

## Causation by Content?

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**Abstract:** Non-reductive Physicalism together with environment-dependence of content has been thought to be incompatible with the claim that beliefs are efficacious partly in virtue of their possession of content, that is, in virtue of their intentional properties. I argue that this is not so. First, I provide a general account of property causation. Then, I explain how, even given the truth of Non-reductive Physicalism and the environment-dependence of content, intentional properties will be efficacious according to this account. I go on to relate my discussion to that concerning whether Anomalous Monism is committed to epiphenomenalism. I close by considering how my proposal suggests we should conceive of different levels of causation in a layered world.

If I believe that my phone is ringing and I pick it up, my belief's possession of a content, *that my phone is ringing*, seems to be part of what causes behaviour. Why did I pick up my phone and not a paper weight? It was because I believed *that my phone is ringing*. The 'because' here suggests causality. Some have thought that this could not possibly be right if Non-reductive Physicalism is true. I shall try to explain how it is.

One clarification needs to be made at the start. The issue concerning whether my belief's possession of a certain content is a cause of behaviour should not be understood as an issue over whether the *content* itself is a cause of behaviour. Contents are usually understood to be truth conditions. But we are not concerned with the efficacy of truth conditions—e.g. ordered sequences of objects and properties (Donnellan, 1974; Kaplan, 1977, published in 1989), sets of possible worlds (Stalnaker, 1976, Stalnaker, 1984, chs 1, 4), etc.—when we inquire into whether the possession of content is a cause of behaviour. Rather the question is whether those properties of a state in virtue of which it possesses a content are efficacious (cf. Crane and Mellor, 1990, pp. 90–91; Crane, 1992b, pp. 196–8). In the case of belief, the properties in question will determine its truth conditions. In the case of desire, the

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properties in question will determine its satisfaction conditions. Since no new issues seem to be raised by focusing on other propositional attitudes, I shall limit the discussion to belief. Call the properties that determine the truth conditions of belief, the satisfaction conditions of desire, and so on, *intentional properties*. The issue which concerns me is whether intentional properties are efficacious.<sup>1</sup>

My characterization of intentional properties enables me to avoid one challenge to their efficacy at the outset—that advanced by Jerry Fodor. He balks at causation by intentional properties—what he calls ‘intentional causation’—because, he urges, if contents are sets of possible worlds, then intentional properties ‘essentially involve relations between mental states and *merely possible* contingencies’. He thinks relations to possibilities are no more efficacious than the possibilities themselves. For instance, nothing is added to his causal powers by the fact that he *could* have been standing at the edge of a high cliff—that he is related to that *possibility*. He must be actually standing there. So, likewise, a state’s causal powers will not be affected by its intentional properties (Fodor, 1987, pp. 140–41).

I agree that the fact that I could have been standing at the edge of a high cliff and the fact that I (falsely) believe that I am standing at the edge of a high cliff both essentially involve a relation to a mere possibility (or set of possibilities). But if, as I have argued, intentional properties are those properties which determine the truth conditions of a belief, then they are properties which ‘essentially involve’ a relation to a set of possibilities by determining that I stand in a relation to a set of possibilities, not by *being* a relation to a set of possibilities. It is by no means clear that intentional properties so characterized must be inefficacious. Possibilities might have no effect on the actual. But those properties which determine *actual* relations to the possible—such candidate intentional properties as that of causally covarying with some item in the environment, having a certain biological function, and the like—may still be efficacious.

What concerns me is whether intentional properties can be efficacious given that although

- (I) the existence of intentional properties is compatible with Physicalism,
- still
- (II) intentional properties are irreducible to physical properties;
  - (III) intentional properties are broad or environment-dependent;

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<sup>1</sup> As far as I can see, my characterization of intentional properties is neutral over whether beliefs are relational or non-relational (see Fodor, 1975; Field, 1978; Stalnaker, 1984, Crane, 1990, Crane, 1992a, Melia, 1992, Matthews, 1994). The issue over the efficacy of intentional properties arises within either framework. It also seems to me that this characterization leaves open the possibility that Fregean Senses are intentional properties in my sense (see Frege, 1892; Frege, 1918).

- (IV) environment-independent physical properties are sufficient causes of behaviour.

Propositions (II) to (IV) represent a worst-case scenario. My interest is not in whether (II) to (IV) are true but rather, if they are true, would it follow that intentional properties are inefficacious and, hence, that there is a consideration *against* believing them to be true. I will attempt to establish that there is not.

In what follows, I will focus on two irreducibility claims: first, the standard thought that there are no type-type identity statements to be had between intentional properties and physical properties; second, the rather stronger irreducibility doctrine put forward by Donald Davidson (Davidson, 1970; Davidson, 1973; Davidson, 1974). The claim that intentional properties are environment-dependent or broad should be understood as the claim that these properties cannot be instantiated unless the environment of the subjects in whom they are to be instantiated is or was a certain way—the modal force of the ‘cannot’ being broadly metaphysical. Hence subjects *cannot* entertain the contents possessed as a result of these intentional properties unless they are in an appropriate environment (see Burge, 1979; Burge, 1982; Evans, 1982; McDowell, 1986). Some philosophers who hold that contents (and so intentional properties in my sense) are environment-dependent are inclined to deny that (IV) is true. They suggest that behaviour is relational and in order to cause behaviour so understood, internal (= environment-independent) properties of a subject won’t be enough—environment-dependent intentional properties must be present. But I don’t think this is plausible. The internal properties *in a certain environment* will suffice (see Jackson and Pettit, 1988, p. 390). It does not much matter if I am wrong about this, given that my aim is to show how content is efficacious even if (IV) is true. So I shall not seek to justify this assumption further.<sup>2</sup>

### 1. *The Argument from Sufficient Physical Causation*

The following argument expresses the main challenge to the efficacy of intentional properties that I aim to meet.

- (1) At each position in the causal chain leading up to a piece of behaviour, causal circumstances constituted from instances of internal physical properties are causally sufficient for the piece of behaviour (or, in the case of indeterminism, sufficient for the probability of the

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<sup>2</sup> Concern over the efficacy of intentional properties has also arisen because it has been thought that they are functional or causal role properties (Block, 1990; Ludwig, 1994, pp. 343–5). I think the concern is misplaced (see Crane, 1992b; Noordhof, 1997). Those who are unconvinced should conditionalize the conclusions reached here on a satisfactory resolution of the issue.

- behaviour) *in virtue of these instances being instances of physical properties.*
- (2) Intentional properties are not identical to internal physical properties.
  - (3) If (1) and (2), then intentional properties are not causes of behaviour.

Therefore,

- (4) Intentional properties are not causes of behaviour.

The argument is a version of the general argument that purports to show that, if mental properties are not identical to physical properties, then they are not efficacious (cf. Malcolm, 1968, pp. 52–3; Mackie, 1979, pp. 131–5; Kim, 1989, pp. 279–84; LePore and Loewer, 1989, p. 180; Yablo, 1992, pp. 247–8; Kim, 1993b, p. 361). If my aim were to endorse the argument, I would have to spend some time defending the assumptions that give it its apparent force. But that is not my aim. I wish to explain why premise (3) is false even in the absence of overdetermination. So what I shall do is merely describe in further detail the assumptions that are made.<sup>3</sup>

The first assumption is the truth of Physicalism. Of course, it is possible to run the argument without being committed to its truth. But the first premise has its greatest plausibility for those who are so committed. The crucial component of Physicalism for that purpose is the claim that *physical properties determine all the causal relations which hold*. The first premise just applies this thought to the causation of behaviour. *Physical* properties should be understood to be those properties identified by some development of current physics. This future physics will, let us allow, resemble our present physics at least to the extent of not referring to properties that are the subject matter of other sciences. Future physics will enable us to identify the causal circumstances (in the sense defined below) behind the occurrence of any particular event.

The truth of Physicalism allows for the instantiation of non-physical properties. These do not threaten the claim that physical properties determine all the causal relations which hold so long as they stand in a certain relation of determination to physical properties. One way to capture this is by appealing to a particular type of supervenience, namely:

*A strongly supervenes on B just in case, necessarily<sub>n</sub>, for each x and each property F in A, if x has F, then there is a property G in B*

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<sup>3</sup> The argument is also closely related to Kim's Supervenience argument. All Kim's argument adds is the claim that, if mental property M supervenes on physical property P, M\* supervenes on P\*, and M causes M\*, then it causes M\* by causing P\*. This just makes explicit how instances of physical properties can determine the occurrence of mental properties and non-physical behaviour. Kim's argument and the argument described above should be dealt with in the same way (for further discussion of the Supervenience Argument, see Kim, 1993a, pp. 350–57; Kim, 1997; Noordhof, 1999a).

such that  $x$  has  $G$ , and *necessarily*<sub>m</sub> if any  $y$  has  $G$ , it has  $F$ . i.e.  $\Box_n (x)(F)(Fx \ \& \ F \ e \ A \ \rightarrow \ (\exists G) (G \ e \ B \ \& \ Gx \ \Box_m (y)(Gy \ \rightarrow \ Fy))$  (cf. Kim, 1984a, p. 65).

(where  $A$  and  $B$  are families of properties, the supervening and supervenience-base (or subvenient) properties respectively, ' $e$ ' is 'is a member of', and ' $\Box$ ' is the necessity operator with ' $\Box_n$ ' meaning nomological and ' $\Box_m$ ' metaphysical necessity respectively).

For our purposes, the  $A$ -properties would be non-physical and the  $B$ -properties would be physical. The first modal operator should be nomological because Physicalism is contingent. There may be possible worlds in which mental properties—to cite the obvious candidates—do not supervene upon physical properties because there aren't any physical properties in these worlds. The mental properties are just had by immaterial creatures such as ghosts and angels. The second modal operator should be metaphysical because we need to capture the idea that other properties are not distinct from but rather constituted by physical properties when physical properties are present—despite being irreducible to them. If the relationship was that of mere nomological necessity, then there would be psychophysical laws which were not determined by merely physical properties and laws. These psychophysical laws may hold between two quite distinct properties; something the physicalist is not prepared to countenance. However, if the mental properties were not distinct from but rather constituted by physical properties, then we have some grasp on the idea that everything is fixed by physical properties and laws. This is what I shall assume to give the argument a run for its money.

The second assumption concerns causation. It is that at any point in a causal chain it makes sense to talk of the causal circumstances of an event like a piece of behaviour. The causal circumstances at a point in the causal chain are all the events, states, facts, or whatever, which together determine—at that point in the chain—the effect's probability of occurring at whatever time it does. In other words, the causal circumstances are what have sometimes been called the *complete cause* at a certain point in the causal chain. To fix ideas, I have taken the causal circumstances to be composed from *instances of properties* leaving open whether these should be counted as events, states, facts or something else.

Most philosophers allow that two properties may have instances in common. This has implications for the formulation of the idea that physical causation is sufficient. Consider Yablo's nice example of the soprano who, by producing a note of 70 or more decibels, will shatter a glass (Yablo, 1992, pp. 259–60). Suppose the soprano produces a note of 80 decibels. Intuitively, an instance of the property of being a note of 80 decibels is a cause of the shattering of the glass. However, it seems plausible to say that instance of the property of being a note of 80 decibels is also an instance of the property of being a note of under 90 decibels. In which case, this instance of the property of being a note of under 90 decibels is also a cause of the shattering

of the glass. Having acknowledged this, one can still ask whether the instance was efficacious *in virtue of being an instance of one or more of these properties and not the others*. Here the answer seems to be that the instance was efficacious in virtue of being an instance of the property of being a note of 80 decibels and not in virtue of being an instance of the property of being a note of under 90 decibels. The intuitive rationale for this is that the property of being a note of under 90 decibels can have instances of 50 decibels, 60 decibels, and so on, which would have no effect on the glass (see Jackson and Pettit, 1990b, pp. 203–5, for other cases raising the same issue). Similarly, if I had just remarked that the causal circumstances constituted from instances of internal physical properties were causally sufficient for the piece of behaviour, I would have left open the possibility that this was so in virtue of the fact that they were instances of non-physical properties. In premise (1), the italicized phrase *in virtue of these instances being instances of physical properties* makes things clear.

Quite generally there is a distinction between causation by instances of properties, and what we might call *property causation*—a preliminary characterization of which is

A property P is a cause of an event of type E if and only if

- (i) An instance of the property P is a cause of an event of type E,
- (ii) The instance of the property P is a cause of an event of type E in virtue of being an instance of the property P (see McLaughlin, 1989).

Since the argument from sufficient physical causation appeals to the idea of property causation, it is important that replies to the argument defend the idea that intentional properties—and not just their instances—are causes. This throws a question mark over the viability of the approach of those who have emphasized that mental properties may be efficacious because they have physical instances (Macdonald and Macdonald, 1986, pp. 37–40; Macdonald, 1992, pp. 231, 235–7; Macdonald and Macdonald, 1995; Robb, 1997). The approach only appears to work if property causation and property instance causation have been conflated. I am not levelling this accusation against the proponents of this approach because they are best read as attempting to write off property causation as merely a fact about what is explanatory or a pragmatic point (a fact about what is explanatory: Macdonald and Macdonald; a pragmatic point: Robb). However, there seems little motivation for these views if an alternative can be provided—the one characterized below—which explains how property causation may be a genuine feature of the world (see Noordhof, 1998, for further discussion).

The conflation between property causation and property instance causation seems to occur more straightforwardly in standard counterfactual accounts such as

F is a cause of e if and only if c were not to have F, then c would not have caused e (see LePore and Loewer, 1987; LePore and Loewer, 1989; Heil and Mele, 1991).

Consider our soprano once more. In order to ascertain whether the property of being a note of less than 90 decibels is a cause of the glass shattering, we need to consider what would happen if the note did not have that property. Suppose the unaided voice of a soprano would not produce a note of more than 90 decibels. Then, the only way in which the note could fail to have the property of being a note of less than 90 decibels is by not being a note at all—just the sound of air escaping the soprano's mouth. This event would not cause the glass to shatter. So the counterfactual account would proclaim that the property of being a note less than 90 decibels is a cause of the glass shattering.<sup>4</sup> Of course, we reached this conclusion given the supposition about the unaided soprano's voice. But the supposition is harmless. For all I know, it may be true. Even if it is not, it serves to dramatize the point that whether or not a property is efficacious cannot turn on merely what would happen if it were not instantiated.

The position of these accounts would be stronger if they had not been developed as alternatives to an account of the causal relevance of properties in terms of strict law. A fairly clear case of property causation occurs if an instance of property P causes an event of type E *and* there is a strict law relating the property P to Es. This shows that it is not just a matter of the instance of P causing an E but that all instances of P cause Es. The thinking behind the argument from Sufficient Physical Causation is that these laws hold for some physical properties but not for intentional properties. The thought is that a piece of human behaviour supervenes upon a complex instantiation of fundamental physical properties—the behaviour's physical supervenience-base. Laws of physics hold between the physical properties whose instances constitute the causal circumstances of the behaviour and those whose instances comprise the physical supervenience-base of the behaviour. These laws fix the probability of the piece of behaviour. It is in this sense that the instances of physical properties which constitute causal circumstances for a piece of behaviour are causally sufficient in virtue of being instances of physical properties.

If I am right, then the standard responses to the argument from sufficient physical causation have largely missed the point in focusing either explicitly or implicitly on property instances. The issue is whether there can be cases of non-physical property causation given that there is property causation at the level of fundamental physical properties. I shall try to demonstrate that there can be property causation at other levels and, thereby, demonstrate that premise (3) is false.

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<sup>4</sup> Clearly, in this case I am taking 'c' to be a rigid designator, 'the note' to rigidly pick out the actual individual that had the property of being a note of less than 90 decibels, and assuming that that property is not an essential property of the individual in question. If there are worries on this score, then the counterfactual account will have to be reformulated anyway (for details, see Horgan, 1989, pp. 57–9). Such a reformulation would make the point easier to make—if anything. So I have neglected to fill in the details.

1.1 *When Efficacy at Different Levels Is Allowed*

To show that premise (3) is false, it is not enough to provide an account of property causation which allows that intentional properties may cause behaviour in spite of being irreducible to physical properties sufficient for the behaviour to occur (see LePore and Loewer, 1987, p. 635; LePore and Loewer, 1989). The argument from sufficient physical causation may be thought to undermine such an account (see Leiter and Miller, 1994). Instead, one must focus on the intuitions that are at work behind the denial that non-physical properties can cause behaviour given that physical properties are sufficient causes of behaviour. So my response will have three components. The first is the provision of an account of property causation. The second is a defence of components of this account by attempting to undermine the intuitions that lead to the denial of non-physical property causation by appealing to other intuitions that seem equally strong if not stronger. I shall also show how the most likely justification of the claim that physical property causation exists will justify the existence of property causation at other levels too. The final component explains how intentional properties meet the conditions on property causation I identify.

My proposal is that

An A-property, F, superveniently causes an A-property, G, if and only if

- (i) An instance of a B-property, K, is part of a minimal supervenience-base of the instantiation of F and an instance of a B-property, J, is part of a minimal supervenience-base of the instantiation of G.
- (ii) The instantiation of K causes the instantiation of J.
- (iii) Each minimal supervenience-base of F,  $Fb_i$ , is such that all its instantiations would cause (or, in the case of indeterminism, raise the probability of) an instantiation of one of the minimal supervenience-bases of G,  $Gb_i$ , if they were in some causal circumstances C—where C may vary for each instantiation of F (cf. Kim, 1984b; Segal and Sober, 1991).<sup>5</sup>

Clauses (i) and (ii) are meant to capture the fact that a necessary condition of property causation is causation by instances of properties. Clause (iii) is needed to bridge the gap between causation by instances of properties and causation by properties. I explain how this works in the sections that follow.

*1.1.1 Causation by Instances of Properties* For ease of exposition, let me set aside for the moment the suggestion that instances of supervening properties are causes if only part of their minimal supervenience-bases are causes. For now, suppose that the first two clauses just require that the instantiation of

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<sup>5</sup> For details of how to understand indeterministic causation and probability raising, see Noordhof, 1999b.

the properties of the supervenience-base of F causes the instantiation of the properties of the supervenience-base of G. One should think of the appeal to supervenience as an answer to the following question: what relationship should hold between non-physical properties and physical properties for *instances* of non-physical properties to be efficacious if *instances* of physical properties are efficacious? It may be that the only satisfactory answer also indicates what should hold for two properties to share an instance. I do not need to commit myself so long as the answer provided is independently plausible (see Noordhof, 1998).

Obviously not any old relation of supervenience will do. I think it must be strong supervenience with the second modal operator standing for metaphysical necessity—precisely the notion to which I appealed to try to explain how physical properties determined all the causal relations that held. My reason for this is that there are two well-known types of property that stand in this relationship to their supervenience-bases—macro-properties and determinable properties—for which the efficacy of the supervenience-base seems to imply that instances of the supervening properties are efficacious as well and no clear cases where this does not hold.

Macroproperties include the following: being a river, having a surface with grooves, being a liquid, being an earthquake, being a rainstorm, being a sperm, being methane, and so on. Each of these macroproperties seems to be instantiated as a result of the collective instantiation of a series of specific microproperties. For instance, for something to be a river, there must be a large number of instantiations of the property of being a water molecule with certain spatial relations between them, travelling in a channel. For something to be a rainstorm, these water molecules must be falling from the sky. For a surface to have grooves, there should be certain relations between instantiations of the property of being a molecule to constitute the characteristic arrangement of grooving. For something to be methane, an instantiation of the property of being a carbon atom should be linked by molecular bonds to four instantiations of the property of being a hydrogen atom. I could go on . . .

For each of these cases, there seem to be two types of causal relation which may arise. First, there are those which are the sum of the causal relations which hold *anyway* between the particular microproperties ( $b_1, b_2, b_3, \dots b_n$ ) whose collective instantiation makes up the instantiation of a macroproperty B and the particular microproperties ( $d_1, d_2, d_3, \dots d_n$ ) whose collective instantiation makes up the instantiation of a macro-property D. The instantiation of  $b_1$ , as it may be, is a cause of the instantiation of a microproperty, say  $d_1$  . . . the instantiation of  $b_i$  is a cause of the instantiation of a microproperty  $d_i$ , and so on. The second type of causal relation is not just the sum of each individual micro-micro causal relation which holds anyway. Instead, it involves non-additive effects. For instance, the joint instantiation of micro-properties which constitute the instantiation of the property of being an earthquake may cause the instantiation of the property of being a collapsing building. But here some instantiation of a micro-property  $b_i$  *by being in that*

*context* causes an instantiation of some microproperty  $d_i$ . In general, my claim is that

If  $JI(b_1, b_2, b_3 \dots)$  in some causal circumstances  $C$  causes  $JI(d_1, d_2, d_3 \dots)$ , then the instantiation of  $B$  in  $C$  causes the instantiation of  $D$ . (where 'JI (...)' stands for joint instantiation of the properties in brackets and the causal relation may be of either of the two types identified).

If the instantiations of these macroproperties are genuinely constituted from the instantiation of these microproperties, then there seems no reason why the instantiation of the macroproperties should not be counted as having the efficacy that these micro-causal relations imply. If we allow that the instantiations of macroproperties *exist* by being constituted from instantiations of microproperties, then why should we deny that macro-causal relations exist by being constituted from micro-causal relations? What's so special about causality?

Worries about the constitution of properties by other properties may mitigate the force of this point. Here it helps to make some distinctions. First, my point rests upon the claim that *instantiations* of macroproperties are composed from *instantiations* of microproperties. I intend this to be taken mereologically. So the general idea is

$\square_m$  (M is instantiated if the instantiation of M has spatio-temporal parts  $x_1, x_2, x_3, \dots$  and  $m_1$  is instantiated at  $x_1$ ,  $m_2$  is instantiated at  $x_2$ , and  $m_3$  is instantiated at  $x_3 \dots$ ) (cf. Lewis, 1986a, p. 27).<sup>6</sup>

I don't think that there is too much of a problem with regard to the instantiation of microproperties constituting the instantiation of macroproperties. Obviously, in the case of macrocausal relations, I would have to reformulate the above in terms of relations between spatiotemporal parts yielding

$\square_m$  (The instantiation of  $B$  macro-causes the instantiation of  $D$  in causal circumstances  $C$  if (i)  $B$  has spatiotemporal parts  $x_1, x_2, x_3, \dots$  and  $D$  has spatiotemporal parts  $y_1, y_2, y_3, \dots$ ; (ii)  $b_1$  is instantiated at  $x_1$ ,  $b_2$  is instantiated at  $x_2$ ,  $b_3$  is instantiated at  $x_3, \dots$ ,  $d_1$  is instantiated at  $y_1$ ,  $d_2$  is instantiated at  $y_2$ ,  $d_3$  is instantiated at  $y_3$  (iii)  $JI(b_1, b_2, b_3 \dots)$  in  $C$  causes  $JI(d_1, d_2, d_3 \dots)$ )

The problem concerns what we should say about the relation between the macroproperties and microproperties themselves (rather than their

<sup>6</sup> I have only provided a sufficient condition for the instantiation of  $M$  and (subsequently) of a macro-causal relation between  $B$  and  $D$  because of the phenomenon of variable realization.

instantiations). Do they also stand in the relation of constitution? Take Lewis's example of the case of methane:  $\text{CH}_4$ . If properties are universals, then the macroproperty would seem to contain the universal carbon and four universals of hydrogen. But there can't be four universals of hydrogen—only one with four instances—so how are we to understand the claim that methane is constituted from carbon and hydrogen? If we can't say something sensible here, we may be forced to doubt the existence of macroproperties—and hence their instantiations—altogether (see Lewis, 1986, pp. 31–46).

The first thing to note is that the problem arises only by shifting from talk of properties to universals—that is, entities that can be wholly present at or 'participate in' more than one spatio-temporal location. So we might take the difficulty as just showing that we ought to adopt a Trope theory or Class Nominalism instead (see Lewis, 1986a, pp. 30–31). The point I was making about macro-causation would survive the transition. However, it is not clear why we can't provide some understanding of (and hence justification for talking in terms of) universal constitution by noting its relationship to universal instance constitution. Thus

Macro-universal  $M$  is constituted from micro-universals  $m_1, m_2, m_3$   
if and only if all instances of  $M$  are mereologically constituted from  
instances of  $m_1, m_2, m_3$ .

We would seek to explain the necessary relationships between macro-universals and micro-universals in terms of the necessary relationships between the instantiation of macro-universals and the instantiation of micro-universals—and not vice versa. Unless it can be shown that macro-universals must be mereologically composed from micro-universals in order to exist, my proposal stands.

Not all macroproperties are composed from other properties. The macroproperty of being an earthquake seems to be variably realized in a way that the property of being methane (for example) is not. An earthquake is 'the movement of the surface of a planet usually as a result of geological forces or volcanic activity' (*Oxford English Dictionary*). This definition—let us suppose—is the earthquake equivalent of  $\text{CH}_4$ . However, it is unlikely that there is only one way in which the property of being an earthquake may be instantiated by movements, geological forces and the like. In which case, it seems to me that the right thing to say is that, although an instance of the macroproperty of being an earthquake is constituted, say, from an instance of a particular type of movement of the earth's crust, the property of being an earthquake is not constituted from these other properties. However, this qualification does not affect the point that I am trying to make about macro-causation since this just relies upon constitution of instances by instances.

It also serves to introduce the second illustration of the hypothesis that instances of properties related by metaphysical necessity transmit efficacy from one to the other. Determinable properties seem to be efficacious if their determinates are efficacious. The determinable-determinate distinction is

easier illustrated than specified. Colour is an example of a determinable property whereas specific colours such as red, blue, green are determinate properties. So is the property of being an earthquake since all the more specific ways in which, I suggested, an earthquake may be were more determinate properties to the determinable property of being an earthquake. It may be that the determinable-determinate distinction is merely relative. For it certainly seems that the colours I mentioned are not determinate but determinables to more precise shades like lime green and pea green. Maybe we can't specify the ultimate determinate properties. But the crucial point is that if we think that an instance of a particular (more) determinate property is efficacious then it follows that instances of determinables of that determinate property are efficacious too. For example, if my 11-stone weight caused the chair to break, it seems that my having weight—an instance of a determinate property to the determinate property of being 11 stone—is efficacious. If an object cannot go through a door because it is five-foot cube, then its shape is efficacious. If a potato printer with *half inch* grooves on its surface caused a striped pattern on a piece of paper, then the instance of the property of being grooved is efficacious, and so on (see Yablo, 1992, pp. 254–8, 272). In all these cases, it seems that the efficacy of the instance of the determinable property is *part of* the efficacy of the instance of the determinate property.<sup>7</sup> In the case of the property of being an earthquake, which is both a macro and a determinable property, the instantiations of the microproperties that make up a particular type of earthquake,  $E_1$ , are responsible for the macro-efficacy of the instantiation of  $E_1$  and the instantiation of the property of being an earthquake inherits the efficacy of the instantiation of  $E_1$  by standing as determinable to determinate to  $E_1$ .

In the case of both the macro–micro relation and the determinable–determinate relation—or indeed a combination of both in the case of earthquakes—it seems to be true that if the instantiation of the appropriate microproperties or determinate property occurs, then the macroproperty or determinable property could not fail to occur. There is no possible world in

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<sup>7</sup> Talk of 'parts' here is not entirely pellucid. For a start, instances of determinable properties are not spatiotemporal proper parts of determinate properties. They take up the same region of space. For another thing, if instances of determinable properties are proper parts of instances of determinate properties, then it would seem that one should be able to separate the determinable proper part from the rest. However, this does not seem to be possible. If parts are distinct things, and one joins with Hume in supposing that distinct existences should be separable, then it seems to follow that instances of determinable properties cannot be proper parts of determinate properties (Hume, 1739, I. iii. 3). However, this conclusion is no more certain than the Humean Principle of Distinct Existences which enabled us to derive it. So I shall trade on the fact that something can be part of a whole by being identical to the whole and claim that instances of determinable properties are parts of instances of determinate properties in the sense that either these instances are proper parts of instances of determinate properties or they are identical with them. The efficacy of instances of determinable properties then becomes part of the efficacy of instances of determinate properties in precisely the same sense.

which the appropriate microproperties or determinate property is instantiated and the macroproperty or determinable property is not. There couldn't be squares that weren't shapes, particular arrangements of molecules that weren't liquids, earth movements that weren't earthquakes and so on. This gives us reason to endorse the following hypothesis

- (H) If the instantiation of  $P$  is a cause of an event of type  $E$  and  $\Box_m(x)(Px \rightarrow Mx)$ , then the instantiation of  $M$  is a cause of an event of type  $E$ .

But it should be clear that this is the crucial component of the claim that one family of properties strongly supervene on another set of properties. So that suggests that, in the absence of counterexamples, any properties which supervene upon other, efficacious, properties in this way are themselves efficacious. This completes my defence of the first component of my account.

*1.1.2 Causes rather than Causal Factors* The claim that only part of the supervenience-base needs to be efficacious tries to capture what we are inclined to say about the following cases. An instance of the property of being air is a cause of the combustion of a match even though not all of its supervenience-base is efficacious, but only part—an instance of the property of being oxygen (Segal and Sober, 1991, pp. 14–15). An instance of the property of being a hammer is a cause of nails going in even though its supervenience-base includes elements that are inefficacious in this regard, for instance the relational-teleological properties that make it a *tool*. It is still a cause because part of its supervenience-base is efficacious, namely having a certain mass and resistance. The car crashing into a tree caused the tree to fall over even though it is not so much being a car as being an object of a certain size and mass travelling at a certain speed which caused the tree to fall over. Put in my present terms of discussion, only part of the supervenience-base of the complex property of being a car crashing into a tree is efficacious. Instances of the other intrinsic and relational properties that made the car *a car* were inefficacious. Similarly my pouring out of a jug of water may be a cause of the glass being full of water. However only instances of some of the properties that make up my instantiation of the complex property of being a living human being were efficacious.

What all these cases show is that we are prepared to count something a cause if only part of what constitutes it is actually doing the causal work.<sup>8</sup> The first two clauses of my account aim to capture this fact for instances of properties. It is justified to the extent that these intuitions about causality

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<sup>8</sup> There may be limits to this. We might wish to deny that gerrymandered property instances can be causes because part of them are causes. However, I think this is more because we are unprepared to countenance the existence of gerrymandered particulars than because we have some independent intuition that they can't be efficacious if part of them is efficacious.

are substantial. So it is worth contrasting this notion of cause with that which is (confusingly) identified by J.S. Mill as a cause and which I shall dub a 'causal factor'. Mill put forward five methods for inferring what was the cause of a certain *type* of phenomena. For my purposes, the key ones are the method of agreement and the method of difference.

*Method of Agreement:* If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause (or effect) of the given phenomenon. (Mill, 1843, p. 255)

*Method of Difference:* If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former, the circumstances in which alone the two instances differ is the effect, or the cause, or an indispensable part of the cause, of the phenomenon. (Mill, 1843, p. 256)

Bracketing complications due to indeterminism, overdetermination and preemption for which there are special strategies, the facts about causation they seem to reflect are (in reverse order)

- (D)  $c$  is a cause or causal factor behind the occurrence of  $e$  in circumstances  $d$  iff (i) if  $c$  were not the case but still  $d$  (where  $d$  does not include  $c$  but does include any potential causal rival to  $c$ ), then  $e$  would not occur (ii) if  $c$  and  $d$  were the case, then  $e$  would occur (cf. Kazez, 1995, p. 88).<sup>9</sup>
- (A)  $c$  is a causal factor behind the occurrence of  $e$  if and only if (a)  $c$  satisfies (D) and (b) it is not the case that there is some  $c'$  ( $\neq c$ ) such that if  $c'$  were to occur in place of  $c$  in (otherwise similar) circumstances  $d'$  (i)  $c'$  would satisfy (D) with circumstances  $d'$ , (ii)  $c$  and  $c'$  have as a common component an instance of  $F$ :  $f_c$  and  $f_{c'}$  respectively and (iii)  $f_c$  satisfies (D) with circumstances  $d$  and  $f_{c'}$  satisfies (D) with circumstances  $d'$ .<sup>10</sup>

<sup>9</sup> This does not mean that the methods only make sense if one adopts a counterfactual theory of causality. My thought is that Mill's discussion enables us to make a distinction that theories of what the causal relation is—as opposed to what a cause is—should seek to capture.

<sup>10</sup> I take this to be something like what Mill had in mind in formulating the method of agreement. (A) is formulated in terms of counterfactuals (and hence overlaps with (D)) to deal with the obvious problems which arise for crude regularity analyses. This allows me to formulate it in terms of single cases. Since I am not trying to defend this approach but merely show how, if it picks out anything, it picks out something distinct from our intuitive notion of a cause, I shall resist discussing issues related to its successful formulation further here. For instance, I have not tried to reflect Mill's requirement that there should just be one common circumstance. This seems unmotivated. Components of the common circumstances would themselves be causal factors.

(A) signals the crucial difference between causes and causal factors.<sup>11</sup> The idea behind it is that, by allowing somewhat changed circumstances, we will be able to identify the components of a cause which are in fact doing the work. If we kept the circumstances fixed, we would not be able to distinguish between these working components (that is, the causal factors) and those properties which vary counterfactually with the effect just because they are instantiated as a result of the working properties being instantiated in *those* circumstances—for instance, the relational property of being present in circumstances of type C.

If we made the mistake of assimilating causal factors to causes, then we would get the wrong verdicts in all the examples I gave above. We would conclude that an instance of the property of being a hammer was not cause of the nails going in, an instance of the property of being an object with a certain mass and resistance was; an instance of the property of being air was not a cause of the fire, just that part of it which was an instance of the property of being oxygen was; and so on. These results could not be obtained by an application of (D) alone. The instance of the property of being an object with a certain mass and resistance is not a causal rival to the instance of the property of being a hammer. So (D) would not require that we consider what would happen if the property of being a hammer were absent and the property of being an object with a certain mass and resistance were still present (as part of d). Of course, the claim that these aren't causal rivals is going to be contentious. It is a consequence of my account that they aren't. But others may view that this is a disadvantage of my account since they obviously are. As I still provide the means to discriminate between these two properties—via (A)—I am not begging any questions at this stage by pointing out the uncertain application of (D). But, even so, perhaps a purely technical difficulty provides a more compelling reason for relying on (A). If we did require that the instance of the property of being an object with a certain mass and resistance be part of d for the property of being a hammer, then we would have to require that the property of being a hammer was part of d for testing whether the property of being an object of a certain mass and resistance was a cause. But then (D) would not establish that the latter was a cause either. Circumstances in which this property were absent and an instance of the property of being a hammer were present, would be ones in which another property of being an object with a (slightly different) mass and resistance would be instantiated instead as part of the supervenience-base of the property of being a hammer. So the effect would still occur. The property of being an object with a certain mass and resistance fails clause (i) of D. This point holds quite generally for all properties related in this way.

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<sup>11</sup> I have ruled out the option that c is an effect because this would involve backtracking counterfactuals and standardly a cause of an event f would still occur even if f failed to occur (see Lewis, 1973, p. 170; Lewis, 1979, pp. 47–8).

Although (D) is no good by itself, in each case we would be able to find some *c'*—for instance being a sculpture with the appropriate mass and resistance—which would make our candidate causal factor fail clause (b) of (A).<sup>12</sup> If we decided to reform our practice to take only those which pass (A) as causes in spite of the counterintuitive verdicts for the cases mentioned, I think we would need to introduce a term to refer to things which guarantee the presence of a causal factor of E when they are present. Since this is what our current term 'cause' (as opposed to causal factor) seems to capture, the suggested reform of our practice is unmotivated.<sup>13</sup>

As the examples I have given suggest, the distinction between causes and causal factors is quite independent of the distinction between causes and causal circumstances. One can choose to describe the causal circumstances of a particular effect in terms of causes or describe it more precisely in terms of causal factors. As the examples also illustrate, the distinction holds for property instances. Therefore, it is quite wrong to suppose that one might somehow capture the notion of property causation by merely moving from talk of causes to talk of causal factors. This is nicely brought out by the case of the soprano. The question was whether the property of being under 90 decibels was efficacious. I suggested that it was not. However, there seems no problem with this property satisfying (D) and it is hard to see how there could be a *c'* such that an instance of the property of being under 90 decibels would fail clause (b) of (A). So we don't get the result we want.

I hope it has become clear why I have required that only *part* of the (minimal) supervenience-base of the instantiation of a property need be efficacious. But why 'minimal' and how should we understand this? If I had formulated the account in terms of the requirement that *just* part of the supervenience-base need be efficacious, my account would have been susceptible to what we may call *the problem of efficacy by extension*. Suppose that an intuitively efficacious property S supervenes on F, also an efficacious property. Let T be a property that does not supervene on F and which is intuitively *inefficacious*. Further suppose that T supervenes on G, an inefficacious property. Then, by all the standard definitions of supervenience, since S supervenes on F, it supervenes on *F-and-G*. But then so does T. So if an instance of S is efficacious just as a result of the efficacy of part of its supervenience-base, then an instance of T is efficacious too.

<sup>12</sup> Recent arguments against the efficacy of (environment-dependent) intentional properties have not always been careful about the application of (D) and the role of something like (A) (see Ludwig, 1994, pp. 345–7; Kazez, 1995, p. 88).

<sup>13</sup> In saying this, I am not suggesting that the supervening properties merely programme the presence of a causal factor of E, and hence program-explain the presence of E, in Jackson and Pettit's sense. They distinguish properties which guarantee the presence of a causally productive property—by programming it—from the causally productive properties (Jackson and Pettit, 1988, pp. 393–400; Jackson and Pettit, 1990a, pp. 107–8, 115). I do not. Moreover, their causally productive properties of an event, E, are more determinate than the programming properties of E (Jackson and Pettit, 1990a, p. 114). My causal factors can be the more determinable property.

The notion of a minimal supervenience-base is introduced to resolve this problem. For my purposes, it may be defined as follows.

P is part of a minimal supervenience-base of S if and only if

(a) P is a member of M.

(b) M is a set of atomic B-properties {F, G, H, ...} such that  
 (i) *metaphysically necessarily*, if all the members of M are coinstantiated in the appropriate way, then S is instantiated;

(ii) it is not the case that *metaphysically necessarily*, if all the members of M except P are instantiated in the appropriate way, then S is instantiated.<sup>14</sup>

My claim is that the efficacy of F cannot make T efficacious because F is not part of a minimal supervenience-base of T. Whether F occurs is entirely irrelevant to whether T is instantiated. I hope that appeal to the notion of a minimal supervenience-base provides an intuitive articulation of how the efficacy of one property instance may be constituted from the efficacy of others.

*1.1.3 Property Causation rather than Property Instance Causation* The third clause of the account is supposed to be an intuitive characterization of what we require in addition to property instance causation to have a case of property causation. It runs:

Each minimal supervenience-base of F,  $Fb_i$ , is such that all its instantiations would cause (or in the case of indeterminism, raise the probability of) an instantiation of one of the minimal supervenience-bases of G,  $Gb_i$ , if they were in some causal circumstances C—where C may vary for each instantiation of F.

An instantiation of a minimal supervenience-base of F,  $Fb_i$ , causes an instantiation of a minimal supervenience-bases of G,  $Gb_i$ , if part of  $Fb_i$  causes part of  $Gb_i$  in the way described above.

For properties, F and G, that don't have supervenience-bases other than themselves—the trivial case—the clause is satisfied just if there is a law relating Fs and Gs in circumstances C. I have already suggested that, if the properties F and G are those of fundamental physics, then this is what property causation will be. But what about the more general case? If F has three supervenience-bases,  $Fb_1$ ,  $Fb_2$ ,  $Fb_3$  and G has three supervenience-bases,  $Gb_1$ ,  $Gb_2$ ,  $Gb_3$ , then it may well be the case that instantiations of  $Fb_1$  only cause instantiations of  $Gb_1$  given circumstances C, instantiations of  $Fb_2$  only cause instantiations of  $Gb_2$  given circumstances D, and so on. Only certain supervenience-bases are related to other supervenience-bases and only then if the

<sup>14</sup> An atomic B-property is not a conjunction or disjunction of other B-properties. It may be a compound of other kinds of properties. I leave this open. Obviously there may be more than one minimal supervenience-base of a property.

circumstances are otherwise right. So the connection between Fs and Gs will in general break down and hence there will be no law of the form 'All Fs in C are succeeded by Gs'. Nevertheless, I think that it would still be appropriate to consider we had a case of property causation if the conditions spelled out by the clause were met. For instance, if there were laws 'All Fb<sub>1</sub>s in C are succeeded by Gb<sub>1</sub>s', 'All Fb<sub>2</sub>s in D are succeeded by Gb<sub>2</sub>s' and 'All Fb<sub>3</sub>s in E are succeeded by Gb<sub>3</sub>s'. Why is it the case that all the supervenience-bases of the property F are related in the way specified to supervenience-bases of the property G? The natural explanation is that it is something about the property F itself which is conducive to bringing about instantiations of G and not just something about one instantiation, or another, of F. The thought is that, in cases of property causation, the property F guarantees the presence of what would count as a causal factor of Gs given the right causal circumstances. Property causation is about patterns of interaction rather than particular interactions. At the lowest level, the patterns of interaction relate to physical laws. At higher levels, there are the patterns I just indicated. I see no reason to deny that the latter are cases of property causation given that the same rationale for allowing there to be property causation in the case of fundamental physics applies to higher level cases. Assertion of the rights of fundamental physical properties alone seems to be a mere prejudice against the supervenient.

The clause should not be mistaken for the requirement that there is so much as a *ceteris paribus* law in which the supervening properties figure. As I have already noted, there would not be a law between F and G in circumstances C (say) because there may be supervenience-bases of F for which the causal connection does not hold in circumstances C. Of course, if you incorporated information about which supervenience-bases were instantiated as well or took '*ceteris paribus*' to be 'given the right instantiation in the right circumstances', then one might have a law. But it would not be what people have in mind when they talk of *ceteris paribus* laws involving Fs and Gs (e.g. see Fodor, 1991a). In particular, the reference to F and G would appear redundant (see Schiffer, 1991, pp. 7–8). Instead, one would focus on the supervenience-bases to formulate the laws—as suggested above.

The clause enables my proposal to deal with many of the standard counterexamples that have been offered to a supervenience-style approach. In the case of the soprano, the reason why the property of being a note of less than 90 decibels is not a cause of the glass breaking is that there are instantiations of this property—for instance notes of 40, 50, 60 decibels—which are not causes of any instantiation of the property of the glass shattering.<sup>15</sup> The sound had to be at least 70 decibels. The same does not hold true for the property of being a note of 80 decibels. Second, there is *the problem of ineffi-*

<sup>15</sup> Suppose we imagine circumstances which include an amplifier? These would not count as part of the property's causal circumstances by my account of them earlier because amplification would occur further down the causal chain between the note and the glass shattering.

*cacious disjuncts*. Dwayne's weighing 170 pounds causes the needle on the scales to point to 170 but the property of *weighing 170 pounds or being a peanut* does not (Segal and Sober, 1991, pp. 7–8). If my account was restricted to clauses (i) and (ii), it would make this disjunctive property—indeed any disjunctive property in which one of the disjuncts is efficacious—efficacious. There are many examples of the same type (e.g. see Pettit, 1993, pp. 37–8). However, the 'each supervenience-base clause' captures the difference we require. It is not true that each supervenience-base of this disjunctive property is such that all of its instances would be a cause of the scales pointing to 170 lb in some causal circumstances. When the disjunctive property has as its supervenience-base that of being a peanut, this does not happen.

There is another type of problem case to consider because it raises an additional issue and is well-canvassed in the literature (Menzies, 1988, pp. 566–7; Jackson and Pettit, 1990b, pp. 203–6 and Pettit, 1993, pp. 34–6). Here is one example. Although both the conductivity and the opacity of a metal supervene on the cloud of free electrons that permeate it, if we pass an electric current along a metal wire to illuminate a light bulb, a cause of the bulb lighting would be the wire's conductivity, not its opacity. As it stands, our account can explain why this is so. Opacity would fail the 'each supervenience-base' clause. There will be supervenience-bases of opacity—for instance, in wood—whose instantiations will not be conductive in some causal circumstances. So although it would be right to say that the *instantiation of opacity* in metals is a cause of the illumination of the bulb, it would not be a cause in virtue of the property of being opaque according to my account.

Unfortunately, the account does not deal with the case of opacity-in-metals (m-opaqueness) and conductivity-in-metals (m-conductivity). There are no wooden supervenience-bases of m-opaqueness. The issue might be resolved by claiming that the property of being a cloud of free electrons is not part of every minimal supervenience-base of m-opaqueness. Suppose the cloud of free electrons possesses properties U and V, where U is a minimal supervenience-base of m-opacity and V is a minimal supervenience-base of m-conductivity. In which case, instead of referring to the property of being a cloud of free electrons in describing a minimal supervenience-base we could refer to U instead. Suppose further that V is a cause of the illumination, not U. Since there would be instances of one minimal supervenience-base of m-opacity—namely that involving U—which did not cause the illumination, m-opacity would fail the 'each supervenience-base' clause.

If this option is not open, then it is because m-opaqueness and m-conductivity are dispositional properties with the property of being a cloud of free electrons the categorical base of both dispositions. One law of nature relates the property of being a cloud of free electrons to the conducting of electricity and another relates the property to the failure to allow light to pass through the metal. But if this is the situation, it is not clear that we want either m-opacity or m-conductivity to be counted as efficacious. If they are instantiated just as a result of the two laws holding, then there are reasons to suppose they are not (e.g. Prior, Pargetter and Jackson, 1982). It is the

cloud of free electrons that is efficacious because of the laws of nature indicated, not the dispositions. The dispositional properties are just attributed if the cloud of free electrons has the potential for standing in the causal relations definitive of the dispositions. The dispositions free ride on the efficacy of others.<sup>16</sup>

My account cannot capture this point as it stands. The property of being a cloud of free electrons is part of each minimal supervenience-base of both properties. What undermines the claims of these properties is the fact that their minimal supervenience-bases include laws of nature. I suggest that this is a special case. So my proposal should be limited to those properties whose minimal supervenience-bases do not include a law of nature. On the other hand, if laws of nature are excluded from the minimal supervenience-bases of m-conductivity and m-opacity, then it is clear that they do not supervene upon the property of being a cloud of free electrons in the sense specified. So they cannot derive their efficacy from its efficacy.<sup>17</sup>

I have now completed the defence of my account. If it is correct, then non-physical properties might be causes of E even if there is a sufficient physical cause of E. This will happen when these non-physical properties are related to the physical properties whose instances constitute the sufficient physical cause of E in the way indicated by my proposal. We have yet to see whether intentional properties are so related.

## 1.2 Causation by Intentional Properties

Intentional properties are efficacious because: (a) part of an instance of their minimal supervenience-base, namely an instance of an internal physical property, is a cause of the behaviour of the subject and (b) each minimal supervenience-base of an intentional property is such that all its instances would cause behaviour in some causal circumstances C. If content is environment-

<sup>16</sup> I should make it clear that I do not endorse the idea that dispositions are inefficacious, just the idea that dispositions understood in the way canvassed as a threat to my proposal are inefficacious. If m-conductivity were efficacious, then I think that it is because it falls under the first option considered here (see Noordhof, 1997, pp. 238–43, esp. p. 243, n. 6).

<sup>17</sup> I should note that both an account based on laws and my account based upon the ‘each supervenience-base’ clause has a problem with the following case (Segal and Sober, 1991, pp. 10–11; cf. Davidson, 1980, pp. 225–9). Consider the property of being either red or weighing 100 pounds. My account would make this a cause of being a red mirror image or a scale reading of 100 since all of the instantiations of each of the supervenience-bases of the first disjunctive property will cause instantiations of the supervenience-base of the property of being a red mirror image or a scale reading of 100 in some causal circumstances C. My response is the same as that of Segal and Sober (Segal and Sober, 1991, pp. 11–12). I don’t think that my proposal should rule that these disjunctive properties are inefficacious. If disjunctive properties exist, then they are efficacious in the way indicated. Our intuition that they are not efficacious stems from the thought that they don’t exist (and not vice versa). The proposal only applies to existents.

dependent, then intentional properties will have as part (but *only* part) of their supervenience-base relational properties. This does not mean that the supervenience-base is the union of a set of internal physical properties and a set of relational properties. Rather, the set of properties upon which intentional properties minimally supervene will be made up of pairs of properties—one internal (I), one relational (R)—or, better still, properties of being states of affairs of the form  $Ri$ : ‘ $Ri$ ’ being read as an instance of an internal property possessing a relational property. If this characterization of the supervenience-base of intentional properties is correct, then there is no problem about their efficacy.

Unfortunately, the claim that intentional properties have instances of internal physical properties as part of their supervenience-base has been challenged by Fred Dretske (in response to Noordhof, 1996, see Dretske, 1996). He argues that their supervenience-base is wholly relational (a view which also seems held by Jackson, 1996, pp. 401–3, and one which is assumed by Ludwig in his argument against the efficacy of environment-dependent content (Ludwig, 1994, pp. 345–7)). However, this does not seem to be right. First, suppose, as Dretske does, that being causally correlated with some property in the environment,  $F$ , is (at least) part of the minimal supervenience-base of intentional properties. Suppose, further, that an internal property  $P$  is causally correlated with the property of being a quail and an internal property  $Q$  is causally correlated with the property of being a pheasant. What makes  $P$  not have the content that there is a pheasant? Answer: it is a different property from  $Q$  and hence is not correlated with pheasants just because  $Q$  is (cf. Dretske, 1988, p. 56). For different intentional properties to be instantiated, there must be different internal properties correlated with different items in the environment. This makes the internal properties part of the minimal supervenience-base of the intentional properties.

That by itself doesn’t show that these internal differences actually have (as opposed to *could* have) the appropriate causal consequences (cf. Sturgeon, 1994, pp. 98–100). For instance, as things stand, the internal properties might have nothing to do with the causation of behaviour. However, a second consideration does better. What shows that these internal properties have the appropriate efficacy is that for something to have the kind of intentional properties characteristic of belief—for instance, being subject to error, being information *for the organism*, and the like—part of the minimal supervenience-base of these intentional properties has got to be an integral component of a cognitive system. That means that the intentional properties of a particular representation should be available, in principle, to a subject’s practical deliberations and thereby have an affect upon behaviour (cf. Dretske, 1988, pp. 54–9).<sup>18</sup> Saying this is not just stipulating that intentional properties

<sup>18</sup> It is particularly surprising that Dretske holds that intentional properties are merely relational bearing in mind that he takes the intentional properties characteristic of belief—involving the possibility of error—as those which are instantiated as a result of internal physical properties, which *were causally correlated* with properties of the

must be efficacious. It is indicating that part of whatever constitutes the minimal supervenience-base of intentional properties must play a certain causal role in order for intentional properties of this type to be instantiated at all.

A related characteristic of belief contents helps to drive the point home. Ascriptions of beliefs do not allow substitution of coreferential or coextensional terms. From the Fregean perspective, this is because contents involve modes of presentation of objects and properties which are attributed as a result of certain inferences a subject is inclined to make or fails to make (e.g. Evans, 1982, pp. 18–19). Different Fregean contents will be determined by different intentional properties. Since it is plausible that differences in Fregean sense correspond to differences in behaviour, intentional properties should partly supervene upon the internal physical properties which have a causal influence upon behaviour. Of course, some philosophers don't hold with Fregean senses. They explain failures of substitution by claiming that beliefs are individuated not just by the content of beliefs but how the content is encoded (e.g. McLaughlin, 1991; Dretske, 1991, pp. 217–19). However, the difference in encoding would only be relevant to the belief ascribed if this different encoding corresponded to behavioural differences. Once more we have internal properties (the encoding) displaying the right kind of efficacy for the intentional properties to inherit. Even if it turned out that some content-fixing properties did not partly supervene upon internal physical properties which cause behaviour, *intentional* properties—the particular kind of content-fixing properties that fix the content of beliefs—do partly supervene upon internal physical properties which influence behaviour in appropriate circumstances.

Given that part of the minimal supervenience-base of intentional properties are instances of internal physical properties, it could only seem plausible that intentional properties were inefficacious if one failed to note the difference between causes and causal factors. Inspection of recent arguments in this area suggests that this is the case (cf. Kazez, 1995, p. 88; Ludwig, 1994, pp. 345–347). But why should there have been this confusion? Part of the plausibility of the idea that all causes should be causal factors seems to derive from the thought that it provides the correct diagnosis of why the *meaning* of a soprano's note is not a cause and its being over 70 decibels is a cause of the glass shattering (see Ludwig, 1994, pp. 340–42). However, the diagnosis is not mandatory. My proposal can provide another. The meaning of the note fails the 'each minimal supervenience-base' clause. A note with the same meaning but softer will not shatter the glass in some circumstances C. So there is a minimal supervenience-base of the meaning of the note that

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environment *in the past*, being recruited as causes of a certain type of behaviour. For Dretske, error occurs because the behaviour they were recruited to cause may not be appropriate for that with which these physical properties *are currently correlated*.

fails the clause. It is just that matters are very different when we turn to the intentional properties of beliefs.

## 2. *Anomalous Monism and more Radical Forms of Irreducibility*

Concerns over the efficacy of intentional properties have often arisen within the framework of Donald Davidson's version of Non-reductive Materialism, *Anomalous Monism* (Honderich, 1982; Honderich, 1984; Sosa, 1984; Johnston, 1985; Kim, 1989; Antony, 1991). Broadly two reasons are given. The first—upon which most discussion has focused—is his claim that there are no psychological laws. If laws are taken to determine what is efficacious, the denial of psychological laws seems to be a denial of the mental being efficacious (Honderich, 1982; Honderich, 1984; Sosa, 1984; Antony, 1991). I take it that the proposal I have been defending in the previous section contains an implicit answer to this line of worry. It explains how intentional properties can be efficacious without requiring that they figure in strict or even *ceteris paribus* laws.

The second line of worry concerns the precise way in which Davidson asserts that the mental is irreducible to the physical. He claims that there is no 'echo' in physical theory of the features that contents possess (Davidson, 1974, p. 231). He denies that psychophysical laws exist. However, he asserts that the mental is weakly supervenient on the physical (Davidson, 1993, p. 4, n. 4). The crucial difference between weak supervenience and strong supervenience is that the second modal operator is absent. Hence we get

*C weakly supervenes* on *P* just in case, necessarily, for each *x* and each property *F* in *C*, if *x* has *F*, then there is a property *G* in *P* such that *x* has *G*, and if any *y* has *G*, it has *F*. i.e.  $\Box_n (x)(F)(Fx \ \& \ F \ e \ C \rightarrow (\exists G)(G \ e \ P \ \& \ Gx \ \& \ (y)(Gy \rightarrow Fy)))$ .

Physical properties and contents have no necessary connection between them as is shown by the italicized part of the formula.

Jaegwon Kim has suggested that by merely adopting weak supervenience, Davidson is open to the following argument (Kim, 1989a, pp. 269–70; Kim, 1993, p. 23—see also Horgan, 1987, p. 518, n. 19; Sosa, 1993, pp. 42–6). The weak supervenience of mental properties on physical properties is compatible with the existence of the following two possible worlds. In the first world, there are both mental and physical properties related as indicated. In the second world, the physical properties and events are distributed in exactly the same way as the physical events and properties in the first world. They stand in precisely the same causal relations, etc. However, in the second world, there are no mental properties.

This suggests that mental properties have no efficacy. The physical world can get on without them. However, it does not *entail* that mental properties have no efficacy. It depends upon the story one tells about the reason for mental properties merely weakly supervening on physical properties. There

is considerable debate over the exact character of Davidson's views and the arguments he offers for the claim that the mental is irreducible to the physical. What I want to do is sketch a plausible interpretation of Davidson's position that has the additional merit of showing where my proposal concerning the efficacy of intentional properties needs qualification. It provides necessary and sufficient conditions for supervenient causation within a rich ontology. But for a more austere ontology of the type about to be sketched, it provides only a sufficient condition. It can be weakened to allow intentional properties which weakly supervene on physical properties to be efficacious so long as the other constraints are satisfied.

According to the austere ontology, describing events as mental or as physical is not mandatory. It is merely an attempt to codify the causal relations between events from a particular perspective—a pattern we impose on particulars. These perspectives are characterized by certain concepts and constitutive principles. In the case of the physical perspective, the concepts are quantitative, based upon measurements of length, mass and so on. Its constitutive principles concern these units of measurement. In the case of the mental perspective, the concepts include that of belief and desire. The constitutive principle is that of rationality. The aim is to understand individuals by assuming that they are rational and attributing mental states accordingly so crudely predicting their behaviour on the basis of slender evidence concerning their interior workings. Although events do not depend for their existence on one perspective or another, what properties they possess does.

The restriction to weak supervenience records the influence of *irrealism* concerning the possession of properties upon the characterization of the relationship between mental and physical. If one is in the business of attributing both mental and physical properties, one should not attribute mental differences without physical differences since both perspectives should agree—where they overlap—in the causal relations they identify and, thereby, codify. It is just that the physical supplies detail that the mental leaves out. However, if one has attributed certain physical properties, and one has not even embarked upon attributing mental properties, then there is no reason to start. That's what I meant by saying that the physical world does not make mental attributions mandatory. It is for this reason that the mental merely weakly supervenes upon the physical. There should be consistency of attribution of mental properties within a possible world but their attribution is not required in every identical physical world.

How does this answer the worry about whether instances of properties cause behaviour in virtue of being instances of intentional properties? Once one recognizes that Davidson has an irrealist view of properties, this worry does not make sense. Neither physical nor intentional properties are causally responsible in the required way, only events. What does make sense is the following concern. If the physical characterizations provide a way to make explicit how all the events are causally related to each other, what guarantee do we have that our mental characterizations succeed in identifying causes of behaviour? Answer: (a) when mental properties are only attributed to

events with physical properties whose attribution indicates that these events cause the appropriate behaviour; and (b) all the events attributed mental properties would satisfy the 'each supervenience-base' clause. In these circumstances, their attributions of efficacy are in sync.<sup>19</sup>

I do not find this ontology congenial. But I think that one might adopt it and remain unmoved by the worry that intentional properties weren't efficacious. So my proposal should be modified—if an irrealist view of properties is adopted—to appeal to weak supervenience at the appropriate places. However, given my earlier conclusions, I think there is no reason to adopt this view to avoid the claim that intentional properties are inefficacious.

### 3. *Compatibility and Suitability*

A characteristic of my approach has been to assume that physical properties are efficacious and then consider what follows from this regarding the efficacy of other properties. If one adopts this perspective, it is natural to think of the physical properties as making the other properties efficacious. However, I think that this is the wrong way to look at things. My assumption that physical properties are efficacious and consideration of the efficacy of intentional properties in the light of this was a dialectical move. I took it that the sceptic about the efficacy of intentional properties was prepared to allow that physical properties were efficacious but doubtful that intentional properties were. I have tried to undermine this doubt.

Why I draw attention to the dialectical character of my approach is that the assumption that physical properties are efficacious and the attempt to then prove that intentional properties are efficacious can be taken to imply that there are two types of efficacy at work: the efficacy that physical properties have, and the efficacy that other properties have by being related in certain ways to physical properties (cf. Crane, 1995, pp. 232–5). I do not think that this way of looking at things is justified. I do not believe that there are two kinds of existence: that had by physical things and that had by things composed from these physical things. I can see no reason why one should adopt a different view in the case of causation.

A consequence of this is that the Physicalist should not claim that the

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<sup>19</sup> Evidence that Davidson holds this position has to be pieced together. Davidson indicates that 'the mental is not an ontological but a conceptual category' (Davidson, 1987, p. 46, see also, 1974, p. 239). I take it that he supposes that the physical is too (for hints to that effect see D. Davidson, 1970, pp. 215, 224; 1993, pp. 12–16). He is probably most explicit in the last. The interpretation that I offer is very much in line with that put forward by Norman Melchert, and latterly, Tim Crane (Melchert, 1986, see esp. pp. 270–74; Crane, 1995, pp. 226–7), except that I think that it is still necessary to try to resolve the question of the efficacy of intentional properties translated into this new framework whereas Melchert and Crane seem to think that no (substantial) equivalent question arises.

causal powers identified by physics are fundamental and the causal powers identified by all the other sciences are derived from these fundamental causal powers. The claim should just be that physics provides one with a way of completely characterizing the world. All the other ways of characterizing the world should be compatible with (rather than derivative from) this way. The issue then becomes which way of characterizing the world best captures features of the causal activity observed. It is not clear that this will be the most determinate—physical—characterization.

This point can be illustrated in other areas. For instance, the causal consequences of two different determinate properties of the same determinable may include certain common consequences which hold in virtue of the fact that they are determinates of the same determinable. If my desk is illuminated because a light bulb is shining, the light bulb doesn't have to be shining at 100 watts in order to illuminate my desk. If a wine glass breaks because an object with mass and resistance collided with it and knocked it over, it does not matter whether the object was 500 g or 2 kg (say). It could have been either and still done the damage. In each of these cases, the more determinable property is a cause of these consequences (cf. Yablo, 1992, pp. 274–9, Sturgeon, 1994, pp. 99–100). To insist that the determinate *rather than* the determinable property is a cause is to give priority to a property with causally irrelevant features (Yablo, 1992, pp. 258–9, 274–9). That is not to say that the determinate property is inefficacious. Just that it is a cause *because* it falls under the appropriate determinable.<sup>20</sup>

The same issue arises in the case of the causation of behaviour. Our classification of movements as behaviours of various kinds involves an abstraction away from the details of the physical supervenience-base of the behaviour. To identify the most suitable specification of a cause of this behaviour, we should consider things at a similar level of abstraction. With any luck, that might be mental events with intentional properties. The issue should not be whether such properties are efficacious but rather whether our classification of behaviour is appropriate and whether mental events with contents are at the right level of generality to count as the most suitable events for the causal

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<sup>20</sup> Sometimes we use the 'in virtue of' locution to capture what would be the best way to describe the causal relationship rather than for property causation. For instance, David Cockburn pointed out to me that it is a consequence of my position that I have to say that the property of being a red hammer caused the crushing of a nut (or the object crushed the nut in virtue of it being a red hammer—if you prefer). This has a counterintuitive ring because it is not the best way to capture the causal connection. It would have been more suitable to have said that it was in virtue of being a hammer or, better still, of being an object with a certain mass and resistance. However, the property of being a red hammer is indeed efficacious for the reason already given: the property of being a red hammer guarantees the presence of a causal factor. So it really is true that, in the sense I have tried to articulate, the nut was crushed by an object in virtue of the object being a red hammer. Any residual counterintuitive ring occurs because we assume that mention of redness is relevant to the causal relation when in fact it is not.

explanation of this behaviour. There are worries on this score that I have not addressed. For instance, some have argued that individuation by environment-dependent contents does not correspond to differences in causal powers (Fodor, 1987; Fodor, 1991). This might be thought to impugn their suitability for mention in causal explanations.<sup>21</sup> Efficacy is relatively cheap—suitability may not be.

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<sup>21</sup> I believe that these worries can be assuaged and that the proposal advanced here is the first step towards this. However, I do not pretend to have answered those worries here.

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