as no surprise that hypothetical properties, for instance dispositions, can be accidental; and that categorical properties can be essential, as mountains are (I suppose) essentially spatially extended.

Though the distinctions are different, they can be related through a certain notion of *essence*. Essences I will understand as sets of essential properties: x 's essence is a set of properties essential to x , y 's essence is a set of properties essential to y , and so on. But which of a thing's essential properties go into its essence?

The simplest proposal, obviously, would be to include *all* of them. Unfortunately, essences so defined will not meet our needs. What we are after, among other things, is an account of comparative strength as discussed in Section 2; and such an account will presumably be in terms of inclusion relations between essences. The problem is that these inclusion relations are liable to be disrupted, if essences are not somehow restricted. Allowing *identity with x* into x 's essence, for example, precludes the possibility of a y whose essence includes everything in x 's essence and more besides. And the effect of allowing x 's *kind* into its essence is to ruin the chances for a thing y whose essence exceeds x 's by properties which things of that kind possess at best accidentally.²⁴

Is there an approach that avoids this difficulty? For the essences of nonidenticals to be comparable they should be drawn from a pool of properties such that any particular such property's modal status – essential or accidental – is without undue prejudice to the modal status of

the others. Since to include properties like these in essences does nothing to impede the later entry of their companions, I call them *cumulative*. Although I do not know how to specify the cumulative properties outright, their most important features can be summed up in a simple condition. Letting x 's *essence* be the set of cumulative properties that it possesses essentially, and letting x^+ *strengthen* x ($x^+ \supseteq x$) if x 's essence is a subset of x^+ 's, the condition is that

- (K) For all x , for all possible worlds w , for all sets S of cumulative properties: x exists in w and possesses there every member of $S \Leftrightarrow$ there is an $x^+ \supseteq x$ which exists in w and to which every member of S belongs essentially.

That is, x exists and possesses a set of cumulative properties (in a world) iff there exists also (in that world) a strengthening of x to which those properties attach essentially.

Applying (K) in the right-to-left direction, with S equal to the empty set, gives:

- (1) If $x^+ \supseteq x$, then necessarily, if x^+ exists, so does x .

Applied from right to left, with S the difference between x^+ 's essence and x 's, it implies:

- (2) If $x^+ \supseteq x$, then necessarily, if x^+ exists, x possesses every property in x^+ 's essence.

And we get:

- (3) If $x^+ \supseteq x$, then necessarily, if x exists and possesses every property in x^+ 's essence, then x^+ exists,

by (first) running (K) from left to right with S the essence of x^+ – this to obtain the existence of an $x^* \supseteq x^+$ – then (second) using (1) to infer the existence of x^+ itself. To illustrate, if the speeding strengthens the driving, then the driving occurs in every world in which the speeding does; and in all such worlds, and only them, the driving is done at a high speed.

When one thing strengthens another, as the speeding strengthens the driving, the difference between them is *merely* hypothetical if any difference is (ultimately it comes down to the fact that x^+ essentially possesses properties that are accidental to x). But, if only hypothetical

properties can distinguish x^+ from x , then a property is categorical only if it *cannot* distinguish them:

- (C) P is categorical \Rightarrow for all x and x^+ such that $x^+ \supseteq x$, and for all possible worlds w in which both exist, x has P in w iff x^+ has P in w .

Thus x and its strengthening x^+ are categorically indiscernible, or coincident, in every world where both exist:

- (4) If $x^+ \supseteq x$, then necessarily, if x and x^+ exist, they are coincident.

For instance, the bolt's suddenly snapping is categorically indiscernible from its snapping per se, not just in this world but in every other where they exist together. Understanding a relation to hold *essentially* between x_1 and x_2 when necessarily, it holds if x_1 and x_2 exist, (4) can be put by saying that if one thing strengthens another, they are essentially coincident.

Strengthening is not the only form of coincidence, though, nor do all coincidence relations hold essentially. Imagine that x and y , although neither strengthens the other, have (in world w) a strengthening z in common. Then by (4), z is coincident in w with x and y , whence x and y are coincident in w , too. To turn this observation to advantage, assume that:

- (U) For every x , and every world w in which x exists, there is an $x_w \supseteq x$ which exists in w alone.

Again by (4), x and x_w have the same categorical properties in w ; and since x_w exists in a single world only, x_w possesses these properties essentially. Thus every detail of x 's worldly condition is essential to x_w , which licenses us in referring to it as x 's *state* in w . Now suppose that x and y are in the *same* state in w , that is, there is a z existing in w alone that strengthens both of them. Then by the same argument as before, they are coincident in w :

- (5) Necessarily, if x and y are in the same state, they are coincident.

With the help of one further assumption, we can strengthen (5) to a necessary biconditional:

- (6) Necessarily, x and y are in the same state iff they are existent and coincident.

That assumption, independently plausible, is that:

- (N) x and y are distinct \Rightarrow either they exist in different worlds, or they are noncoincident in some world where both exist.

Suppose that x and y exist in w and are coincident there. By (4) and (U), x_w and y_w are existent and coincident there, too. Since x_w and y_w exist in no other world but w , they exist in the same worlds and are coincident in all of them, which by (N) makes them identical. So x and y are in the same state in w . That proves (6)'s right-to-left direction; (1) and (5) imply the other. Assuming that things in the same state in one world can be in distinct states in others, (6) supports the claim above that it is possible for coincidence relations to hold accidentally. (An example might be the coincidence of a statue with its constituent clay (see Gibbard 1975).)²⁵

5. CONSTITUTION AS ESSENCE

At the end of Section 2, constitutions were proposed as a way of reconciling the following assumptions:

- (i) the bolt's suddenly snapping has different causal powers from its snapping per se;
- (ii) there must be some prior difference between them, to account for this;
- (iii) this prior difference must be in point of suddenness; but
- (iv) they are exactly alike in every ordinary respect, suddenness included.

These can all be true together, I said, if, although both snappings are *sudden*, only one of them is sudden *constitutively*. But I acknowledged that the proposal may seem to raise more questions than it answers. What are constitutions? How is it that disparately constituted entities can be otherwise so similar? And how can things as similar as *that* still differ in their causal powers?

What recommends essentialism is that it gives a way of approaching these questions. Constitutions are essences. Because essential properties, that is properties of the form *being essentially P*, are hypothetical,

things can differ essentially while still being categorically just the same.²⁶ Lastly, if causal properties are hypothetical (see below), then it is only to be expected that categorical duplicates will sometimes differ in their effects.

To me this is motivation enough for the essentialist account, or at least for pursuing it further. But some may feel that it runs so far counter to modal intuition that it cannot be taken seriously as it stands (at best it bears some fortuitous formal analogy to the correct account).

Well, what *are* our intuitions here? Few would find it strange to say, of Brutus's stabbing Caesar, that Caesar might have survived if the knife had been blunter; or of the sinking of the Titanic that, if certain hatches had held, it might have stretched out over hours or days.²⁷ Yet to say these things of Brutus's *killing* Caesar (that Caesar might have survived *it*) or of the Titanic's *swiftly* sinking (that *it* might have taken days) is incomprehensible.²⁸ These are far from being isolated hunches. With expert medical attention Caesar might have pulled through; in that case, the stabbing would have occurred in the killing's absence. Likewise the Titanic's sinking, if had been sufficiently prolonged, would have occurred without the Titanic's *swiftly* sinking.²⁹ Essentialism may not be the only interpretation of these data but it is certainly the most straightforward one.

Essentialism about causes is a theory of their common nature; to stretch a phrase, it is a theory of "what they are". However it could be held – and I do hold³⁰ – that essentialism applies to all particulars whatever, regardless of categorial or other differences. So if the question is, not what causes *are*, but what they are *as opposed to other things*, essentialism is rather a minimal position. Nevertheless I propose to add very little more: only the commonplace, anticipated in one or two incautious formulations along the way, that they are things which take place or happen, thus *events* or *occurrences* or *happenings* of some sort.

Notice that even this would be to say too much, if events were (as on some theories) inherently coarse-grained.³¹ Whatever else is true of causes, there needs to be a *distinct* one for each of the finely discriminated causal roles they are called on to fill. An opposite worry would be that the proposal is not explicit enough; that the needed distinctions are so extraordinary that they can be provided for only on some special basis, e.g., by intensionalising events, or endowing them with internal structure.³² But, on the first point, it is only *concrete* events that are

inherently coarse-grained, and, on the second, fine-graining comes automatically with our freewheeling background essentialism. So the most straightforward course is to treat causes simply as events with essences; or, since *everything* has an essence, simply as events.³³

6. CAUSAL PROPERTIES AS HYPOTHETICAL

Above we distinguished categorical properties from hypothetical, but said nothing about how the distinction bears on causal properties. To any ordinary way of thinking, I suggest, causal properties are hypothetical. For instance, we see, or think we do, a strong connection between x 's causing y and its being such that without it y would not have occurred. But whether x has the latter property depends on what goes on in nonactual situations.

Another sort of evidence that causal properties are hypothetical comes from our essentialism about causes. Recall that properties like that of causing a certain effect are liable to discriminate on grounds of strength, e.g., the bolt's suddenly snapping has different effects from its snapping *per se*. But events related by strengthening are categorically alike. If there is a causal difference between them, then, it can only be hypothetical.

So causal properties *must* be hypothetical to tell categorical duplicates apart; it is a further point that their being hypothetical clarifies *how* they do this, or, to put it the other way around, how essence manages to be causally relevant. For a case can be made that a thing's essential properties enjoy a certain preeminence relative to its other hypothetical properties, causal properties included. To possess hypothetical property P is to lead a certain kind of counterfactual life, amounting finally to the possession of such-and-such categorical properties in such-and-such counterfactual situations. But, how a thing categorically comports itself across its counterfactual environments is a function of how it is essentially. Here then is the form (only that) of a mechanism connecting essence to causal powers. Sections 7–10 suggest one way, perhaps not the only way, in which the mechanism might actually work.

7. EFFECTS AS CONTINGENT ON THEIR CAUSES³⁴

In the *Enquiry Concerning Human Understanding*, Hume describes cause and effect as items such that "if the first . . . had not been, the

second never had existed".³⁵ As an analysis or definition of causation, this is of course extremely doubtful.³⁶ But as the *de facto* generalisation that, other things equal, *x* causes *y* only if:

(C) If *x* had not occurred, then *y* would not have occurred,

Hume's remark verges on truism. Calling *y* *contingent* on *x* when *x* and *y* satisfy (C), the truism is that effects are, other things equal, contingent on their causes.³⁷ (Here and throughout, 'if it had been that *P*, then it would have been that *Q*' is counted true in a world *w* iff *Q* is true in the *P*-world best resembling *w*.³⁸)

Because the contingency condition makes no overt mention of essence, its essence-sensitivity can easily be overlooked. Suppose that it was irrelevant to Socrates's death that he guzzled the hemlock, rather than simply drinking it. Then Xanthippe is mistaken when, disgusted at her husband's sloppiness, she complains that his *guzzling* the hemlock caused his death. Assuming that the drinking would still have occurred if the guzzling hadn't, contingency explains the error nicely. Even without the guzzling, the death would still have followed on the drinking (the details would naturally have been different). If not for the drinking, though, the death would not have occurred at all. So the effect is contingent on the weaker antecedent, but not the stronger.³⁹

Implicit in the example is an argument that as properties irrelevant to *y* accumulate in *x*'s essence, *y*'s contingency on *x* is threatened. Suppose that *x* possesses many such irrelevancies essentially. Then *x*'s absence from the nearest *x*-less world is liable to signify nothing more than the failure there of a property not implicated in *y*'s production. Since the failure of *that* sort of property should not take *y* out of existence, it will be *false* that *y* would not have occurred if *x* had not, i.e., false that *y* is contingent on *x*. To the extent then that effects are contingent on their causes, it damages *x*'s credentials for the role of cause if irrelevant properties are too often essential to it.⁴⁰

8. CAUSES AS ADEQUATE FOR THEIR EFFECTS

Most counterfactual theories of causation put the contingency condition front and centre; they refine it in light of counterexamples and surround it with caveats, but genuinely collateral conditions are rare. To the outsider this is surprising, since naively one expects some sort of ad-

equacy condition complementary to contingency. Here are two reasons why such a condition seems desirable.

When Xanthippe attributed Socrates's death to his guzzling the hemlock, she overestimated the actual cause. But causes can also be essentially *underestimated*. Some examples: whatever Admiral Poindexter might think, it was not his testifying to Congress, *as such*, that caused his downfall; rather his *lying* to Congress was to blame. But where Xanthippe's mistake is subject to correction by the contingency condition, Poindexter's opposite error is not, for the indictment and so on were no less contingent on his testifying than on his lying. Or suppose someone suggests Zsa Zsa Gabor's *driving* (rather than her speeding) through the police radar as what led to her detention, or attributes the officer's abrasions to her *touching* his face (rather than her slapping it). Again, these attributions strike most of us as wrong, but the contingency condition is unbothered.

Apart from the examples, a new condition is needed to complete a powerfully, if obscurely, felt symmetry in the character of causation: if the cause is a *that without which not*, it is also a *that with which*.

Probably the main reason for adequacy's neglect is that this second notion has resisted all attempts at counterfactual analysis. Neither of the obvious candidates seems to work. When (C)'s antecedent and consequent are negated, we get:

(A₁) If *x* had occurred, then *y* would have occurred also;

when we transpose them the result is:

(A₂) If *y* hadn't occurred, *x* wouldn't have occurred either.

Although (A₁) is not *wrong* as a condition on causation, it follows trivially from a more basic condition – that *x* and *y* should actually occur – to which adequacy is intuitively quite unrelated.⁴¹ (A₂)'s problem is worse: it approaches on being *incompatible* with a more basic condition and hence with the causal relation itself. To cause *y*, *x* must be causally prior to it. But if *x* is causally prior to *y*, then it is probably *not* the case that it would not have occurred if *y* hadn't; rather *x* would have occurred as ever, but the causal train from *x* to *y* would have been derailed at the last minute.⁴²

So where (A₁) is vacuous, (A₂) is for the most part unsatisfiable. Avoiding both extremes is the condition that:

- (A) If x had not occurred, then *if it had*, y would have occurred as well⁴³

(i.e., y occurs in the nearest x -containing world u to the nearest x -omitting world v to actuality). (A) *would* be vacuous – it would follow automatically from the existence of x and y – if the nearest x -containing world u to the nearest x -omitting world v was, whenever x actually existed, the actual world. But why should it be? More likely, the actual world sits in the interior of a neighbourhood of x -containing worlds, whose outskirts contain worlds *nearer* to the nearest x -omitting world than the actual world is. Unlike (A₁), then, (A) is not vacuous. Unlike (A₂), it doesn't ask too much: it will be satisfied whenever it is correct to say 'suppose that x had not occurred; then y *would* have occurred if x had'. This seems, in any case, a reasonable test of intuitive adequacy. For the question is whether x , introduced into the actual circumstances *minus* x , brings y in its train. And it is hard to think what the actual circumstances *minus* x could be, if not the circumstances that *would* have obtained if x had not occurred.⁴⁴

Imagine a bridge designed so that, given time to respond, it shifts its weight away from failing bolts. To take advantage of this design feature, special 'soft' bolts are used which snap readily but seldom abruptly. This particular day, alas, our bolt has just begun to give way when molecular bonds along the fracture line improbably deteriorate. The snapping is thus accelerated, and the bridge, lacking time to rearrange itself, collapses in a heap. Now, since the bridge would not have collapsed at all if the bolt had snapped less abruptly – we can even assume that this would have resulted in a *stabler* overall comportment – it was not the bolt's snapping per se that caused the collapse. Adequacy explains this as follows: given the unlikelihood of the molecular mishap, if the snapping had not occurred, it might well not have been sudden if it had; hence the bridge might well not have collapsed. Speaking then of how things *would* have been if not for the snapping, it *cannot* be said that if it had occurred, so would have the bridge's collapse.⁴⁵ In other words, the snapping per se was not *adequate* for the collapse; and that is why it was not the cause.

Again the underlying mechanism is worth noticing, both for its own sake and for the connection it suggests between x 's essence and its causal powers. Properties accidental to x are potentially ones that it lacks in u , the x -including world most similar to the x -excluding world

v most similar to actuality. In proportion then as x 's causally important properties are accidental to it, the chances increase of its lacking, in u , some of the properties by which y was caused. This raises in turn the likelihood that y is absent from u , i.e., that x is inadequate for y . So, adequate causes cannot have too many of their causally important properties only accidentally.

9. EFFECTS AS REQUIRING THEIR CAUSES

When a cause is essentially overestimated, as, e.g., when Xanthippe blames Socrates's death on his guzzling the hemlock, this often shows itself in a violation of the contingency condition. Not always, though. Imagine that Socrates is a sloppy eater who infallibly guzzles what he drinks. Then his death *might*, I suppose, be contingent on his guzzling the hemlock; but Xanthippe is as unconvincing as ever when she calls it the effect of his doing so. Or imagine that Poindexter, his testimony complete, attends the symphony, where his talking so irritates his fellow concert-goers that he is ejected from the hall; and moreover that, although this plays no role in his ejection, he knows what he is saying to be untrue. To attribute Poindexter's ejection to his *lying* as opposed to his *talking* seems hardly credible. Yet if Poindexter is talking only to pass along misinformation, the ejection may well be contingent on both.

Where do these attributions go wrong? In both cases one wants to say that not *all* of the proposed cause was needed. Included in the guzzling, for example, was a lesser event, the drinking, which would still have done the job even in the guzzling's absence. By hypothesis, of course, without the guzzling this lesser event would not have occurred; but that doesn't stop us from asking what would have happened if it had, and evaluating the guzzling on that basis. Accordingly we define x as *required* for y iff:

- (R) Given any x^- strictly weaker than x , if x^- had occurred without x , y would not have occurred.

Among its other advantages (see below), (R) gives the intended result that Socrates's guzzling the hemlock is not what killed him. For the guzzling was required for the death only if there was no strictly weaker event such that, if it had occurred in the guzzling's absence, the death

would still have ensued. Socrates's drinking the hemlock being a counterexample to this, his guzzling the hemlock is rejected as not required.

Against the essentiality of causally irrelevant properties, I complained that too much of it jeopardises the contingency of effect on cause. But the argument had a loophole. All that follows from x 's possessing causally irrelevant properties essentially is that there are *some* worlds from which x is absent for causally irrelevant reasons. This leaves it open that in the *nearest* x -less world v , x 's absence is for failure of one or more of its causally *relevant* properties. In that case, we would expect y not to occur in v . So the threatened conflict with contingency need not always materialise.

With condition (R), this loophole can be partly closed. Remember that (C) concerns itself with the nearest world from which x is absent *for whatever reason*. Subject though to the availability of suitable weakenings,⁴⁶ (R) shifts the focus to the nearest worlds from which x is absent *specifically* for lack of causally irrelevant properties. For y to be missing from the former world is understandable, but its existence should *not* be threatened if, as in the latter worlds, properties are lacking on which it is not in any case causally dependent.⁴⁷ So essential-but-irrelevant properties are likelier to result in violations of (R) than of (C); this consolidates our earlier conclusion that properties of the cause unneeded by its effect cannot be too often essential to it.

10. CAUSES AS ENOUGH FOR THEIR EFFECTS

Adequacy was used to explain why the bolt's snapping per se could not be blamed for the bridge's collapse. But this required a special assumption: that if the snapping had not occurred, it might well not have been sudden if it had. Suppose instead that when the temperature is extremely low, as on this occasion, soft bolts snap suddenly if at all. Barring an implausible counterfactual dependence of the temperature on the bolt, it would have been just as cold if the snapping had not occurred. But then, given the effect of cold on soft bolts, if the snapping *had* occurred, it would still have been sudden, and the collapse would still have followed. Since now the snapping *is* adequate for the effect, the problem with taking it for the cause lies elsewhere; and the obvious thought is that although the snapping was *part* of the cause, the effect required more. Suppose we call x *enough* for y if:

- (E) For all (actually occurring) x^+ strictly stronger than x , y does not require x^+ .⁴⁸

Because the bolt's *suddenly* snapping was required for the bridge's collapse, its snapping per se was not enough.

Adequate causes, I said, cannot have too many of their causally relevant properties accidentally. However, the argument I gave was not airtight. There is a conflict with adequacy only if x lacks some causally relevant property in world u specifically (as before, u is the nearest x -including world to the nearest x -omitting world to actuality). But all that follows from such a property's being accidental to x is that x lacks it *in some world or other*; and why should the property choose world u to put in its nonappearance? Fortunately what happens in u is not decisive, where the enoughness condition is concerned: subject to the availability of suitable strengthenings and weakenings,⁴⁹ enoughness homes in on the nearest worlds in which x 's relevant but accidental properties *do* fail. These being worlds in which the effect is unlikely to eventuate, this increases the pressure on causally relevant properties not to be accidental.⁵⁰

11. PROPORTIONALITY AND CAUSAL ONTOLOGY

By *proportional* events, I mean events satisfying the contingency, adequacy, requirement, and enoughness conditions:

- (C) (If x had occurred, then) if x had not occurred, neither would have y ;
 (A) If x had not occurred, then if x had occurred, y would have occurred as well;
 (R) For all x^- strictly weaker than x , if x^- had occurred without x , y would not have occurred; and
 (E) For all (occurring) x^+ strictly stronger than x , x^+ is not required for y .

(Call the conjunction of these conditions (P).) Whether x is proportional to y is sensitive, I have been arguing, to the content of x 's essence, specifically to how well its essence lines up with the properties by which y was brought into being. To the extent then that causes are proportional to their effects, x 's essence bears similarly on its causal powers.

At this point it seems that we have answered the skeptical challenge of Section 3: what possible difference can an event's essence make to what it causes? Yet a major issue has been dodged. Up to now I have been talking as though proportionality was a single well-defined condition. But from (P)'s logical form one sees that its demands *intensify* as its quantifiers range over more and more events. Equivalently we could say that the condition (P) expresses is a monotonically increasing function of its quantificational domain – what I will call *causal ontology*. The question is, how strong or weak a condition can (P) be made to signify by variation in this ontology?

Imagine an ontology so meagre that events have no coincidents but themselves (x_1 is coincident with x_2 only if they are identical). Since strengthening entails coincidence, none of these events is strictly stronger than any other. (R) and (E) are therefore trivialised, and (P) collapses into (C) and (A), the contingency and adequacy conditions. So that is one extreme. For the other, suppose we call x *necessary* for y iff y cannot – metaphysically cannot – exist without it, and *sufficient* for y iff x cannot exist without y . Unless x is necessary and sufficient for y , it turns out, there is room, reliably exploitable by an ontologically unscrupulous monkey wrencher, for a *counterexample* to the hypothesis that x is required by and enough for y .⁵¹ Depending on causal ontology, then, (P) can mean as little as contingency-plus-adequacy, or as much as necessity-plus-sufficiency.

Now, I take it that neither of these extremes is tolerable: the second makes (P) absurdly overdemanding,⁵² and on the first the commensuration ideal is all but surrendered. How though to find the happy medium? Suppose we conceive the problem operationally: starting from a modest foundation, say an ontology with no nontrivial coincidence relations, and building upwards, does there emerge at some point a natural brake on the construction? The more ontology grows, we know, the more commensurate (P)-related events become. What we'll discover is that too *much* commensuration is a bad thing; and this for reasons that make themselves felt *before* we arrive at the upper extreme just noted.

To fix ideas, consider the course our process takes with a specific causal episode, say, Lucy's demolishing a sandcastle with a rock. Relative to the going ontology, we find, say, that $x = \textit{her dropping that rock}$, is proportional to y , the castle's breakup. Now let the pool of events be gradually enlarged. As (P)'s demands increase, we are forced to

nominate new causes in place of the old, each momentarily satisfying us until further events make their way onto the scene and the cycle repeats. For instance, the sequence $\langle x_i \rangle$ of causes might begin like this (the letters in the right-hand column indicate whether (R) or (E) motivated x_i 's rejection);

$x_1 = x =$ her dropping that rock	(R)
$x_2 =$ her dropping a rock	(E)
$x_3 =$ her dropping a large rock	(R)
$x_4 =$ her dropping a large object	(E)
$x_5 =$ her dropping a large object from above the sandcastle	(R)
$x_6 =$ her propelling a large object in the direction of the sandcastle	(E)
$x_7 =$ her propelling a large and heavy object in the direction of the sandcastle	(R)
$x_8 =$ the propulsion of a large and heavy object in the direction of the sandcastle	(E)
$x_9 =$ the propulsion of a large, heavy, stable object at a good velocity in the direction of the sandcastle	(R)

Of course, even x_9 will not satisfy us for long. How slowly the object can afford to be moving depends on how heavy and stable it is; and how heavy it needs to be depends likewise on its size and velocity, whose permissible values depend in turn on the gravitational and other forces then in effect. So even at this relatively early stage we seem driven to something like:

$x^* =$ The propulsion of a suitably large and heavy, sufficiently stable object at an adequate velocity towards the sandcastle in the presence of appropriate gravitational forces and the absence of effective electromagnetic interference,

where 'suitable', 'sufficient', 'adequate', 'appropriate', and so on, are to indicate that these parameters should assume mutually satisfactory values relative to the goal of achieving the castle's collapse. Describing events like this as *dedicated* to their effects helps to underline that their conditions of occurrence are of the form (exaggerating somewhat): there obtains *some* such combination of the given factors as will result

in the effect's occurrence. What we are after is a rationale for excluding dedicated events from our ontology.

Associated with Aristotle is the idea that certain outcomes, what we might ordinarily call 'accidents', are not as such caused. To borrow one of his examples, there may be a cause for your entering the market at 4 p.m., and a cause for your debtor's entering it then; we may even suppose that these combine to form a cause of your *both* entering it at 4 p.m. But if your meeting was, as we say, *accidental*, we would precisely *not* expect to find a cause for your entering the market *at the same time*.⁵³ Neither do we expect a cause if, as in the O. Henry story, someone receives as a Christmas present the very thing that she can no longer use. There may be causes for her receiving what she did, and for her changed situation, but nothing accounts, on an intuitive level, for their discord *as such*.

Although I have no foolproof definition to offer, it seems characteristic of accidents that they essentially specify the *relations* among several causally independent parameters but without prejudice to their separate values (e.g., that you enter at the same time, but not the time you enter). Rough as it is, this suggests that our reluctance to ascribe causes to accidents is what one would anyway expect from the commensuration principle. For what would an accident's commensurate cause be like? On the one hand, it would have to arrange for each of the causally disconnected factors in whose rapport the effect consists to respect the others; on the other hand, it could not fix these separately on pain of overshooting the mark. The problem is to see how the first condition can be met without sacrificing the second.⁵⁴

Accidents do not, per se, have causes.⁵⁵ But accidents are what we are dealing with, in causes dedicated to their effects. Take, for instance, the strange event x^* : the propulsion of a suitably large and heavy, sufficiently stable object at an adequate velocity towards the sandcastle in the presence of appropriate gravitational forces and in the absence of effective electromagnetic interference. As with the other accidents mentioned, x^* occurs iff there obtains *some* such combination of factors as meets a certain externally imposed condition (in this case, that of securing a certain effect). What we said about the other accidents therefore applies here: it is obscure how any prior event could hope to coordinate these factors without constraining them beyond what x^* requires.

Along with the problem of finding causes for dedicated events, there

is a problem finding effects for them to cause. Thus our original cause x (Lucy's dropping the rock) is at least *roughly* commensurate with not only y (the collapse) but any number of other events: the sensation of release, the twins' cry of alarm, the honeybee's sudden flight, etc.; and it goes with this that relative to a moderate, although not an extravagant, causal ontology, x will come out proportional to all of them. Not so with x^* , which stands little chance of proportionality with any but the collapse. It is not required, because, e.g., it makes no difference to the honeybee's flight if the projectile is so unstable that it disintegrates just on reaching the castle; and it is not enough, because, e.g., there would have been no sensation, if the propulsion had been accomplished by mechanical means. So the contemplated additions to causal ontology reduce overall effectiveness in *two* ways: both by undermining preexisting causal relations (like that between x and y); and by their own relative ineffectiveness (x^* causes little else *but* y).

Summing up, as events are multiplied in the interests of causal precision, they suffer in accountability on the side of their causes, and versatility on the side of their effects. As a whole the causal order becomes fragmentary and disconnected; ultimately we find ourselves in a world whose every outcome derives from an unmoved mover dedicated precisely to it. Yet with too few events proportionality cannot carry out its assigned task of enforcing commensuration. I conclude that the right ontology, for purposes of causal theory, is the one that strikes the best overall compromise between commensuration on the one hand, and the unity and integrity of the causal order on the other.

12. WORLD-DRIVEN VS. EFFECT-DRIVEN CAUSES

"Surely, though, an objectively *ideal* compromise is not to be hoped for; so the above leaves the question of causal ontology partly open". So much the better, I argue now.

Inspiring the commensuration constraint is a certain platitude: the cause is the thing that 'made the difference', in the obtaining circumstances, between the effect's occurring and its not. But the platitude can mean more than one thing, according to which of two related contrasts we want the cause to mark. First is the contrast between worlds where the effect goes on to occur and those where it doesn't: x is to be the choice-point, as it were, between these two types of future. Second is that between the *actual* world and worlds where the effect

does not occur: x is to indicate how the choice of a y -containing future is implemented *here* as opposed to elsewhere.⁵⁶

Mill gives the example of a man dying from a bad meal: “[I]f a person eats of a particular dish, and dies in consequence, that is, would not have died if he had not eaten of it, people would be apt to say that his eating of that dish was the cause of his death”.⁵⁷ But is the cause his eating *poisonously tainted* oysters, or his eating *those* oysters? Apart from context, it could be either. Which way we go depends on which of the just-mentioned contrasts we have mainly in mind. Intent of the first contrast, and concerned to find the antecedent that marks off the effect-worlds from the others, we look for an x which essentially involves what it *took* for the effect to occur: in this case, the man’s eating poisonously tainted oysters, never mind exactly which. Like any event, x occurs in some determinate way, but its essence homes in on those aspects of its occurrence critically implicated in y ’s production. But suppose our aim is to say what *specifically* happened in the *actual* world, to make it one of the worlds in which y occurred. Then we look for an event which brings out how actuality contrived to *realise* these critical aspects: in this case, the man’s eating *those* oysters. So, where the first sort of cause emphasises what the effect *needed* in order to occur, the second indicates something of *how its needs were in fact met*.⁵⁸

Two elements have been distinguished in causal judgement. Both are present, to greater or lesser degree, practically whenever we nominate one event as another’s cause. Where the first element predominates, and x is tailored to the effect’s causal requirements, I call the judgement *effect-driven*; where the second element predominates, and x is considerate of how those requirements are in the event fulfilled, I call it *world-driven*. So to blame the man’s death on his eating *tainted* oysters is to make an effect-driven judgement; the retort that it was his eating *those* oysters that killed him is world-driven. Again, your judgement is effect-driven, if you attribute Rumpelstiltskin’s furious stamping to the miller girl’s guessing his name, or Icarus’s fall to his flying so near the sun; world-driven, if you propose instead her saying “Rumpelstiltskin”, or his flying so high.⁵⁹

Assuming that neither of these attributional styles is to be privileged, how on the present theory can we make room for both? This is where causal ontology returns to do useful work. Enlarging it, we saw, turns up the commensuration pressure on would-be causes. Relatively incidental features of the causal scene, distinctive though they might be of the

actual progress of events, are worn away to reveal the steadier causal currents beneath. Such a strategy can of course be taken too far (a theme of the last section). Practised in moderation, though, it brings on an agreeable broadening and deepening of causal judgement, what I described by saying that these judgements become less world- and more effect-driven. Sometimes, it is true, we are willing to accept a shallower causal story in return for more discriminating information about what took place; in that case an easing of commensuration pressures is called for and hence a reduced causal ontology. So, if the question is: isn't ontology something to be settled uniquely, and identically across applications? – my reply is that this is a common assumption but not always a useful one. Underlying as it does a familiar and advantageous flexibility of causal judgement, the openness of *causal* ontology, at least, is all to the good.

13. EPIPHENOMENALISM⁶⁰

Writing to Descartes in 1643, Princess Elisabeth requested an explanation of “how man's soul, being only a thinking substance, can determine animal spirits so as to cause voluntary actions”.⁶¹ Dualism has been struggling to dissociate itself from epiphenomenalism ever since. The outlines of the problem are clear enough: if mind and body are metaphysically separate, as the dualist says, then how can the one affect the other? Three centuries of dualist apologetics on the topic have failed to provide an answer.

Why though should this old problem concern anyone today? Dualism is an evolving doctrine, and its Cartesian version has by now given way to something far less outlandish, to which Elisabeth's original complaint about the obscurity of cross-category interaction no longer applies. Immaterial minds are gone, and although mental *phenomena* (facts, properties, events) remain, the contemporary dualist admits, in fact insists, that they are physically realised. All that survives from Cartesianism is the denial of their numerical *identity* with their physical bases. Surely it would be hard to imagine a dualism more congenial to mind/body causation than this!⁶²

Indeed it would. But epiphenomenalism has been evolving too, and in its latest and boldest manifestation, this is all the dualism it asks for. The paradoxical result is that, at a time when the prospects for accommodating mental causation seem little short of ideal, epiphenomenalism

menalist anxiety runs higher than ever. Nor is this a pretended anxiety, put on for dialectical purposes but posing no genuine danger to established views. Some say we must simply make our peace with the fact that “the mental does not enjoy its own independent causal powers”.⁶³ Others would renounce (distinctively) mental entities altogether, rather than see them causally disabled.⁶⁴

Radical as these proposals are, they are backed by a rather straightforward line of thought: “How can mental phenomena make any causal difference to what happens physically? Every physical outcome is causally assured by its physical antecedents; its mental antecedents are therefore left with nothing further to contribute”. This is the *exclusion* argument for epiphenomenalism. Here is the argument as it applies to mental events; for the version that applies to properties, replace ‘event x ’ with ‘property X ’.⁶⁵

- (1) If an event x is causally sufficient for an event y , then no event x^* distinct from x is causally relevant to y (*exclusion*).⁶⁶
- (2) For every physical event y , some physical event x is causally sufficient for y (*determinism*).⁶⁷
- (3) For every physical event x and mental event x^* , x is distinct from x^* (*dualism*).
- (4) So: for every physical event y , no mental event x^* is causally relevant to y (*epiphenomenalism*).

This is bad enough – as Malcolm says in ‘The Conceivability of Mechanism’, it calls into question even the possibility of speech and action – but a simple extension of the argument seems to deprive mental phenomena of all causal influence whatsoever. Every event z of whatever type is metaphysically necessitated by some underlying physical event y , whose causally sufficient physical antecedents are presumably sufficient for z as well. But then by the exclusion principle, mental phenomena are entirely causally inert. And now it is not only speech and action that are endangered but also thinking.

Now, it is important that the exclusion argument raises *two* problems for mental causation, one about mental particulars (events) and the other about mental properties. Their evident similarity notwithstanding, philosophers have tended to treat these problems in isolation and to favor different strategies of solution.⁶⁸ Easily the most common reaction to the first is to insist that mental events are *identical* with (some among) physical events, whose causal powers they therefore share.⁶⁹ Such a

response is at best incomplete, because of the second problem. Mental events are effective, maybe, but not in virtue of their mental properties; any causal role which the latter might have hoped to play is occupied already by their physical rivals.⁷⁰ Although someone *could*, following the line above, attempt to identify mental with (some among) physical properties, this response is now discredited; the argument bears examination, since, appropriately modified, it seems also to cast doubt on *token* identity.

When philosophers abandoned the hope of finding for every mental property an identical physical property, their reason was that mental properties seem intuitively to be *multiply realisable* in the physical.⁷¹ But some care must be taken about what this means. Sometimes it is claimed that for *any* pair of properties, one mental and the other physical, something could have the first without the second. Really, though, this is stronger than intended or needed. Imagine a philosopher who holds that necessarily every thinker is spatially extended. Presumably she could also accept multiple realisation, intuitively understood, without falling into inconsistency. But, since the necessitation of extension by thinking is the necessitation of a physical property by a mental one, her view actually runs contrary to multiple realisation as just explained! *Provided that they are suitably unspecific*, then, physical properties *can*, compatibly with multiple realisation, be necessitated by mental properties; which suggests as the thesis's proper formulation that *M* necessitates no physical properties specific enough to necessitate *M* in return:

- (M) Necessarily, for every mental property *M*, and every physical property *P* that necessitates *M*, *P* necessitates *M* asymmetrically, i.e., possibly something possesses *M* but lacks *P*.

For purposes of refuting the type identity theory, note, (M) is all that's needed. Assume for contradiction that *M* is *P*. Then *P* necessitates *M*. But then by (M), a thing can have *M* otherwise than by way of possessing *P*, contrary to their assumed identity.

What is not often noticed is how easily the above adapts to mental and physical events. Take, for instance, a pain sensation *s*, and some underlying brain event *b* alleged to be identical with *s*; and grant the identity theorist that *b* at least strengthens the pain. The problem is that as *b* takes on the degree of essential physical detail without which the pain is not necessitated, the likelihood increases that the pain is

possible even in *b*'s absence. Something like this is one of Kripke's arguments against token identity:

[*B*]eing a brain state is evidently an essential property of *b* (the brain state). Indeed, even more is true: not only being a brain state, but even being a brain state of a specific type is essential to *b*. The configuration of brain cells whose presence at a given time constitutes the presence of *b* at that time is essential to *b*, and in its absence *b* would not have existed. Thus someone who wishes to claim that the brain state and the pain are identical must argue that the pain could not have existed without a quite specific type of configuration of molecules.⁷²

Prima facie, it seems obvious that the pain could still have occurred, even if that specific configuration of molecules hadn't; and, as Kripke says, the *prima facie* appearances aren't easily defeated. But if the molecular configuration is essential to *b* alone, then *b* strengthens *s* properly or asymmetrically. Extended across mental and physical events in general, this amounts to an analogue for particulars of the multiple realisability thesis:

- (m) For every mental event *m*, and every physical event *p* which strengthens *m*, *p* strengthens *m* asymmetrically.

By (m), any physical *p* specific enough to *strengthen* a mental event *m* is *too* specific to be *identical* with *m*. Token dualism follows, by the same reasoning as before.

Isn't this playing into the epiphenomenalist's hands, though? If *m* is distinct from *p*, then *m* can influence an outcome only to the extent that *p* leaves that outcome causally undecided. Effects which *p* causally guarantees, then, it renders insusceptible to causal influence from any other source, *m* included. Assuming, for instance, that all it took for me to wince, clutch my brow, and so on, was my antecedent physical condition, everything else was strictly by the way. Since my headache is a different thing from its physical basis, it is not a *bona fide* causal factor in my headache behaviour.

How plausible we find this argument depends on how much rivalry we admit between an effect's would-be causal antecedents. Does *x*'s causal sufficiency for *y* really make *all* of *y*'s other antecedents irrelevant? Such a view implies, absurdly, that *y* owes nothing to *x*'s causal antecedents, or to the causal intermediaries by which *x* generates *y*!⁷³ At least as it applies to events, then, the exclusion principle is overdrawn; but not, or not yet, in a way that helps with the problem of mental causation, for the charge against mental causes is that they are

preempted by underlying physical causes to which they are bound, not causally, but in some more intimate metaphysical association. Next we consider what their relation could be, that events related in *that* way do not compete for causal influence.

For the reasons given, I find no fault with type- or token-dualism, or with the picture of mental phenomena as necessitated by physical phenomena which they are possible without. Rather than objecting, in fact, to the asymmetric necessitation picture, I propose to go it one better. It will be easiest to begin with mental and physical properties. According to a still reputable traditional doctrine, some properties stand to others as *determinate* to *determinable*, e.g., *scarlet* is a determinate of *red*, *red* is a determinate of *coloured*, and so on. Since the distinction is relative, one does better to speak of a determination *relation*, where:

- (Δ) *P* determines *Q* iff to be *P* is to be *Q*, not *simpliciter*, but in a specific way.

As traditionally understood,⁷⁴ determination involves conceptual and metaphysical elements jumbled confusingly together. Metaphysically, the main idea is that:

- (Δ) $P > Q$ ⁷⁵ only if: (i) necessarily, for all *x*, if *x* has *P* then *x* has *Q*;
(ii) possibly, for some *x*, *x* has *Q* but lacks *P*.

Not always distinguished from this a requirement of asymmetric *conceptual* entailment: there is no conceptual difficulty about *Qs* which are not *Ps*, but the reverse hypothesis is conceptually incoherent.

Now, just as the discovery by Kripke and Putnam of *a posteriori* necessities upset the conceptual equivalent condition on property-identity,⁷⁶ it also invites a reconsideration of the conceptual condition on *determination*. Let *K* be some highly specific micromechanical property chosen so that necessarily, whatever is *K* is at temperature 90°C. Assuming that warmer or cooler *Ks* cannot be ruled out on conceptual grounds alone, *K* does not determine the temperature property, at least not in the full-blown traditional sense. Or let the pertinent aspects of my physical condition be encoded in some physical property *P*, such that unthinking *Ps* are metaphysically impossible. Again, barring some

unsuspected conceptual entailment from physics to thought, traditional determination fails.

Yet the relevance of these *conceptual* possibilities to the properties' *metaphysical* relations is obscure; and since it is only the metaphysics that matters to causation, it seems wisest simply to drop the second, epistemological, component of the traditional doctrine, and to conceive determination in purely metaphysical terms.⁷⁷ This of course opens the way to treating *K* as a determinate of the temperature property, and (what is of course the point) *P* as a determinate of thinking.

Then why not see all mental properties as determinables of their physical bases? Such a view is in fact implicit in the reigning orthodoxy about mind/body relations, namely, multiple realisation (M) plus the supervenience thesis:

- (S) Necessarily, if something has a mental property *M*, then it has a physical property *P* that necessitates *M*.⁷⁸

By (S), anything with a mental property has a necessitating physical property, which by (M), necessitates the mental property asymmetrically. Necessarily, then, something has a mental property iff it has a physical property by which that mental property is asymmetrically necessitated. But this is extremely suggestive, for with 'determines' substituted for 'asymmetrically necessitates' it becomes:

- (D) Necessarily, something has a mental property *M* iff if it has also a physical determination *P* of that mental property;

and (D) is an instance of the standard equation for determinables and determinates generally, viz., that something has a determinable iff it has some determinate falling thereunder. It is hard not to hear this as an argument that, as (D) says, mental/physical relations are a species of determinable/determinate relations.

Properties stand in the determination relation iff for a thing to possess the one is for it to possess the other, not *simpliciter*, but in a specific way (this was (Δ) above). But this way of putting things comes naturally, too, in connection with *particulars*, and especially events. If *p* is the bolt's *suddenly* snapping, and *q* is its snapping per se, then for *p* to occur is for *q* to occur in a specific way, viz., suddenly; likewise for my *slamming* the door to occur is for my *shutting* it to occur, not *simpliciter*, but with a certain forcefulness. Examples like these suggest the possibility of a determination relation for particulars, where:

- (δ) *p* determines *q* iff for *p* to exist (in a possible world) is for *q* to exist (there), not *simpliciter*, but in a specific way.

As luck would have it, such a relation is already available from Section 4. When one event strictly or asymmetrically *strengthens* another, for the stronger event to occur in a world is for the weaker to occur there, not *simpliciter*, but in possession of the properties by which their essences differ (Section 4, (1)–(3)). So we define *p* as a *determination* of *q* iff *p* strengthens *q* asymmetrically.

Perhaps the analogy with properties can be pressed a little further. Corresponding to the multiple realisation thesis (M), we have:

- (m) For every mental event *m*, and every physical event *p* which strengthens *m*, *p* strengthens *m* asymmetrically, i.e., *p* determines *m*.

So far we have no analogue for particulars of (S), the mental/physical supervenience thesis; but suppose, as an experiment, that:

- (s) Whenever a mental event *m* occurs, there occurs also a physical event *p* that strengthens *m*.⁷⁹

There is partial support for this in the supervenience thesis itself. By supervenience, each mental property in *m*'s essence is necessitated by some underlying physical property. Even if some or all of these physical properties are only accidental to *m*, we can imagine a physical event *p* to which they are all essential, and to which every mental property in *m*'s essence is therefore essential, too. Thus every mental property in *m*'s essence is also in *p*'s essence. Assuming that *p* can also be fitted out with essential properties to necessitate what few *nonmental* properties might be found in *m*'s essence, *p* is the physical strengthening of *m* postulated by (s).

Now the analogy is complete. For every mental event *m*, (s) guarantees a physical strengthening *p*, which by (m) is *m*'s determinate. Since the converse is immediate from Section 4, we have:

- (d) A mental event *m* occurs iff some physical determination *p* of *m* occurs.

Assuming (m) and (s), then, the relation of mental to physical events effectively duplicates that of mental to physical properties.

14. DETERMINATION AND CAUSAL RELEVANCE

According to the picture I am promoting, whatever has a mental property *M* has also a determining physical property *P*, such that to have *P* is to have *M* in a certain physical way; and whenever a mental event *m* occurs, there occurs also a determining physical event *p*, such that for *p* to occur is for *m* to occur in a certain physical way. Yet it is as true as ever that the physical property (event) and its mental counterpart are not the same; and this is all the exclusion objection asked for in the way of mental/physical separation. How then does it respond to the objection to say that the mental item is a determinable of the physical one?

Imagine a pigeon Sophie conditioned to peck at red shapes, and them only; a red triangle is presented, and Sophie pecks. Most people would say that the redness was causally relevant to her pecking, even that this was a paradigm case of causal relevance. But wait! I forgot to mention that the triangle in question was a specific shade of red, say scarlet. Assuming for argument's sake that the scarlet was already causally sufficient for the pecking, the exclusion principle entails that every *other* property was superfluous. So the redness, although it looked to be *precisely* what Sophie was responding to, in reality makes no causal contribution whatever.

Another example concerns properties of events. Suppose that the buildings in a certain region, although built to withstand lesser earthquakes, are in the event of a *violent* earthquake – one registering five or more on the Richter scale – causally guaranteed to fall. When one unexpectedly hits, and the buildings crumble, one property of the earthquake that seems relevant to their doing so is that it was violent. Or so you might think, until I mention that this particular earthquake was *merely* violent, in the sense of registering over five on the Richter scale, but less than six. What with the earthquake's *mere* violence being *already* sufficient for the effect, that it was *violent* cannot have made any causal difference.

Surprising results, these! To the untrained eye, the redness and the violence are *paradigm cases* of causal relevance, but it takes only a little philosophy to see through them. Yet I take it that our initial reaction was the correct one, and that it is the exclusion principle that is steering us wrong. What the examples really show is, not that the redness and violence are irrelevant, but that determinates do not compete with their determinables for causal influence.

And a good thing, too. For suppose that the competition was real. Then practically whenever a determinable Q was *prima facie* relevant to an effect, a causally sufficient determinate Q' of Q could be found to expose Q as irrelevant after all.⁸⁰ But this would hold equally of Q' , Q'' , Q''' , etc. So in the end only *ultimate* determinates – properties unamenable to further determination – could hope to retain their causal standing. Or, on second thought, maybe not them either. Not everything about a cause contributes to its effect, and even where a property does contribute, it need not do so in all its aspects. From the examples it is clear that such irrelevancies do creep in, as we pass from determinable to determinate; and if the determination process is continued *ad finem*, they may be expected to accumulate significantly. But then abstracting some or all of this detail away should leave a determinable which, since it falls short of the original only in causally irrelevant respects, is no less sufficient for the effect. By the exclusion principle, this robs even ultimate determinates of their causal powers; and now it begins to look as though no property *ever* makes a causal difference.

So, the exclusion principle dramatically overstates the potential for causal competition between properties. Not that there is nothing right about it. In *some* sense of 'separate', it stands to reason, separate properties *are* causal rivals as the principle says. Well, what if someone identifies the appropriate notion of separateness and reformulates the exclusion principle accordingly? Suppose it done. Even without hearing the details, we *know* that the corrected principle does not apply to determinates and their determinables; for we know that they are not causal rivals. Such a position is of course familiar from other contexts. Take, for instance, the claim that a space completely filled by one object can contain no other. Then are even the object's *parts* crowded out? No, in this competition parts and wholes are not on opposing teams, and any principle that puts them there needs rethinking. Likewise any credible reformulation of the exclusion principle must respect the truism that determinates and their determinables are not in causal competition.

All of this goes over to particulars *mutatis mutandis*. Remember Archimedes's excited outburst on discovering the principle of displacement in his bath. That his shouting "Eureka!!" was causally sufficient (let us pretend) for the cat's startled flight cannot be thought to rule it out that his (simply) shouting was relevant as well. Equally incredible is the suggestion that, granted the causal sufficiency of Socrates's

guzzling the poison for his death, his *drinking* it had no effect. Rather, in both these cases, as in the majority of others, the determinate's contribution *includes* the determinable's as a part. Far from being rivals, I conclude, for causal influence, determinates and determinables seem literally to share in one another's success.⁸¹

With the exclusion principle neutralised, the application to epiphenomenalism is anticlimactic. As a rule, determinates are tolerant, indeed supportive, of their determinables' causal aspirations. Why should it be different, if the determinate is physical and its determinable mental? Suppose that *P*, the physiological basis of my high spirits, was causally sufficient for my grinning. To conclude that its determinable *Q*, the property of feeling happy, was causally otiose, is no better than rejecting the redness as irrelevant on the ground that all the causal work was accomplished already by its determinate scarlet. And how could it make my pain *s* irrelevant to my wincing, that the latter was guaranteed by *s*'s occurring in some specific physical way?⁸²

15. MENTAL CAUSATION

So far our position is wholly negative: for all that the exclusion argument shows, mental phenomena *can* be causally relevant compatibly with the causal sufficiency of their physical bases. It is a further question whether they *will* be in any particular case. And even if *m* is causally relevant to an effect *y*, it is a further question yet whether it actually *causes* *y*.

Notice some important differences between causal relevance and sufficiency on the one hand, and causation on the other: *x* can be causally sufficient for *y* although it incorporates indefinite amounts of causally extraneous detail, and causally relevant to *y* even though it omits factors critical to *y*'s occurrence. What distinguishes causation from these other relations is that causes are expected to be *commensurate* with their effects. This makes causation special in another way also: determinables and determinates may not compete for causal *influence*, broadly conceived as including everything from relevance to sufficiency; but they *do* compete for the role of *cause*, with the more commensurate candidate prevailing. Now I argue that the effect's mental antecedents often fare *better* in this competition than their physical counterparts.

To be commensurate is, nearly enough, to be proportional. Thus faced with a choice between candidate causes, one determinate of

the other, the more proportional of the two is, other things equal, to be preferred. Which of the contenders proportionality favours depends, of course, on the effect in view. Socrates's drinking the hemlock is better positioned than his guzzling it to cause his death, but relative to other effects proportionality may back the guzzling over the drinking.

Here is an example more to the present point. In a fit of pique I decide to topple the milk pitcher. Epiphenomenalist neuroscientists are monitoring my brain activity from a remote location, and an event e in their neurometer indicates my neural condition to be thus and such. Like any mental event, my decision m has a physical determination p , and the question arises to which of these the neurometer reading e is due. The scientists reason as follows: because the neurometer is keyed to the precise condition of his brain, e would not have eventuated if the decision had been taken in a different neural way, in particular if it had occurred in p 's absence. Therefore m was not enough for e ;⁸³ and, if it was not enough, it was not e 's cause.

Before announcing this as a victory for epiphenomenalism, we should consider how things look from the interactionist's perspective: belief in the possibility of mental causation does not entail the commitment to find it *everywhere*; and, in *this* case, no one would (should) think that the mental event was the cause. Recognising that an effect depends not just on an event x 's occurring, but on its occurring in some quite specific manner, we rightly hesitate to assign x causal credit. To treat the meter reading as resulting from my decision per se would be like attributing Zsa Zsa's citation to her driving through the police radar, or the officer's abrasions to her touching his face.

Then when do we attribute effects to mental causes? Only when we believe, I can only suppose rightly, that the effect is relatively insensitive to the finer details of m 's physical implementation.⁸⁴ Deciding to topple the pitcher, that is what I do, and the milk spills across the floor. Most people would say, and I agree, that my decision had the spill as one of its effects. As for the decision's physical determination p , most people would also say, and I agree again, that the decision would *still* have been succeeded by the spill if it had occurred in a *different* physical way (because I have taken aspirin, say, or run around the block).⁸⁵

Someone could of course question this seemingly commonsensical assumption. But whoever accepts it must reckon with its *prima facie* consequences (where m is my decision, p is the brain event, and s is the spill):

- m is a counterexample to s 's requiring p (for s would still have occurred, if m had occurred without p);
- p is not proportional to s (since s does not require it);
- p did not cause s (since it is not proportional to s);
- p is not a counterexample to m 's enoughness for s (it could be a counterexample only if s required it);
- p is not a counterexample to m 's proportionality with s (by inspection of the remaining conditions);
- p poses no evident threat to the hypothesis that m caused s .

And here are the beginnings, at least, of a story in which a mental event emerges as *better* qualified than its physical basis for the role of cause.

16. CONCLUSION

Indeterminism aside, whatever happens is in strict causal consequence of its physical antecedents. But to be causally necessitated is a different thing from being caused, and the physical has no monopoly on causation. Among causation's prerequisites is that the cause should be commensurate with its effect; and part of commensuration is that nothing causes an effect which is essentially overladen with materials to which the effect is in no way beholden. This, though, is a condition of which would-be physical causes often fall afoul, thereby opening the market up to weaker events with essences better attuned to the effect's causal requirements. Sometimes, these events are mental; and that is how mental causation happens.

NOTES

* Something like the present approach to causation was proposed in the last two chapters of my dissertation (1986, 'Things', University of California, Berkeley). In Yablo (1987) the essentialist half of the story is laid out in some detail, and the connection with causation briefly indicated; this paper takes the cause/essence connection as its main object. I am grateful to Louise Antony, Paul Boghossian, Sin Yee Chan, Donald Davidson, John Drennan, Graeme Forbes, Sally Haslanger, Jaegwon Kim, Louis Loeb, Vann McGee, Sarah Patterson, Gideon Rosen, Larry Sklar, William Taschek, Ken Walton, and Crispin Wright for discussion and advice. Research for this paper was supported by the National Endowment for the Humanities and the Social Sciences and Humanities Research Council of Canada.

¹ Lewis (1986a) and Bennett (1988) are important exceptions.

² Actually I will be arguing these points in connection with causes and their causal properties only, not effects and theirs. But most of what I have to say applies to effects *mutatis mutandis*.

³ See Vendler (1962, 1967/1975), Davidson (1967/1980a), Kim (1973), Lewis (1986a), and Bennett (1988).

⁴ Hume (1968; p. 171).

⁵ Mill (1950, Bk. III, Ch. V. §3). True,

each and every condition of the phenomenon may be taken in its turn and, with equal propriety in common parlance . . . spoken of as if it were the entire cause. And, in practice, that particular condition is usually styled the cause whose share in the matter is superficially the most conspicuous, or whose requisiteness to the production of the effect we happen to be insisting on at the moment.

But “philosophically speaking”, the cause “is the sum total of the conditions . . . the whole of the contingencies of every description, which being realized, the consequent invariably follows” (loc cit.).

⁶ Hume (1968, p. 148).

⁷ Ibid., p. 149.

⁸ This is at any rate what they say about general causes – sunlight as the cause of day – and there is nothing to suggest that they want to deal differently with the singular case – the lightning bolt as the cause of the stampede. Some of Mill’s examples are explicitly singular, e.g., when a man slips on a ladder his death is due not just to the fall but also “the circumstance of his weight” (Mill, loc. cit.). However the situation is complicated by the fact that neither author is very attentive to the distinction between singular and general causation.

⁹ Mill, loc. cit. Assuming that the earlier voting did not influence his thinking, the chairman’s vote falls short of the true cause in what might be called *latitudinal* extent: extent along lines cross-cutting the lines of causal influence. Building on some enigmatic remarks of Hume, Russell (1963) poses an interesting problem of *longitudinal* extent. Normally we think of causes as taking time, the later portions depending on the earlier. But unless we are prepared to countenance the temporal equivalent of action at a distance, “it would seem that only the later parts can be relevant to the effect . . .” (p. 135). Apparently, then, the earlier portions must be written out as superfluous. An analogous argument shows that the only *real* causation is simultaneous causation! (See Hume 1968, pp. 76, 174–75; Ducasse 1969, pp. 44ff.; Taylor 1962–63/1975, p. 41; Lucas 1962, pp. 63–65; and Beauchamp and Rosenberg 1981, pp. 182ff.).

¹⁰ Mill (1950, Bk. Ch. III, V, §6).

¹¹ Davidson (1967/1950a, pp. 155–56): “What is partial in the sentence, ‘The cause of the match’s lighting is that it was struck’”, he continues, “is the *description* of the cause . . .”.

¹² Or at least that is how I would describe the case. Davidson speaks rather of the collapse’s being caused by the *fact* that it gave way so suddenly. Further the ‘caused’ here “is not the ‘caused’ of straightforward, singular causal statements, but is best expressed by the words ‘causally explains’”, the latter to be understood as a non-truth-functional connective (Davidson 1967/1980a, pp. 161–62). To appreciate why he thinks

the example needs special treatment, we need to see what his objection is to the “straight-forward” reading. The objection in the text is offered as in the spirit of his remarks elsewhere.

¹³ For an influential early treatment of concreta, see Ducasse (1969, pp. 62ff. and *passim*). Davidson sometimes puts the concrete theory like this: concrete particulars are “endlessly redescribable”. Presumably the idea is that entities not so redescribable are made in the image of language, so “intensional” rather than concrete. Such a view harks back to Quine’s early criticism of quantified modal logic that it was committed to a realm of “dubious entities” insusceptible of analytically inequivalent description (Quine 1953, pp. 152ff.). As Quine subsequently realized, though, anything that can be talked about at all can be specified in analytically inequivalent ways (loc. cit.); hence no ontological distinction whatever is marked by the proposed condition. Neither is any distinction marked by the redescribability condition, for literally anything, intensions included, can be endlessly redescribed. Similarly unhelpful are the following remarks: “[It is wrong to think] that we have not specified the whole cause of an event when we have not wholly specified it” (Davidson 1967/1980a, p. 156); “[Not] every deletion from the description of an event represents something deleted from the event described” (op. cit., p. 157); “[A]n event is something . . . concrete with features beyond those we use to describe it” (Mackie 1974, p. 256); and “causes and effects are events in the sense of concrete occurrences exemplifying features over and above the ones we hit upon for describing them” (Beauchamp and Rosenberg 1981, p. 248). For again, entities of every sort admit of more or less informative description, and none can be described completely. (It was a mistake in any case to try to characterise the concrete by a contrast with the intensional. By a concrete ontology is meant one too coarse-grained to supply distinct entities for, e.g., ‘the bolt’s snapping’ and ‘the bolt’s snapping so suddenly’ to refer to. But Davidson nowhere argues, and it is not true, that the rejected distinction can be provided for only on an intensional ontology. Like Quine and others reared on the Church/Carnap interpretation of quantified modal logic, he tends not to recognise any middle ground between the concrete and the intensional, such as the essential could conceivably occupy. As a result his own formulations are apt to mislocate his position in the space of contemporary options, which is why I have preferred to characterise the concrete theory as in the text.)

¹⁴ At least they give the appearance of admitting both types of commensuration. But again, interpretation is complicated by their willingness to run particular and general causes together. (Relevant texts are Hume (1968, pp. 148–49, 173–75), and Mill (1950, Bk. III, Chs. VI–X, *passim*). See also Hume’s remark (1963, pp. 150–51) that “[i]f the cause, assigned for any effect, be not sufficient to produce it, we must either reject that cause, or add to it such qualities as will give it a just proportion to the effect”. Here though Hume seems to be making an epistemological point rather than a metaphysical one.)

¹⁵ For example, Hume writes that “where several different objects produce the same effect, it must be by means of some quality, which we discover to be common amongst them. For as like effects imply like causes, we must always ascribe the causation to the circumstances, wherein we discover the resemblance” (1968, p. 174). This leads Davidson to speculate that “it is not events, but something more closely tied to the descriptions of events, that Hume holds to be causes” (Davidson 1967/1980a, p. 150). A less extreme

reaction would be to say that Humean causes cannot, consistently with the passages in question, be regarded as *concrete* events. Kim (1973) and Beauchamp and Rosenberg (1981) argue in effect that Hume *should* have conceived his causes as constitutional events given the uses he has in mind for them.

¹⁶ Mill in particular maintaining that "individuals have no essences" (1950, Bk. I, Ch. VI, §3).

¹⁷ "[I]t should be clear not only that Hume did not address the question of the ontology of causation directly, but that no consistent theory about what kinds of items are causally related is likely to emerge solely from textual analysis" (Beauchamp and Rosenberg 1981, p. 249).

¹⁸ Davidson (1967/1980a,b, p. 150; the example is Mill's).

¹⁹ Bennett (1988, pp. 81–82). I should point out that I am wilfully misreading Bennett. His objection is to the causal relevance of constitution, not in the sense of essence, but in the sense of Kim's property-exemplification theory (that he is not himself puzzled about the causal relevance of constitution-*qua*-essence is clear from pages 54ff.). However his language can be read as expressing the more general concern raised in the text.

²⁰ Some of the material in this section is adapted from Yablo (1987).

²¹ As usual, a thing's essential properties are those it could not have existed without.

²² Lewis, interestingly enough, concedes it for events but not objects. See Lewis (1971; 1986a).

²³ Notice the parallel with the more familiar occurrent/nonoccurrent and intrinsic/extrinsic distinctions; categorical/hypothetical is to the model dimension roughly as occurrent/nonoccurrent and intrinsic/extrinsic are to time and space.

²⁴ To events of the kind *stabbing*, for example, it is not essential that the victim subsequent dies. So if *being of the kind stabbing* was allowed into the essence of Brutus's stabbing Caesar, there would be no possibility of building up to Brutus's killing Caesar by adding in Caesar's subsequent death.

²⁵ (N) has one other consequence worth noting:

$$(7) \quad x\text{'s essence} = y\text{'s essence} \Rightarrow x = y.$$

If x and y have the same essence, then each strengthens the other. By (1), they exist in the same worlds; by (4), they are coincident in each of these worlds; and now (N) implies that they are identical.

²⁶ Indeed some essential differences *entail* categorical indiscernibility (Section 4, (4)).

²⁷ I have given the descriptions wide scope to deflect the common charge that event essentialism owes all its plausibility to scope confusions (see Davidson pp. 170–71; Neale 1990, pp. 145ff.). Thus it might be held that 'necessarily, Brutus's killing Caesar was not survived by Caesar' resembles 'necessarily, the U.S. President is an American citizen' in being defensible on the narrow scope reading only. But then 'regarding Brutus's killing Caesar, it could not have been survived by Caesar' should be just as preposterous as 'regarding the U.S. President, he could not have failed to be an American citizen'; which I submit it is not.

²⁸ Not that all, or only, the features by which we identify a cause or effect are essential to it. To turn a well-known remark of Davidson's to a foreign purpose, "we must distinguish firmly between causes and the features we hit on for describing them" (Davidson 1967/1980a, p. 155). Nobody would think, simply on the basis of their descriptions,

that it was essential to the revolutionary upheaval recounted in *Ten Days That Shook the World* to have featured in that work, or accidental to Versailles' most famous post-war conference that it involved the European powers. How far a cause's essence can be judged from its description is a complicated matter; appearances can and do mislead. For example: at first 'the rabbi's noisy praying' and 'the rabbi's noisily praying' may seem coreferential. But then a puzzle arises. Much as to speak of the rabbi's blue prayer-book is to speak of his prayer-book, identifying it by its color, to speak of his noisy praying is to speak of his praying, identifying it by its volume. Accordingly there is no more reason to think of his noisy praying as *essentially* noisy than of his blue prayer-book as essentially blue. Yet we can make little sense of a situation in which his *noisily* praying, though it still occurs, is not noisy. So the descriptions are not coreferential after all. This should give some idea how unobvious the rules are linking a cause's description to its essence. Here are some extremely amateur hypotheses. One, in so-called *imperfect* nominals (see Bennett 1988), the converted verb typically indicates an essential property. Thus Amelia's *flying* to Marseille could not have been a swimming there. Two, whether *perfectly* nominalised verbs indicate essential properties depends on whether the verb's perfect form amounts to a genuine sortal. Flights are essentially flights; but at least some failures, or so we imagine, *could* have been successes. Three, recalling that perfect nominals are modified adjectivally, imperfect nominals adverbially, only the second sort of modification connotes essentiality. Thus the heavy fall Amelia took might have been lighter if she had managed to catch herself; her falling heavily would not have occurred at all.

²⁹ For more on nominalisation, see Vendler (1962; 1967/1975), Kim (1973), Chomsky (1975), Thomason (1985), Lewis (1986a), and Bennett (1988, chs. 1 and 2). Kim holds, as I do, that 'his praying' and 'his noisily praying' are non-coreferential. However Kim's neglect of the perfect/imperfect distinction leads him to class 'his noisy praying' with the latter rather than the former. Vendler and Bennett agree with me that 'his noisy praying' and 'his noisily praying' are non-coreferential, but only because they construe imperfect nominals as standing quite generally for a different *type* of entity than perfect – facts, rather than events. That goes too far. Facts have their reality by timelessly and placelessly *obtaining*, and the rabbi's noisily praying is, like his noisy praying, something that *happens* at a particular time and place. Moreover the rabbi's noisily praying was, like his noisy praying, *noisy* (or we standing outside the rabbi's door would not have heard it); but the *fact* that he prayed noisily was not noisy, and it is not what we heard. (Several authors have noticed that (i) 'the rabbi's noisy praying' and (ii) 'the rabbi's noisily praying' seem to be related roughly as (iii) 'the cat, which purrs' and (iv) 'the cat's purring'. To strengthen the analogy we might try postulating for 'NP, which VPs' and 'NP's VPing' a common transformational ancestor; say, 'NP + VP'. Applied to 'the cat + purr', the suggested transformations yield (iii) and (iv). Applied to 'his praying + occur in a noisy manner', they yield, not (i) and (ii) exactly, but the roughly equivalent (i*) 'his praying, which occurs in a noisy manner' and (ii*) 'his praying's occurring in a noisy manner'.)

³⁰ Yablo (1987).

³¹ Davidson (1967/1980a); Mackie (1974, ch. 10).

³² See Vendler (1962, 1967/1975); Kim (1973); Gibbard (1975); Dretske (1977); and Bennett (1988).

³³ Perhaps it would be useful to compare the approach taken here with Kim's property-exemplification theory. That theory discovers a uniform object-property-time structure

in events, and calls events identical iff they have the same constitutive elements. These identity-conditions being intraworld only, the theory makes no distinction whatever between an event's essential properties and its accidental ones. What our approaches have mainly in common, and their principal contrast with the concrete theory, is the insistence on fine distinctions between events that are in some attenuated sense 'the same'. However only essentialism has a story to tell about what these fine distinctions are – categorical indiscernibility tempered by hypothetical difference – and only essentialism can predict them on the basis of its analysis of the events themselves. For example, from the essences of the bolt's snapping per se, and its snapping so suddenly, it *follows* that they are coincident but hypothetically unlike. Given just the object-property-time analyses of these events, one has so far not even an *interpretation* of their 'sameness', much less an argument for it.

³⁴ From this point on, I make a distinction between *necessary* and *essential* properties: x 's necessary properties are those it cannot exist without, and its essential properties are those in its essence (see Section 4). Similarly, I distinguish between *contingent* and *accidental* properties: x 's contingent properties are those it can exist without, and its accidental properties are those of its contingent properties which are eligible to belong to essences, i.e., the cumulative ones. So a property is essential (accidental) iff it is necessary (contingent) and also cumulative. Occasionally it may seem that I am treating a property P as essential whose cumulateness is doubtful. In all such cases I should be read as speaking rather of P^0 , defined so that x has P^0 in a world iff something coincident with x in that world has P there. (From its definition it follows that P^0 is categorical, and on assumptions defended elsewhere, to be categorical is equivalent to being cumulative (Yablo 1987, prop. 3)). For example, I do *not* maintain that the essence of Brutus's killing Caesar includes the property P of causing Caesar's death. Surely in fact P is not a property of Brutus's killing Caesar at all; when someone dies as Caesar did, it is not the killing that kills him, but the stabbing. What *is* essential to the killing is to be *coincident* with something, in this case the stabbing, causative of Caesar's death. But this last is a categorical property, hence cumulative.

³⁵ Hume (1963, p. 83). This is not of course his preferred description of the causal relation; see Lewis (1973/1986b).

³⁶ Most of the counterexamples are to the condition's sufficiency for causation (Kim 1974). On the necessity side we have mainly the problem of causal preemption to deal with (Lewis 1973/1986b). Preemption happens when, although y results from x , if x had not occurred y would still have occurred as the result of some other cause. So x causes y but y is not contingent on it. (For reasons developed by Lewis, in some such cases x and y *do* stand in the ancestral of the contingency relation, i.e., they are connected by a chain of events each contingent on its predecessor. Thus contingency's ancestral comes closer to being necessary for causation than contingency itself. I ignore this refinement here.)

³⁷ See Lyon (1967) and Lewis (1973/1986b). All I can offer in defence of my resort to an admittedly fallible condition is that: (i) virtually *every* known condition is fallible; (ii) the condition holds *in general*; and (iii) some *such* condition will presumably have a place in anyone's counterfactual theory of causation.

³⁸ So we opt for the Stalnaker rather than the Lewis variant of the standard semantics – allowing, with Stalnaker, that where it is indefinite what the closest P -world is, this

can make for indeterminacy in the counterfactual (Stalnaker 1981a, 1981b). Specifically: 'if it had been that P , then it would have been that Q ' is true (false) iff on every (no) admissible choice of closest P -world, the closest P -world is a Q -world. Might-counterfactuals 'if it had been that P , then it might have been that Q ' are true iff the corresponding would-counterfactuals 'if it had been that P , then it would have been that not- Q ' are untrue, i.e., iff on at least one admissible choice of closest P -world, the closest P -world is a Q -world.

³⁹ Lewis (1986a) puts contingency to similar use.

⁴⁰ Here is the argument less metaphorically: as x 's essence accumulates causally irrelevant properties, the chances increase that x is survived, in the nearest x -less world v , by a weakening x^- whose essence falls short of x 's essence in causally irrelevant respects only. Since x^- preserves x 's causally important properties on the scene, y should still occur in v , contrary to the contingency condition.

⁴¹ (A_1) comes from Lewis (1973/1986b). Since it is Lewis, too, who notices that (A_1) is trivial when x and y occur, I assume that he is not offering it as an interpretation of adequacy.

⁴² (A_2) is from Mackie (1974). See Lewis (1979/1986c, 1973/1986b) for the argument about "back-tracking" counterfactuals.

⁴³ Rasmussen (1982) contains the only explicit reference to condition (A) I have seen. There Rasmussen argues, fallaciously I think, that (A) follows from (C) on the hypothesis that both x and y occur.

⁴⁴ Unlike (A_1) and (A_2), (A) is not formally dual to (C). But it *is* in an obvious sense dual to:

(C*) if x had occurred, then if it had not occurred, y would not have occurred either.

And since (C*) is equivalent to (C) in worlds where x exists, they are interchangeable as conditions on causation.

⁴⁵ See Note 38 for the relation between would- and might-conditionals. I emphasise that the deterioration begins only *after* the snapping is under way because I want it to be clear that *that very snapping* could have been less abrupt (as opposed to: a less abrupt snapping could have occurred in its place). To deny this would be to say that the snapping, once begun, *could not* have continued apace, i.e., that the impending acceleration was *essential* to it. As for the further claim that if the snapping had not occurred, it *might* have been less abrupt if it had, suppose if you like that indeterminism holds, and that the mishap's objective probability, conditional on preceding events, was vanishingly small.

⁴⁶ See Sections 11–12.

⁴⁷ Here is the argument more explicitly: let x^- be the result of deleting some set I of causally irrelevant properties from x 's essence, and consider what happens in the nearest world w in which x^- occurs in the absence of x . By (1)–(3) of Section 4, x is absent from a world iff x^- is either nonexistent, or lacks some I -property, there. Since x^- *does* occur in w , w is the nearest world in which x^- occurs without some I -property. But then the question whether y occurs in w is the question whether it would have occurred, if x^- had been without some I -property; and since the I -properties are by hypothesis irrelevant to y 's production, the answer must presumably be that it would. Thus there is an event

weaker than x such that y would still have occurred if that event had occurred in x 's absence; it follows that x is not required by y .

⁴⁸ This notion of enoughness is prefigured in Dretske and Snyder (1973) and Anscombe (1975).

⁴⁹ See Sections 11–12.

⁵⁰ Here is the argument in full: assume towards a contradiction that x is required by, and enough for, y , although x has causally relevant properties R only accidentally; and let x^+ come from x by expanding the latter's essence to include these R -properties. Then a case can be made that y requires x^+ , too. An event $(x^+)^-$ strictly weaker than x^+ is an event whose essence falls short of x^+ 's by some combination S of R -properties and properties in x 's essence. Consider the nearest world w in which $(x^+)^-$ occurs without x^+ . By (1)–(3) of Section 4, $(x^+)^-$ lacks some or all of the S -properties in w . But the S -properties are predominantly causally relevant to y (the R -properties by hypothesis, and the properties from x 's essence because y requires x). Probably then y does not occur in w . Thus for an arbitrary weakening $(x^+)^-$ of x^+ , y would probably not have occurred if $(x^+)^-$ had occurred without x^+ . Assuming (!) that each of these probable counterfactuals is in fact true, y requires x^+ . But this is contrary to our assumption that x was enough for y .

⁵¹ Let x be unnecessary for y . Then the set W of worlds in which y occurs but x does not is nonempty. Supposing a suitably rich ontology, x can be weakened to an event x^- existing in all the x -worlds plus W . Since W contains every world in which x^- occurs without x , if x^- had occurred in x 's absence, that would have been in some W -world. But y occurs in every W -world, so y would still have occurred if x^- had occurred without x . Thus x^- is a counterexample to the hypothesis that y requires x . That completes the argument that (R) entails necessity on the condition of an unrestricted ontology. Next we argue that (R) and (E) entail sufficiency on the same condition. Assume for contradiction that although x and y satisfy (R) and (E), x is insufficient for y . By the previous result, we can assume that x is necessary for y . Because x is not sufficient for y , the set W of worlds in which x occurs but y does not is nonempty. Ontology being unrestricted, x has a strengthening x^+ which differs from x only in being absent from these W -worlds, i.e., x^+ occurs in exactly the x -worlds which contain y . Since x is necessary for y , every y -world is an x -world; and since x^+ exists in every world containing both y and x , every y -world is an x^+ -world as well. From this last it follows that y requires x^+ . But then x is not enough for y , contrary to assumption.

⁵² Even if an x necessary and sufficient for y could be found, they would not be "distinct existences" in the sense of each being possible without the other. On most theories this rules out a causal relation between them (cf Hume 1968, Bk. I, Part III, Secs. III and XII; and Mackie 1974, Ch. 1).

⁵³ Here I assume that your entering the market at the same time is, to the extent we can make sense of it as a token event at all, something that *could* have occurred (e.g.) at 4:03 p.m.; in this it differs from your both entering the market at 4 p.m.

⁵⁴ This is compatible with there being antecedent events which causally *necessitate* the accident; what we are looking for is a *commensurate* antecedent. For discussion, see Kim (1974), Sorabji (1980), and Lewis (1986a, esp. Sec. VII).

⁵⁵ Or, if a cause was for some reason insisted on, we would expect it to be of an even more *outré* variety than the accident itself, and so heir to the same difficulties in more aggravated form.

⁵⁶ In this and the next few paragraphs, 'worlds' means: worlds agreeing with the actual world in contextually determined background conditions (what the platitude called the obtaining circumstances). The notion admittedly bears very little scrutiny and I wish I knew how to express my point without it.

⁵⁷ Mill (1950, Bk. III, Ch. V, §3).

⁵⁸ Related to this, causes of the first sort will be more *robust* than those of the second, in the sense of continuing to operate through a broader range of counterfactual cases. Compare Putnam's notion of an "autonomous explanation" in 'Philosophy and Our Mental Life': "The same explanation will go in any world (whatever the microstructure) in which [the same] *higher level structural features* are present. In that sense [the] *explanation is autonomous*" (Putnam 1975b, p. 296).

⁵⁹ Two remarks. First, the world-driven/effect-driven distinction is a relative one; some causes are more world-driven than others but none is world-driven in an absolute sense. Second, as the examples show, there is no direct correlation between a cause's world-drivenness and its strength. What does happen as causes become more world-driven is that their essences become more explicit about how the effect's needs were in fact met. But this often brings with it a *loss* of information about what those needs were, and so about how it was that what actually happened served to meet them. So although there is strengthening along one dimension there may well be weakening along another.

⁶⁰ Parts of this and the next two sections are based on Yablo (1992).

⁶¹ Wilson (1969, p. 373).

⁶² In case it seems odd to describe the theory just sketched as dualistic, I should explain that all I mean by the term is that mental and physical phenomena are, contrary to the identity theory, *distinct*, and contrary to eliminativism, *existents*. That this much dualism is acceptable even to many materialists is in a way the point. Having broken with Cartesianism over its troubles with mind/body causation, they find to their horror that epiphenomenalism lives equally happily on the lesser dualism latent in their own view.

⁶³ Kim (1983, p. 54).

⁶⁴ Schiffer (1989, ch. 6).

⁶⁵ So 'x' and 'x*' become 'X' and 'X*', and where either is prefixed by 'event', this becomes 'property'; 'event y' and 'event z' are unaffected. Although causes and effects are events, properties as well as events can be causally relevant and/or sufficient. I try to remain neutral about what exactly causal relevance and sufficiency come to, e.g., causal sufficiency could be absolute, or it could be sufficiency-in-the-circumstances. Versions of the exclusion argument are found in Malcolm (1968/1982), Goldman (1969), Campbell (1970), Honderich (1982), and Kim (1979, 1989). Analogous objections are sometimes raised against the causal claims of other phenomena apparently unneeded in fundamental physical explanation, e.g., macro- and color-phenomena. The next few sections offer a potentially general strategy of response.

⁶⁶ Some authors use a slightly different premise: if *x* is causally sufficient for *y*, then *barring overdetermination*, no $x^* \neq x$ is causally relevant to *y*. I do not consider this form of the argument explicitly, but my response will be easy to guess from what I say about the version in the text.

⁶⁷ Although (2) could obviously be questioned, I take it that physical determinism isn't the issue. For one thing, the conviction that mind makes a causal difference is not beholden to the contemporary opinion that determinism is false, and would remain if

that opinion were reversed. Second, nothing essential is lost if 'x is causally sufficient for y' is replaced throughout by 'x fixes y's objective probability'. So unless the argument can be faulted on other grounds, mental causation is problematic under indeterminism, too.

⁶⁸ An exception is Kim (1984b).

⁶⁹ In his (1970/1980a), Davidson advances the token-identity theory as the solution to a different problem: singular causal claims need always to be backed by strict causal laws; strict laws are always physical laws; physical laws subsume physical events only; therefore mental events are inefficacious, unless they are also physical events.

⁷⁰ Again, this needs to be distinguished from a quite different worry directed mainly at Davidson's (1970/1980a) anomalous monism: singular causal claims always need to be backed by some strict causal law; x's causally relevant properties vis-à-vis y are those figuring in the antecedent of some such backing law; strict laws never involve mental properties; so x's mental properties are causally irrelevant. For discussion, see Stoutland (1980), Honderich (1982), Loewer and LePore (1987, 1989), Fodor (1989), Macdonald and Macdonald (1986), and McLaughlin (1989) (some of these papers discuss the exclusion objection also). Note that the exclusion objection assumes nothing about the role of laws in causation or in the characterisation of causally relevant properties.

⁷¹ See, e.g., Putnam (1980) and Block and Fodor (1972/1980).

⁷² Kripke (1980, p. 147–48) with inessential relettering.

⁷³ Goldman (1969) and Kim (1989) make related observations.

⁷⁴ Johnson (1964, ch. 11), and Prior (1949) are classic discussions.

⁷⁵ ' $P > Q$ ' is short for: P determines Q .

⁷⁶ For example, the property of being salt is equal to the property of being sodium chloride, but it is not conceptually necessary that all and only salt is sodium chloride. See Putnam (1975a, p. 306); Kripke (1980, pp. 115ff.); and Yablo (1992).

⁷⁷ Thus P is a determination of Q just in case the traditional relation's first, metaphysical component is in place, where this consists primarily in the fact that P s metaphysically must be Q s, but not conversely. Probably it goes too far to identify determination with asymmetric necessitation outright, otherwise, e.g., conjunctive properties determine their conjuncts and universally impossible properties are all-determining. For dialectical reasons I try to remain as neutral as I can about where determination leaves off and 'mere' asymmetric necessitation begins (Prior (1949) reviews some of the history of this problem).

⁷⁸ (S) is Kim's "strong supervenience" thesis (Kim 1984a).

⁷⁹ This may seem doubtful, if one insists on seeing p as (i) a localised brain event, (ii) capable of occurring in isolation from anything like its actual neural context. Imagine a C-fiber stimulation b realisable in isolated C-fibers afloat in a dish of agar jelly. So realised, b involves no sensation of any sort, so if s is a pain sensation, then b does not necessitate s , or (therefore) determine it. The moral is not that s has no physical determination, but that (i) and (ii) ask too much. Many mental events seem not to be localisable in any specific portion of the brain. Since determination entails coincidence, their physical determinations are not localisable either (thus p might be the event of falling into a certain overall neurological condition). Arguably no mental event is localisable, but if m is an exception, then its physical determination is a localised brain event whose essence is partly extrinsic, e.g., the C-fibers' firing in something like their actual neural

environment. (So-called “wide content” mental events raise related problems which I don’t discuss. See Fodor (1987, ch. 2; 1991) and Heil and Mele (1991).)

⁸⁰ Depending on what exactly the exclusion principle asks in the way of causal sufficiency, Q' might be a determinate of Q only in a fairly relaxed sense. Those uncomfortable about this should remember the dialectical context: we are trying to show that the assumption needed to disempower mental properties, viz., that determinates are causally competitive with their determinables, would if true disempower virtually *all* properties. But if the assumption is true with determination strictly interpreted, then it should also be true on the looser reading; and the argument in the text now applies.

⁸¹ I do not say that the determinable *must* be relevant if the determinate is; Yablo (1992) gives examples to the contrary.

⁸² Suppose that causal sufficiency is read in some fairly demanding way, e.g., as requiring the nomological impossibility of x 's occurring without y 's doing so. Then no physical event p with hopes of determining a mental event m is likely to be itself causally sufficient for m 's presumed effect e . To causally *guarantee* e 's occurrence, p would need to be enormously larger than m in spatial terms (assuming, anyway, that p 's essence is not unconscionably extrinsic). But that is ruled out by p 's determining m , and their resulting coincidence. Let it be granted, then, that p is not causally sufficient for e ; that honour falls instead to a spatially far more extensive physical event p^* , whose occurrence essentially requires, in addition to p , that the surrounding physical conditions should be approximately as they are in fact. This affects the question of m 's causal potency *only* if there is more causal rivalry between m and p^* than we found between m and p (namely, none). But, how could there be? What dispelled the illusion of rivalry between m and p was that p 's occurrence consisted, in part, in m 's occurrence, and that is as true of m and p^* as it was of m and p : for p^* to occur is for m to occur in a certain physical way, and in a certain physical environment. So p^* poses no greater threat than p to m 's causal ambitions.

⁸³ Strictly speaking this assumes that *each* of p 's determinables, not just m , is such that if it had occurred in p 's absence, e would not have ensued (p can counterexample m 's claim to be enough for e only if e requires it).

⁸⁴ “But sometimes we want to know what is *distinctive* in an effect’s etiology, i.e., how it comes about in this world as opposed to others. Then the underlying physical event might be exactly what we are after”. True enough; see the discussion of world-driven causal judgements in Section 12.

⁸⁵ Remember that this makes no prediction about what would have happened, if the decision had occurred in *whatever* physical way, but speaks only of what happens in the *nearest* world in which the decision’s physical implementation was not as actually – the world in which it undergoes only the minimal physical distortion required to put its actual implementation p out of existence. Maybe, of course, we were wrong to think that the spill would still have occurred in such a world; in that case, let us hurry to withdraw the claim that the decision caused it.

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