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Do Causal Powers Drain Away?

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No one has contributed as much to our understanding of the problems of mental causation in recent years as Jaegwon Kim. We non-reductive materialists must face up to the serious difficulties he has raised for our position.[1]

In this note, I will discuss one issue concerning the main argument of *Mind in a Physical World* (Kim, 1998), the Causal Exclusion Argument. The issue is whether it is a consequence of the Causal Exclusion Argument that all macro level causation (that is, causation above the level of fundamental physics) is an illusion, with all of the apparent causal powers of mental and other macro properties draining into the bottom level of physics. I will argue that such a consequence would give us reason to reject the Causal Exclusion Argument. But there is also a stronger challenge, the charge that, if there is no bottom level of physics, the Causal Exclusion Argument has the consequence that "causal powers would drain away into a bottomless pit and there wouldn't be any causation *anywhere*." (81—page numbers that are not attributed to other works are to Kim, 1998)

The Causal Exclusion Argument

To begin, I will describe what I take the Causal Exclusion Argument to be. When one event causes another, some properties are causally efficacious and others are not. If the singer breaks the glass (Dretske, 1988, p. 79) by shrieking "Peace and quiet", we may suppose that the intensity and frequency of the

[1] A minimal version of materialism could be defined as the view that every thing is decomposable into particles of the sort that make up inorganic matter. The materialist can nonetheless be a property dualist, that is a denier of the claim that mental properties are physical properties; and this is one tenet of non-reductive materialism. Non-reductive materialists have made much of the multiple realizability argument—that says that since mental properties can be realized by physically different properties, a mental property cannot be identified with any one of the realizers. (If a mental property is a second order property, the property of having some first order properties that have certain effects, then a realizer of such a second order property is a first order property that has the relevant effects.) Kim (1992) has made the case against the multiple realizability argument, maintaining the view that the only real mental properties are structure-restricted, and that those mental properties are indeed physical properties. See Block (1997) for a reply to Kim.

sound are causally efficacious but not its meaning. And we may suppose that the causation depends on the thickness and tensile strength of the glass, but not the place of its manufacture or the name of its owner. If the cause causes in virtue of its property F and the effect is caused in virtue of property F* of the effect, we can represent this as

$F \Rightarrow F^*$

Let the (putatively) causally relevant properties in the a case of one mental event token causing another be mental properties M and M*. That is, $M \Rightarrow M^*$. (This is a premise in a reductio.) Let physical property P be the supervenience base of M and physical property P* the supervenience base of M*. Then (Kim assumes and I concur) $P \Rightarrow P^*$. (We could assume Davidsonian events, in which case it is a single event e that has both properties M and P, and a different single event e* that has both M* and P*. We could equally suppose that the event that has property M is distinct from the event that has property P. I won't presuppose either scheme. I will follow Kim in framing the discussion in terms of an instance of one property causing an instance of another, e.g. an instance of F causes an instance of F*. The intended meaning is that an instance of F causes an instance of F* *in virtue of the former having F and the latter having F**. I will usually leave out the phrase 'instance of' where the sense is obvious, saying just that F causes F*.) We could diagram the situation as follows:

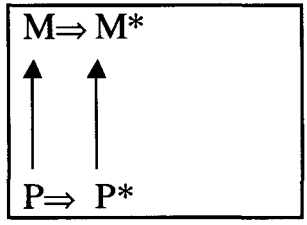

Figure 1

Double arrows indicate causation, single arrows indicate supervenience. (An instance of) mental property M causes (an instance of) mental property M*, physical property P causes physical property P*, M supervenes on P and M* supervenes on P*. The $M \Rightarrow M^*$ causal relation is putative—it is a premise in a *reductio* that Kim will reject.

Kim's argument begins by alleging a tension in our thinking about how (the instance of) M* comes to be. It is (putatively) caused by (the instance of) M and determined by P*. How can these both be true? Kim says that there is a problem because M and P* can each be used to offer complete and independ-

ent explanations of M*. Of course, the non-reductive materialist who accepts causation at many levels should not recognize any tension. The non-reductive materialist thinks that every property above the level of basic physics has "horizontal" causal relations (at the same level) and vertical determination (from a lower level). And these explanations are not completely independent, since the property that M supervenes on (viz. P) is the property that produces P*. In any case, Kim does not rest anything on this alleged tension. It is a way-station that he uses to justify the claim that M can only cause M* by causing P*, a claim that I will not question. Thus we have the situation diagrammed in Figure 2:

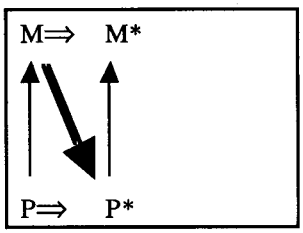

Figure 2
M (putatively) causes M*, P causes P*, M supervenes on P, M* supervenes on P*, and—here is the new feature—M (putatively) causes P*

Now we have a more plausibly problematic tension: we have two different causally sufficient properties competing for the causation of P*, namely M and P. The crux of the Causal Exclusion Argument is Kim's claim that P pre-empts M. To use a metaphor that Kim uses in a slightly different context,[2] P does all the causal work, so there is nothing left over for M to do. Mental causation, Kim says, is threatened. But why does the causal work done by P exclude that done by M? Perhaps the thought would be that if there is a sufficient physical cause and a sufficient mental cause, then each does 100% of the work, and so more work is being done than there is to do. But if causation derives from causal law and if there are causal laws at different levels that specify sufficient causes, then we cannot "add up" work in this way.

(Famously, not all laws are causal laws. For example, the Wiedemann-Franz Law is a correlational law: electrical and thermal conductivity are corre-

[2] In discussing the version of the argument that is geared to a somewhat different form of the Causal Exclusion argument put in terms of the first order/second order distinction rather than supervenience, he says "What isn't clear, however, is why this removes the difficulty: if the color of the cape is, in and of itself, a sufficient cause of the anger...what further causal work is left for provocativeness?" (53). Kim (1993, p 361) uses the metaphor more generally: "If a physical event has a sufficient physical cause, what causal work is left for an event consisting in the instantiation of some *nonphysical* mental property?"

lated but changes in one do not cause changes in the other. But some laws are causal laws. Those are the ones that underwrite causal efficacy of properties on one way of thinking about causation that I will appeal to. I will not attempt to say what distinguishes the causal from the non-causal laws.)

Let us call the principle that sufficient causation at one level excludes sufficient causation at another level the Exclusion Principle. The rest of this paper is a critique of the Exclusion Principle.

Overdetermination

Kim entertains the "overdetermination" view, that M and P are both sufficient causes. He says, "...consider a world in which the physical cause does not occur and which in other respects is as much like our world as possible. The overdetermination approach says that in such a world, the mental cause causes a physical event—namely that the principle of causal closure of the physical domain does not hold." (45) He adds, uncontroversially, that the failure of causal closure is not an acceptable conclusion.

Problem 1: Kim supposes that on the overdetermination view, a world in which the physical cause does not occur and which in other respects is as much like our world as possible is a world in which the mental cause does nonetheless occur. Though I cannot go into the matter here, some supervenience doctrines but not others will preclude such a world. I don't see a way of choosing among these supervenience doctrines. (See McLaughlin, 1997.) If there is no fact of the matter as to which of these supervenience doctrines holds, there is no fact of the matter of whether the closest non-P world contains the instance of M.

Problem 2: Going along with Kim's assumption that (assuming overdetermination) the closest non-P world is one that nonetheless contains the instance of M, why should we suppose that the closest world in which the instance of P does not exist is a world in which causal closure no longer holds? Cain slew Abel by strangling him—let us suppose. This causal sequence was implemented by molecular trajectories, including the molecules of all or parts of Cain and Abel. Cain and Abel might have had a *merely* micro-physically different diet for the previous ten years—that is, a diet of food that was not different from their actual food in a way that anyone could notice, but merely consisted of different tokens composed of different molecules—the same types of carbohydrates and proteins but different tokens of those types. Molecules in the food we eat and air we breathe are constantly replacing the molecules in a human body. If Cain and Abel had eaten these different token molecules for ten years, they would have been composed mainly of different molecules. If Cain and Abel had eaten these different token molecules, the strangling would have occurred just the same, but the mole-

cules involved would have been different. Further, the strangling would have caused the death even if the molecular realizations had been different, so long as the difference wasn't significant at the macro level. So a world in which the molecular implementer of an event (token), e, does not exist can be a world in which e exists but is implemented differently. Kim says "we may assume, without prejudice, that no alternative physical base...would have been available on this occasion." (43) But although there are worlds in which there is no alternative physical base, Kim owes us a reason for thinking the world in which there is no alternative physical base (in which causal closure fails) is closer than one in which it doesn't fail but M is implemented differently (or M doesn't exist at all).

I said that the strangling would have occurred just the same even if its perpetrator and victim had been composed of different molecules. On second thought, I am not sure whether *that particular* strangling would have occurred. I don't claim to know how to identify token events across possible worlds. Cross-world identification of token events arose because of the way Kim puts his point. He says "...consider a world in which the physical cause does not occur and which in other respects is as much like our world as possible. The overdetermination approach says that in such a world, the mental cause causes a physical event." But the overdetermination approach is committed to no such thing (for reasons already mentioned and in addition) since the overdetermination approach need not countenance cross-world identity of token events.

If we are to stipulate cross-world identification of token events, it would be natural for non-reductivists to resist the idea that a world in which the molecules are different is a world in which that strangling does not exist, but is rather replaced by a different strangling. If we non-reductivists are to countenance cross-world identification of token events, we should not say that token events have microphysical individuative conditions. There is a lawlike relation between hurricanes and damage. Hurricane Edna caused damage. But the molecules of air and debris and their trajectories might have been different—e.g. they would have been different if there had been distinct nitrogen and oxygen molecules that moved in exactly the same way as the actual nitrogen and oxygen molecules. Winds in the days before the storm might have blown in air from somewhere else. Alternatively, there might have been a micro difference that made a macro difference, e.g. if there had been more moisture in the air. And even with this alternative molecular realization of Edna it might have caused similar damage (Lepore and Loewer, 1987). If you think there are lawlike relations at many levels, and you think laws have

something to do with individuation of events and properties, you have some reason to endorse event individuation at levels other than the physical.[3]

The Exclusion Principle and the Problem of Causal Powers Draining Away

The Exclusion Principle leads to problems about causal powers draining away. Kim discusses a number of such problems, including the following two. First, it is hard to believe that there is no mental causation, no physiological causation, no molecular causation, no atomic causation but only bottom level physical causation. Second, it is hard to believe that there is no causation at all if there is no bottom level of physics. I will usually concentrate on the second, but many of the points I make transfer to the first in an obvious way.

There is some reason to think that the hypothesis that there is no bottom level of elementary particles is an open question from the point of view of the core of contemporary physical theory. (This view is suggested by Nobel laureate (1989) Hans Dehmelt. See Dehmelt, 1989) Of course, it is incompatible with the Standard Model of eighteen elementary particles (six quarks (the constituents of atomic nuclei), six leptons (including electrons and neutrinos) and six bosons (including photons)), but there is little reason to think the Standard Model will persist, as many elementary particle physicists concede (*The Economist*, 2000; see also Wilczek, 1996; Walker, 1996). Glanz (2001) describes interviews with scientists from "a dozen institutions in Germany, Japan, Russia, and the United States" (p. A1), quoting "theorists" as saying that the Standard Model "is unlikely to represent natural law at its most fundamental level", and that recalcitrant data may be explained by "the possibility that particles believed to be elementary and indivisible are made of smaller entities..." (p. A21) The hypothesis that there is no bottom level—that matter is infinitely divisible, with different properties at each level—appears to be an open question, not a mere philosopher's possibility like the possibility that the world was created 5 seconds ago complete with the evidence of an ancient provenance. (I mean 'open question' to contrast with 'merely skeptical question'.)

If there is no bottom level, and if every (putatively) causally efficacious property is supervenient on a lower "level" property (Call it: "endless subvenience"), then (arguably) Kim's Causal Exclusion Argument would show, if it is valid, that any claim to causal efficacy of properties is undermined by a claim of a lower level, and thus that there is no causation. (Block, 1990, p. 168) This is not a proof, but nonetheless assuming it for the moment, we get

[3] If the strangling exists in another world in which it has a different molecular constitution than the actual strangling, the actual strangling is not "token identical" to a molecular event. See (Burge, 1979) for another argument of this general character against token identity.

the following refutation. It is an open question whether there is or is not a bottom level, but it is not an open question whether there is any causation. It may be an open question whether cigarette smoking causes cancer but it is not an open question whether anything ever causes anything. So something is wrong with Kim's Causal Exclusion Argument.

Here is a slightly different way of putting it. Consider

> *The Anti-Reductionist Conditional*: If there is no bottom level, then cancer never causes suffering or death

Suppose that a lawyer for the R.J. Reynolds, the tobacco company and Johns Manville, the manufacturer of asbestos, uses Kim's Causal Exclusion Argument to argue for the Anti-Reductionist Conditional and uses that to argue that his clients needn't pay damages. His argument is this: given the Anti-Reductionist Conditional, his clients' guilt depends on an open question in physics. That is, given the Anti-Reductionist Conditional and the fact that it is an open question in physics whether there is a bottom level, it is an open question whether anything causes anything and therefore whether cancer ever causes death. I hope we all agree that the lawyer's argument should be rejected. It is incompatible with our causal-explanatory practice (cf. Burge, 1993) to regard the fact that it is an open question in physics whether there is a bottom level as showing that it is an open question whether cancer ever causes death. (Note: I don't say that *no* result in elementary particle physics could possibly challenge our causal-explanatory practice.)

But perhaps you think that it is the Anti-Reductionist Conditional rather than the Causal Exclusion Argument that should be rejected. I have been assuming the plausible idea that endless subvenience and the undermining of each level by the one below shows there is no causation. But perhaps you are suspicious of the step from the claim that causation at each level is undermined by the level below it to the claim that there is no causation. Whether this reasoning is valid depends (you may object) on an open question involving infinitary reasoning, which we can take to be in the domain of philosophical logic. But the argument can easily be modified to accommodate this objection. Consider

> *The Conservative Anti-Reductionist Conditional*: If there is no bottom level, and if the issue in philosophical logic concerning infinitary reasoning turns out as I suggested, then cancer never causes death.

And if the Causal Exclusion Argument were really valid, the Conservative Anti-Reductionist Conditional could also be used to get the tobacco and asbestos companies off the hook. The lawyer's reasoning would be the same

as before except that the issue of whether cancer ever causes death would now be said to depend on *two* open questions, one in physics, the other in philosophical logic.

Someone might reply on Kim's behalf that the mere possibility of no bottom level can't be used against the Causal Exclusion Argument. Imagine someone arguing that the mere possibility that the world was created 5 seconds ago with all the evidence of an ancient age undermines rational belief that cancer ever causes death. What is the difference between the skeptical conditional "If there is no past beyond 5 seconds ago, then cancer never causes death" and the Conservative Anti-Reductionist Conditional?

Answer: Perhaps it is metaphysically possible that there is no past beyond five seconds ago, but it is not an open question. The claim that there is no past beyond five seconds ago is a skeptical claim—unlike the claim that there is no bottom level of physics. A second and related difference is that our ordinary inductive practice that establishes and justifies our continued belief that cancer causes death *really would be stymied* by the assumption that there is no past beyond five seconds ago. But it is not stymied by the assumption of no bottom level. Indeed, prior to the atomic theory of matter, the belief that matter is infinitely divisible (though not the belief in different fundamental properties at each level) is reputed to have been as much part of the educated person's lore as today's belief that matter is not infinitely divisible.

In short, if there is no bottom level and if there is endless subvenience, then Kim's Causal Exclusion Argument would yield absurd results. The Exclusion Principle (that causally sufficient properties at one level exclude causally sufficient properties at another level) is to blame and should be rejected. Even if there is subvenience only down to elementary particle physics, there is a problem of causal powers draining down that far. Kim does not contest the possibility of there being no bottom level (81), but he does reject one form of endless subvenience. Let us now turn to his discussion of that issue.

The Ambiguity of 'Level'

Kim starts with a version of the Causal Exclusion Argument that depends on two ideas, the notion of inter-theoretic level (macro-level vs. micro-level) and the realization relation—the relation between second order properties and the first order properties they invoke. Dormitivity in one sense of the term is the property of having some first order property that causes sleep.[4] The first order property is the realizer of the second order property of dormitivity. The version of the Causal Exclusion Argument Kim begins with is concerned with the issue of whether second order properties are causally efficacious with

[4] In a second sense of 'dormitivity', dormitivity is the property of causing sleep. See footnote 6.

respect to the effects they are defined in terms of. This argument is directed towards a viewpoint that says that mental properties (and properties of some other special sciences) are functional properties, a species of second order property.[5] Kim's response brings in the idea that the realization relation does not track the micro-macro relation, that is that orders don't track levels. The reader would be forgiven for wondering what all this has to do with the Causal Exclusion Argument in the form in which I am discussing it here. The version of the Causal Exclusion Argument I am talking about here does not appeal to orders or to realization but rather to supervenience. Supervenience of the mental on the physical is a basic tenet of materialism—one that is shared by Kim's reductionism and his anti-reductionist but materialist opponent—whereas functionalism about the mental is not. (And I accept supervenience but not functionalism mainly because of failure of functionalism with respect to consciousness. Kim may have the same view.) So I have been ignoring the realization version of the Causal Exclusion Argument in favor of the supervenience version. And I will consider only the supervenience version of Kim's defense against causal powers draining away.

> In general, supervenient properties and their base properties are instantiated by the same objects and hence are on the same level. This again is a simple consequence of the concept of supervenience: Socrates' goodness supervenes on his honesty, generosity, courage and wisdom, and it is the same person, Socrates, who instantiates both these subvenient virtues and the supervenient goodness. So the microphysical, or mereological, supervenience does not track the micro-macro hierarchy any more than the realization relation does; the series of supervenient properties, one mereologically supervenient on the next, when we go deeper and deeper into the micro, remains at the same level in the micro-macro hierarchy, just as the properties ordered by the realization relation stay at the same level. This means that the supervenience argument, [that is, the supervenience version of the Causal Exclusion Argument, which is the version discussed here—N.B.] which exploits the supervenience relation, does not have the effect of emptying macro-levels of causal powers and rendering familiar macro-objects and their properties causally impotent. (86)

Kim's defense against the line of thought I am advocating here (mentioned briefly in Block, 1990) is that there is no problem of the causal powers of mental properties draining to the causal powers of the properties of cells, molecules, atoms or elementary particles, for these properties are all properties of the same thing, Socrates, and are therefore on the same level. He is using a notion of level keyed to objects. On his notion of level, the level of a

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5 A second order property is the property of having some other properties (usually first order) that have a certain causal relation to one another. (In the text, I simplify by leaving out the 'usually'.) A functional property is the special case in which the causal relations are grounded in inputs and outputs. For more on this topic, see the articles on functionalism in any of the many reference works on philosophy, e.g. Blackwell's *A Companion to the Philosophy of Mind*, the Macmillan *Encyclopedia of Philosophy* supplement, the *Routledge Encyclopedia of Philosophy*, *The Oxford Companion to Philosophy* or *The Cambridge Dictionary of Philosophy*.

property depends on what it is a property of. Properties of Socrates are on one level, properties of Socrates' cells are on another level, properties of Socrates' molecules are on another level, and so on. But there is another notion of level, which is keyed to *relations* among properties. The following is plausible: Socrates' pain supervenes on his neurological properties and his neurological properties supervene on the biochemical properties of his brain, and the biochemistry of his brain supervenes on the atomic-physical properties of his brain, and the atomic physics of his brain supervenes on the elementary-particle properties (if there are elementary particles) of his brain. The family of mental properties can be used to characterize the level of psychology, the family of neurological properties can be used to characterize the level of neuroscience, the family of elementary particle properties can be used to characterize the level of elementary particle physics. These distinct branches of science and their associated families of properties plausibly form a supervenience hierarchy, as Kim acknowledges. ("the series of supervenient properties, one mereologically supervenient on the next, when we go deeper and deeper into the micro") No mental difference without a neurological difference. No neurological difference without a bio-chemical difference. No bio-chemical difference without a difference in atomic physics. No difference in atomic physics without an elementary particle difference. And we can define a notion of level unlike Kim's that is keyed to branches of science. On Kim's notion of level, if the object of study is Socrates, the psychological, neurological, bio-chemical, atomic physics and elementary particle physics properties of Socrates are all at the same level, despite belonging to different branches of science. On the notion of level I am suggesting (what Kim calls 'order'), Socrates' mental properties are at one level, his physiological properties are at another level and his atomic properties are at still another level.

But does the Causal Exclusion Argument depend on the verbal issue of what one chooses to mean by level'? This question leads to another: how is Kim's notion of level supposed to be relevant to the Causal Exclusion Argument? My view is: Kim's notion of level is not relevant to the most significant version of the Causal Exclusion Argument. If you look back at the argument, you will see that at least in my rendition of it, the word 'level' does not occur. The relevant premises are that M putatively causes M*, P causes P*, that M supervenes on P and M* supervenes on P* and that M and M* are mental and P and P* physical. To the extent that the argument generalizes to other cases involving levels, the relevant notion of level is one in which the mental and the physical are distinct levels, even if they both apply to Socrates.

Of course, Kim may say that that is just his point: just as the mental and the physical are at the same level, so in other cases what appear to be different levels are the same, e.g. the temperature of a gas and the properties of its

molecules are both properties of the gas and thus at the same level in Kim's sense. But my point is that the problem of causal efficacy draining away remains even if the draining is from mental properties of Socrates to neurological properties of Socrates to bio-chemical properties of Socrates, etc. Kim's reasoning may show that causal powers don't drain from big entities (Socrates) to smaller entities, Socrates' parts (particles in his body), but that isn't relevant to the issue of causal powers of mental properties draining into the causal powers of properties of particle physics. Whether there is a sense of level in which this hierarchy of properties are at the same level is beside the point.

I'm not sure that Kim would dispute this point. For at the end of his discussion of levels, he says: "Granted that both the supervenient properties and their base properties are properties of the same objects and hence belong to the same ontological level, there still is the problem of *intralevel causal exclusion.* What we have shown is only that the causal exclusion problem is not an *interlevel* problem. I will return to this issue in my next lecture." (87) So no doubt he would regard the issue I am raising as the intralevel problem. But what has been gained in moving from thinking of the problem as an interlevel problem in Kim's sense of level to thinking of it as an intralevel problem?

I suppose that I should concede that at least Kim has plugged the causal drain from people to cells to molecules to elementary particles. But that is a Pyrrhic victory given that the draining issue concerning properties rather than things remains.

Micro-based Properties

Kim returns to the intralevel issue in the last few pages of the book. The discussion is compressed and I am not sure I have got it right. The reply depends on the notion of a micro-based property. Intuitively, micro-based properties are "properties of a whole that are characterized in terms of its microstructure". (82) More exactly, P is a micro-based property ≡ P is the property of being completely decomposable into non-overlapping parts $a_1 \ldots a_n$ such that $P_1(a_1) \ldots P_n(a_n)$ & $R(a_1 \ldots a_n)$. Here is how micro-based properties figure into the reply:

> ...the case of micro-based properties is not at all parallel to the case of supervenient psychological properties. In the latter case the physical base properties, presumably certain neurobiological properties, are at the same level as the psychological properties: they are both had by human beings and other sentient creatures. This is part of what generates the problem about mental causation: the causal role of a mental property had by me is threatened with preemption by another property, a neural property, also had by me. My causal powers seem fully explicable not only *in terms of* but also *as* the causal powers of my neural/biological/physical properties. Difficulties of this sort do not arise for micro-based properties in relation to their constituent properties because the former do not supervene on the latter taken individually or as a

group. Rather, they supervene on *specific mereological configurations* involving these micro-properties—for a rather obvious and uninteresting reason: they *are* identical with these micro-configurations... It follows then that we must grant novel causal powers to micro-based properties at higher levels—novel in the sense that these causal powers are not had by any lower-level properties that constitute them. And, as we saw, the supervenience argument does not apply to them, and their causal roles are not threatened by the supervenience argument. (117-118)

As I read Kim, he is saying that what stops the draining down of causal efficacy is reaching micro-based properties in the downward hierarchy. Note that Kim's reply doesn't hinge on whether that downward hierarchy is intra-level or inter-level in his sense of 'level'. His earlier reply (claiming that even if causal powers drain from Socrates' mental properties to Socrates' physical properties, still they are both properties of Socrates and hence at the same level) seems to play no role here.

What is it supposed to be about micro-based properties that block the drain? First note that micro-based properties *do* supervene on "specific mereological configurations" of micro-properties, as indicated in Figure 3:

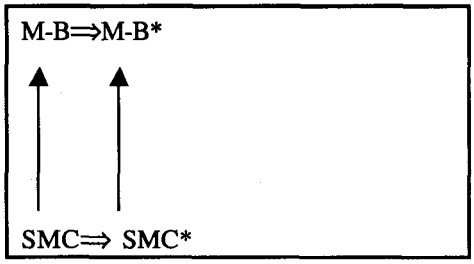

Figure 3
Micro-based property M-B causes micro-based property M-B*. M-B supervenes on specific mereological configuration SMC, M-B* supervenes on specific mereological configuration SMC*

The geometry is exactly the same as in Figure 1. The only difference is that the subvenient property is a specific mereological configuration of properties rather than a single property. As Kim notes, the supervenient property therefore has causal properties not possessed by any *single* member of the subvenient configuration. But why should that make a difference to the draining of causal powers? Even assuming that we are happy with the distinction between configurations of properties and individual properties, does it matter whether the causal powers of the supervenient level drain away to configurations of properties rather than individual properties?

As I understand Kim, the answer is that the key feature of micro-based properties is that they are (always?) *identical* with the micro-configurations.

If water = H_2O, a mereological configuration *par excellence*, there is no worry about the causal efficacy of water (that is the property of being water) draining down to H_2O—if H_2O is efficacious, so is water, since identicals are indiscernible. Kim's view is that mental concepts—at least concepts of properties that don't involve consciousness—are functional concepts. These concepts specify an occupant of the role.[6] And the properties that occupy the role are supposed to be micro-based properties. And those micro-based properties are identical to mereological configurations of lower level properties. So the causal efficacy of the mental (outside of consciousness) does indeed drain down to the physiological, but the physiological doesn't drain down any further—at least not in any sense that makes the physiological inefficacious—because of an identity between the physiological and the next "level" down, say the biochemical. And the biochemical doesn't drain down any further because of an identity between the biochemical and say the atomic-physical. The mental is causally unreal, but the physiological is causally real and the draining stops there.

Multiple Composition

But why can't micro-based properties be micro-based in *alternative ways*? Why isn't jade an example of a micro-based property, micro-based in both calcium magnesium silicate (nephrite) and sodium aluminum silicate (jadeite)? Recall that P is a micro-based property ≡ P is the property of being completely decomposable into non-overlapping parts $a_1 \ldots a_n$ s.t. $P_1(a_1) \ldots P_n(a_n)$ & $R(a_1 \ldots a_n)$. So my question is: why can't a micro-based property have more than one such decomposition? Perhaps it is a stipulation about the meaning

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[6] Kim says that second order properties are identical to the first order properties they specify. So, for example, dormitivity in the sense of having some property that causes sleep is identical to the (contextually indicated) first order property that causes sleep. (99, footnote 11 on 132). This way of putting his point is needlessly paradoxical. Second order properties cannot be identical with first order properties.

Kim says "M is the property of having some property that meets specification H, and P is the property that meets H. So M is the property of having P. But in general the property of having property Q = property Q." He concludes that M = P. But "having the color of the sky" plausibly rigidly picks out the property of matching the sky in color in every possible world, whereas "the color of the sky" plausibly non-rigidly picks out the color of the sky itself in each world. Thus having the color of the sky ≠ the color of the sky.

When Kim explains what he means by the puzzling claim that second order properties are first order, however, it turns out that he adopts non-rigid designators that (as I understand him) are definite descriptions of the form "the occupant of causal role R" (e.g. 'dormitivity' in the first order sense mentioned above). So all the puzzling claim really comes to is that designators which can be construed so as to pick out second order properties also can be construed so as to pick out first order properties. The second order conception of dormitivity is: having some property that causes sleep. The conception I am attributing to Kim by contrast is that of *the property that causes sleep*. 'Having some property that causes sleep' picks out a second order property. 'The property that causes sleep' picks out a first order context-relative property.

of 'micro-based property' that alternative composition is precluded. Perhaps the decision to regard a property as micro-based is a decision to regard alternative decompositions as variants of a single property. But that stipulation simply changes the terms of the debate to one about micro-based properties—when and where they exist. To the extent that there is multiple decomposition, micro-based properties (that fit this stipulation) will be hard to find. (I will not use this stipulation below.)

As I see Kim's picture, he recognizes four classes of properties. First, we have functional properties that are properties in name only, being better construed as concepts or designators. Second, we have supervenient properties, third, micro-based properties and fourth basic properties that don't supervene on anything and aren't properties of things that have parts. Mental properties (that do not involve consciousness) are functional, that is not genuine properties on a causal criterion of properties, but rather merely nominal properties, what Kim calls "designators", that pick out (on the basis of their role) the properties of the next lower level, which are themselves micro-based. The mental (again outside of consciousness) is therefore not causally efficacious "on its own" but the micro-based properties picked out by mental designators are.

Here is an example of how the mental might look on Kim's picture. Thought is a property in name only; there is no science of thought. But thought in humans is micro-based in human physiology, and these human physiological properties are causally efficacious. Thought properties are functionally analyzable, hence they are "mere designators" picking out micro-based physiological properties. Pain is like thought in lacking causal efficacy, but unlike thought, pain is not functionally analyzable. Pain is inefficacious because supervenient on the physiological, but the physiological properties that pain supervenes on in humans are micro-based and hence themselves causally efficacious. Micro-based physiological properties prevent the causal efficacy of the mental from draining very far. These are examples of (1) functional properties (2) non-functional but nonetheless supervenient properties and (3) micro-based properties.

My doubts about this picture center on the worry just mentioned concerning multiple decomposition. Micro-based properties are supposed to prevent draining away for both supervenient and functional properties, but Kim's plugging the draining with micro-based properties depended on assuming identities (such as 'water $=H_2O$') and multiple composition will preclude such identities. That there is a problem here will not be news to Kim since he says that the topic of multiple realization cannot be fully treated in this book. In the hope of drawing him out a bit further, I will say more about what I take the problem to be.

The Fragmentation Strategy

One can object to a putative case of multiple decomposition by objecting to the *multiple* or to the *decomposition*. Suppose it is alleged that upper level property U has multiple decompositions in two (and only two) lower level specific mereological configurations, properties L_1 and L_2. An objector may say that U is identical to the single disjunctive property whose disjuncts are L_1 and L_2 rather than saying that U decomposes separately into L_1 and into L_2. Kim does not smile on this viewpoint, regarding disjunctive properties as properties in name only. The obvious alternative to multiple decomposition for Kim is to say that it isn't that a single property U can be composed in two ways, but rather there are two different upper level properties, say U* and U**, one of which is identical to L_1 and the other of which is identical to L_2. This is Kim's standard strategy, fragmenting the macro level. But what is the rationale for avoiding multiple decomposition by fragmenting the macro level? Is it an empirical hypothesis? A metaphysical thesis?

Kim (1992) considers a possible law:

> "Sharp pains administered at random intervals cause anxiety reactions". Suppose this generalization has been well confirmed for humans. Should we expect *on that basis* that it will hold also for Martians whose psychology is implemented (we assume) by a vastly different physical mechanism?...The reason the law is true for humans is due to the way the human brain is "wired"; the Martians have a brain with a different wiring plan, and we certainly should not expect the regularity to hold for them just because it does for humans...."Pains cause anxiety reactions" may turn out to possess no more unity as a scientific law than does "Jade is green." (Kim, 1992, p. 16)

The thought behind this passage seems to be that where there are multiple decompositions, there are different laws. And where there are different laws there are different kinds. Let us test this idea against some specific examples.

The rigidity of a rigid body has a role in laws of motion, for example the conservation of angular momentum. This law explains for example why leaning while riding a bicycle causes it to turn. Rigid bodies have a number of decompositions, for example in a crystalline substance like diamond (a solid) and in an amorphous substance like glass (a supercooled liquid). So rigidity appears to be both causally efficacious and multiply constituted—an affront to the fragmentation strategy.

Laws at the level of these different molecular structures explain the conditions under which a rigid body ceases to be rigid. Amorphous substances deform and break differently from crystalline substances. But when not deformed, rigidity in both appears to be causally efficacious in the same way according to the same laws of motion.[7] The law of conservation of angular

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[7] This is a change of view from Block, 1997, p. 118, where I treated the law of conservation of angular momentum as a law of ideal objects instead of a conditional law of real

momentum only applies to a rigid body while it remains rigid. Laws of the particles that make up the rigid body are more accurate in that they predict and explain what will happen when rigid bodies cease to be rigid. And the micro laws are more general in that they apply to particles whether or not they make up rigid bodies. I suppose that an advocate of Kim's view will say that the fact that there are more accurate and more general laws at the level of particles would undermine the law of conservation of angular momentum of rigid bodies as a causal law, but this claim remains to be justified.

The same issue arises in other cases of laws of ensembles, for example laws of heat and temperature. An input of heat into a closed system containing a gas causes the pressure of the gas to go up. Nonetheless, there is a finite probability of a decrease in pressure due to a coincidence about the positions and velocities of the particles. In principle, a more accurate prediction could be based on the behavior of individual particles. The fragmentation strategy would seem to dictate that temperature and heat are not causally efficacious. And a similar upshot attaches to the fact that temperature and heat appear to have one realization in solids, another in gases, another in plasmas and another in vacuums. (See Churchland, 1986 and Blackburn, 1993.) But the claim that heat and temperature properties are not causally efficacious remains to be justified.

Water= H_2O, it is said, but this is just shorthand. Actually water has a more complex structure of rings of H_2O molecules with varying numbers of loose H_2O molecules in their centers. Thus there is some variation from water molecule to water molecule, depending on the number of loose molecules within the ring. According to the fragmentation strategy in the form I am considering, being water wouldn't be a causally efficacious property because more accurate predictions could in general be obtained on the basis of the properties of individual molecules rather than on the ensemble property water. And the molecular laws would be more general as well since they would apply to molecules other than H_2O molecules.

A normal human brain and its "enantiomorph", i.e. its perfect reflection (as if in a mirror) obey the same neurological laws, if there are neurological laws. But the molecules of the two brains are enantiomorphs of one another and thus are chemically different—e.g. they rotate polarized light in opposite directions and interact differently with a variety of dissymmetric molecules. So the neurological laws that are the same in the two brains are purely internal laws. Melatonin pills will have different effects on the two brains (we may suppose) and melatonin pills will have the same effect on one brain that enantiomorphic metalatonin pills will have on the other. (The enantiomorph of the key doesn't fit the lock but the enantiomorph of the key fits the enan-

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objects. (Also, that discussion was about realization and this one is about the somewhat different notion of decomposition.)

tiomorph of the lock.) The laws of the internal operation of the brains are the same, but the parts that constitute the two types of brain are significantly different. A brain and its enantiomorph will behave differently under some circumstances, but the overlap in their behavior appears to have nomological unity. Why is this nomological unity undermined by the fact that there are in principle more accurate and more general predictions at the molecular level?

The problem for Kim could be put in the following way: Suppose we have good reason to believe all of the following:

1. $U_a \Rightarrow U_b$ is a causal law

2. U_a has alternative decompositions in mereological configurations L_1 and L_2

3. L_1 and L_2 participate in different laws.

U_a would appear to be both multiply constituted and causally efficacious in violation of the fragmentation strategy. If L_1 and L_2 participate in different laws, that counts against regarding U_a as simply identical to the disjunction of L_1 and L_2, for the disjunction of L_1 and L_2 would not be a genuine property (from Kim's perspective). But the option of regarding U_a as fragmenting into U_a* and U_a** would seem unpalatable (though perhaps not to Kim) because of the fact that U_a itself participates in a causal law. Kim seems to regard the nomological claims of L_1 and L_2 as undercutting the nomological claims of U_a—that seems the upshot of the point of view behind the fragmentation strategy. The idea would be that the separate laws of L_1 and L_2 show that there are no real laws of U_a but only similar laws of L_1 and L_2. That is, rather than the law '$U_a \Rightarrow U_b$', Kim would suppose (on this interpretation) that there are two laws, '$L_1 \Rightarrow U_b$' and '$L_2 \Rightarrow U_b$'. If this is Kim's view, he owes us a rationale for it.

Suppose that the rationale is just that this point of view solves problems of mental causation (and other analogous problems). But there is another point of view that has an equal claim to solving problems of mental causation: the point of view that recognizes causal efficacy at many levels and does not regard them as competing. And this latter point of view also avoids the problem of causal powers draining away.

In short, Kim uses the fragmentation strategy to shore up the Exclusion Principle, but the fragmentation strategy remains to be justified. The Exclusion Principle (and the Causal Exclusion Argument that depends on it) appears to yield conclusions that conflict with our explanatory practice. This

conflict entitles us—and causes us—to reject the Causal Exclusion Argument until these justifications are provided.[8]

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