

CAUSAL INHERITANCE AND SECOND-ORDER PROPERTIES

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Abstract

We defend Jaegwon Kim's 'causal inheritance' principle from an objection raised by Jurgen Schröder. The objection is that the principle is inconsistent with a view about mental properties assumed by Kim, namely, that they are second-order properties. We argue that Schröder misconstrues the notion of second-order property. We distinguish three notions of second-order property and highlight their problems and virtues. Finally, we examine the consequence of Kim's principle and discuss the issue of whether Kim's 'supervenience argument' generalizes to all special sciences or not.

1. Introduction

Our purpose in this essay is to defend Jaegwon Kim's 'causal inheritance' principle from a certain objection raised by Jurgen Schröder.¹ The objection is that the principle is inconsistent with a view about mental properties assumed by Kim, namely, that mental properties are second-order properties. The significance of this objection has to do with a different worry about Kim's 'supervenience argument' against non-reductive physicalism. The worry is that, if it is correct, the argument not only shows that psychological properties must be reduced to physical properties; it also shows that biological properties, chemical properties, economical properties and all properties in the domains of the special sciences must be reduced as well. According to Schröder, the right lesson to draw from the supervenience argument, given that the causal inheritance principle fails, is that all these properties are causally idle. We shall argue that Schröder's charge of inconsistency relies on a misunderstanding of the notion of second-order property.

We proceed as follows. In section 2, we describe the causal inheritance principle and we place it against the background of Kim's reductionist program. In section 3, we evaluate Schröder's argument against the causal inheritance principle. Our contention is

¹ Schröder (2002).

that Schröder's argument relies on attributing a certain notion of second-order property to Kim which he does not have. In sections 4 and 5, we step back from the debate on causal inheritance and we explore two broader issues on mental causation that the debate in question leaves open. Section 4 is devoted to the issue of whether the supervenience argument in fact generalizes. We pull apart three readings of this question. Some of these readings, we suggest, warrant a positive answer whereas others do not. Section 5 is devoted to the issue of how exactly we should think of mental properties as second-order properties. We briefly map some of the explanatory virtues and challenges of three notions of second-order properties and conclude that each of them is useful to deal with some of the problems in the mental causation literature. But none of them provides us with a satisfactory account of three of those problems.

2. The causal inheritance principle and the supervenience argument

The causal inheritance principle is sometimes formulated as a principle about the causal powers of mental properties and it is sometimes formulated as a principle about the causal powers of second-order properties. Thus, Kim offers the following two formulations of the principle, which we may label 'causal inheritance for mental properties' (or simply 'CIM') and 'causal inheritance for second-order properties' (or 'CI2' for short):

CIM If mental property M is realized in a system at t in virtue of physical realization base P, the causal powers of this instance of M are identical with the causal powers of P.²

CI2 If a second-order property F is realized on a given occasion by a first-order property H (that is, if F is instantiated on a given occasion in virtue of the fact that one of its realizers, H, is instantiated on that occasion), then the causal powers of this particular instance of F are identical with (or are a subset of) the causal powers of H (or of this instance of H).³

² Kim (1993a), p. 326.

³ Kim (1998), p. 54.

The reason why it is not problematic that the principle is offered in two forms concerns the role that it plays within Kim's overall reductionist project. Let us therefore turn our attention to that project briefly.

The causal inheritance principle is part of a broader argument against non-reductive physicalism, sometimes labeled the 'causal exclusion' or 'supervenience' argument.⁴ This well-known argument is meant to show that non-reductive physicalism is inconsistent given some weak assumptions. More specifically, the argument is meant to show that the following five theses are inconsistent:

1. Anti-reductionism: Mental properties are not physical properties.
2. Supervenience: Mental properties supervene on physical properties. Necessarily, for any object *x* and any mental property *M*, if *x* has *M*, then there is a physical property *P* such that *x* has *P* and, necessarily, if any object *y* has *P*, then *y* has *M*.⁵
3. Causal closure of the physical domain: Every physical event that has a cause at time *t* has a physical cause at *t*.⁶
4. Mental causation: Mental properties are causally efficacious.
5. Causal exclusion principle: If an event *E* has a sufficient cause *C*, then no event distinct from *C* can be a cause of *E* (unless this is a genuine case of causal overdetermination).⁷

Claims 2 and 3 are supposed to capture the minimal commitments of physicalism and, consequently, claims 1-3 are meant to describe the non-reductive physicalist's commitments. Claim 4 is grounded on the intuitive idea that the instantiation of a mental property may cause the instantiation of a different mental property, in the way in which

⁴ See Kim (1997, 1998) for two versions of the supervenience argument.

⁵ Strictly speaking, this is the definition of 'strong' supervenience. The question of whether this formulation of supervenience is essential to the argument is relevant to the debate on whether the argument generalizes or not.

⁶ Kim (1993b), p. 280.

⁷ See Kim (2001) pp. 276-278. For a defence of this principle see Kim (1993c).

being in pain causes one to lose concentration, for instance (hereafter ‘mental-to-mental’ causation). And it may cause the instantiation of a physical property, in the way in which being in pain may cause one to wince (hereafter ‘mental-to-physical’ causation). The denial of claim 5 is supposed to lead to the counter-intuitive result that, systematically, human behavior is causally overdetermined by neurological and mental causes. Thus, Kim takes claims 4 and 5 to be plausible assumptions. He then proceeds to derive a contradiction from all five claims, namely, that there is and there is not mental-to-physical causation. Basically, the contradiction is obtained by arguing for the following conditionals:

- C1 If (mental-to-mental causation and supervenience), then there is mental-to-physical causation.⁸

- C2 If (anti-reductionism, causal closure and causal exclusion), then there is no mental-to-physical causation.⁹

The bottom line is that 1-5 constitutes an inconsistent set of claims. The moral of the argument is meant to be that the best way of securing mental causation within a physicalist framework is by embracing the reductionist view that mental properties are identical to physical properties. Basically, we must drop claim 1 in order to hold on to claim 4.

Evaluating the supervenience argument is not our concern in this essay. However, for the purposes of assessing Schröder’s attack on the causal inheritance principle, it is worth pointing out that this principle is grounded on the supervenience argument.¹⁰ If the right lesson to draw from the argument is that mental properties must be identified with physical properties, then it is not surprising that the causal powers of the former turn out to be identical to the causal powers of the latter. This explains that the causal inheritance principle is sometimes presented as CIM and it is sometimes presented as CI2. The

⁸ Kim (1993d), pp. 350-353 argues for this conditional.

⁹ An argument for this conditional is provided in Kim (1993d), pp. 353-357.

¹⁰ In (1993d), p. 355, Kim says of those considerations that support the supervenience argument that they ‘point to’ a picture of the world that can be stated in a version of the causal inheritance principle.

reason for this is that the principle is grounded on a *reductio* of the view that theses 1-5 above are consistent. And a common point often raised in support of thesis 1 is that mental properties are second-order with respect to physical properties. Thus, Kim's discussion of the causal inheritance principle assumes, for the sake of a *reductio*, the following 'mental as second-order' view (or, for short, M2):

M2 Mental properties are second-order properties.

As a first approximation to this view, we can say that, according to M2, all physical properties are, in some sense yet to be specified, ontologically basic or 'first-order.' And, for each mental property M, there is a physical property P with respect to which M is 'second-order.' (We may call this physical property P the 'first-order property of' M.) If one assumes that M2 holds, then CIM simply emerges as a more restricted version of CI2. For CI2 clearly entails CIM assuming M2. The upshot is that the central version of the causal inheritance principle is CI2. Following Schröder, we shall concentrate on that formulation of the principle for the remainder of our discussion.

Now, a concern that a number of philosophers have had about the supervenience argument is that it may show too much. If the argument is right about psychological properties, some have argued, then all properties in the domains of any special science must reduce to physical properties for analogous reasons.¹¹ Schröder shares the view that the supervenience argument generalizes in that way. This is why he thinks that, given that Kim's causal inheritance principle fails, the supervenience argument delivers the result that all second-order properties are causally inert.¹² If the causal inheritance principle fails, then giving up claim 1 above is not an option as a reaction to the supervenience argument. If the principle fails, then the causal powers of mental properties are different from the causal powers of physical properties. This means that we cannot identify mental properties with physical properties (unless we give up the indiscernibility of identicals, that is). Thus, the supervenience argument seems to force us to give up some claim

¹¹ For expressions of this worry, see Van Gulick (1992), p. 325, Burge (1995), p. 102 and Baker (1995), p. 77.

¹² Schröder (2002) p. 322.

among 2-5. The natural candidate to turn to is claim 4. The upshot is that we need to come to terms with the fact that mental properties are not causally efficacious. But if the supervenience argument generalizes, then Schröder's attack on the causal inheritance principle seems to deliver the stronger result that, for analogous reasons, biological properties, chemical properties and economical properties are not causally efficacious either. A lot seems to hang on Schröder's attack on the causal inheritance principle, then, if the supervenience argument generalizes. We will return to the generalization issue in section 4. First, let us examine Schröder's attack on the principle.

3. The argument against causal inheritance

What exactly is wrong with causal inheritance according to Schröder? Schröder's objection is ingeniously raised as a worry about the metaphor of inheritance. Thus, Schröder claims:

If the metaphor of inheritance is to be any guide in these abstract matters there must be an heir and a testator. But we only have a testator, the physical property, and no heir. This is because the functional property is second-order. It is not a property on the same footing as the realizer property. Just as a policeman cannot inherit the fortune of Jones if Jones *is* the policeman, i.e., if Jones fills the role of a policeman, so it is impossible for a second-order property to inherit the causal powers of its first-order property.¹³

Schröder's argument seems to come down to an argument with the following structure:

- a. Let us suppose, with Kim, that CI2 is correct.
 - b. Second-order properties inherit the causal powers of their first-order properties. (From assumption a.)
 - c. But second-order properties are identical with the causal powers of their first-order properties.
 - d. Thus, second-order properties inherit themselves. (From b and c.)
- However, d is absurd. Therefore,

¹³ Schröder (2002) p. 321.

CI2 is incorrect.

Naturally, the question is what Schröder's grounds for premise c are. Presumably, premise c is meant to be analytic. This means that, in order to evaluate Schröder's argument properly, what we need to determine is whether the notion of second-order property assumed in CI2 (and therefore used in premise b) is the same as the notion spelled out in premise c.

The idea that mental properties are second-order properties arose within a functionalist understanding of the mind. On this approach to the mental, the attribution of mental states to a given system only makes sense under the assumption that the system in question has a set of states that are causally related to perceptual inputs, behavioral outputs and each other in a certain way.¹⁴ (To abbreviate: They have a certain 'causal role'.) Now, we can distinguish at least three senses in which a given property may be said to be a 'second-order property'. All of them involve the notion of causal role, and some of them will be familiar from the literature on different varieties of functionalism:

- 2P A property Q is second-order in that:
 Q is the property that plays a certain causal role.¹⁵
- 2C A property Q is second-order in that:
 Q is the property of playing a certain causal role.
- 2M A property Q is second-order in that:
 Q is the property of having some property that plays a certain causal role.¹⁶

¹⁴ See Putnam (1991), for example.

¹⁵ This notion is used in the kind of functionalism known as 'realizer functionalism', which has been defended by Lewis (1991). Notice that calling a property a 'second-order' property in sense 2P is a little misleading if one is assuming a 'sparse', as opposed to a 'latitudinarian' or 'abundant', conception of properties. There are, in the 2P sense, no sparse second-order properties over and above first-order properties. There only are first-order properties, some of which can be referred to by second-order predicates.

¹⁶ This notion is used in the kind of functionalism known as 'role functionalism'. See Block (1990).

To illustrate, consider the following picture about the relation between a subject's being in pain and the rest of her properties. The picture in question involves the following three properties of the subject. There is, first of all, the property of having C-fibers firing. This is a property of the human subject. Let us call it P (for 'physical property'). Then, there is the causal role that property P plays within the subject's cognitive economy. To simplify, let us assume that this causal role simply comes down to the property of being typically caused to be instantiated by tissue damage and typically causing wincing. Let us call it C (for 'causal role'). Clearly, C is a property of P so it is different from P. Finally, there is the property of having some property or other with C. Let us call this property M. M is, like P, a property of the human subject so it is different from C. In addition, M is a property that the human subject could have even if she did not have P (so long as she had some other property with C). So M is different from P as well. Now, how does the subject's being in pain fit in this picture? If we try to make it fit by construing the property of being in pain as a second-order property, then it will fit in different ways depending on what notion of second-order property we use. If being in pain is second-order in sense 2P, then it is identical to P. For P is the property that plays the appropriate causal role, namely, being caused by tissue damage and causing wincing. However, if being in pain is second-order in sense 2C, then it is identical to C. For C is the property of being caused by tissue damage and causing wincing. Finally, if being in pain is second-order in sense 2M, then it is identical to M. For that is the property of having some property that is caused to be instantiated by tissue damage and whose instantiation causes wincing.

Generalizing on the example above, we can distinguish three readings of the claim that mental properties are second-order properties, depending on whether the locution 'are second-order properties' in M2 is understood along the lines of 2P, 2C or 2M:

M2P If a property Q is mental, then:
Q plays a certain causal role.

M2C If a property Q is mental, then:
Q is identical to the property of playing a certain causal role.

M2M If a property Q is mental, then:

Q is identical to having some property that plays a certain causal role.

Let us now return to the question of whether the notion of second-order property used in CI2 is the same as the notion used in premise c. Clearly, the notion of second-order property used in premise c must be the notion captured by 2C. Otherwise, premise c is patently false: Second-order properties in sense 2P *have* causal powers and, therefore, they are not identical to those powers. And second-order properties in sense 2M are not properties of *other properties*, which means that they cannot be identical to the causal powers of their first-order properties. Thus, the notion used in premise c must be 2C.

What notion of second-order property is assumed in CI2? The answer to this question concerns the above-examined role that the principle plays in Kim's reductionist program. As we have seen, CI2 is grounded on a more general argument against non-reductive physicalism. Recall that the argument in question is meant to be a *reductio* of the view that a certain collection of theses is consistent, one of which is property dualism or anti-reductionism. We have mentioned that the reason usually produced by non-reductive physicalists in support of the anti-reductionist claim 1 is precisely that mental properties are, unlike physical properties, second-order properties. So the notion of second-order property assumed in the causal inheritance principle must be the same as the notion that non-reductive physicalists are operating with when they defend the anti-reductionist thesis.

Now, the notion of second-order property that non-reductive physicalists operate with when they argue in support of anti-reductionism is 2M. The idea that non-reductive physicalists seem to have in mind when they claim that mental properties are second-order properties is best captured by M2M. For their view is not that mental properties are causal powers of other properties, but that mental properties are identical to having some properties with certain causal powers. Ned Block, for instance, specifies the relevant notion of second-order property for functionalists (or, more specifically, those functionalists who are non-reductive physicalists) as follows:

A property that consists in the having of some properties or other (say first-order properties) that have certain causal relations to one another.¹⁷

As a matter of fact, Kim is very explicit about the fact that this is the notion of second-order property that he is assuming in his argument:

Let D be a set of first-order properties: a second-order property over D is the property of having some property in D satisfying a certain specification C. Where C involves causal relations (that is, C specifies a causal role) we may call the second-order property a functional property. Properties in D satisfying C are the realizers of the second-order property in question. [...] Notice that a second-order property and its realizers are had by the same entities.¹⁸

Thus, the notion of second-order property assumed by Kim in the causal inheritance principle is 2M. Where does this leave us *vis à vis* Schröder's argument? It means that the notion of second-order property used in premise c must also be 2M in order for the argument to have some bite. But, as we have seen, it is not. The upshot is that the argument relies on an equivocation of the expression 'second-order property'. For that expression is used in sense 2M in premise b whereas it is used in sense 2C in premise c. There does not seem to be a way of fixing this problem. If Schröder uses the 2C notion of second-order property in premise b (and, therefore, in the initial assumption a), then the principle reduced to the absurd is certainly not Kim's causal inheritance principle, and it is hard to see why such a principle would have any intuitive appeal in the first place. And if he uses the 2M notion of second-order property in premise c, then premise c turns out to be obviously false. Either way, the causal inheritance principle does not seem to be vulnerable to Schröder's argument.

4. Does the supervenience argument generalize?

Let us now step back from Schröder's challenge to Kim and consider whether the supervenience argument actually generalizes. So far we have granted, for the sake of the argument, that it does. This is why Schröder's attack on the causal inheritance principle

¹⁷ Block (1990) p. 45.

¹⁸ Kim (1997) p. 290. See Kim (1998) p. 20 and p. 82 as well.

seemed to have substantial consequences. But an interesting question about the supervenience argument on its own right, one might argue, is whether the argument generalizes or not. Our contention in this section is that this question turns out to be ambiguous. In the background of this question, there seems to be a certain picture of the world according to which the world is somehow layered. Essentially, the idea is that the world is divided into different groups of entities organized hierarchically. They correspond to the domains of the various sciences, beginning with the elemental particles which physics studies at the bottom, all the way up to social groups studied by a discipline such as economics or sociology. But this picture collapses an important distinction.

Kim has pointed out that two different hierarchies are implicit in this model.¹⁹ First, there is a hierarchy of objects divided into ‘levels’ according to the part-whole relation: Objects belonging to a given level are parts of those objects that belong to higher levels. This mereological hierarchy begins at its lowest level with the elemental particles of physics, moving up to atoms, molecules, cells, organisms and social groups. In addition, there is a hierarchy of properties stratified into ‘orders’ according to the realization relation. The properties that we take to be ‘first-order’ properties are those individuated by their causal powers. Examples of first-order properties include, at the level of organisms, the above-mentioned property P of having c-fibers firing. Then, there are second-order properties in the 2M sense. Continuing with the example above, suppose that having c-fibers firing typically causes wincing and the firing is typically caused by tissue damage. Being in pain can then be construed as a second-order property, that is, the property of having some property or other that it is typically caused by tissue damage and it typically causes wincing. Notice that this property is at the same level as P, namely, the level of organisms. We can now appreciate that the original generalization worry involves, at least, two different concerns. The first one is a concern about the drainage of the causal powers of all second-order properties (in the 2M sense) to their first-order realizers. The second is a concern about the drainage of the causal powers of all properties at high levels to properties at lower levels.

¹⁹ In Kim (1998), pp. 80-82.

Kim grants that the supervenience argument yields the result that the second-order properties of objects at a given level do not cause anything over and above the first-order properties of objects at that level. We side with Kim here. After all, the supervenience argument can be generated for any second-order property, not only for psychological properties. To the extent that one intuitively thinks of psychological properties as properties with causal powers that are distinct from physical properties (even though they depend on them), it seems that one will also construe biological or chemical properties as properties with those same features. And one will then be able to run a version of the supervenience argument for those properties as well. (Notice that two of the five claims in the argument do not even mention psychological properties.) Thus, the coherent reductionist position to take here is to accept that reduction generalizes to all second-order properties. This is precisely the result that the causal inheritance principle is meant to capture.

What about generalization across levels? The question is now whether the supervenience argument shows that first-order properties of objects at a particular level do not have causal powers over and above first-order properties of objects at lower levels. The debate on what the right answer to this question is concerns the relation that holds between those properties. Kim claims that a property at some level is ‘micro-based’ on certain properties at lower levels:

Property P is micro-based on properties $P_1 \dots P_n$ and relation R when the object a that has P fully decomposes into parts $a_1 \dots a_n$ which have $P_1 \dots P_n$ in configuration R . We may call $P_1 \dots P_n$ the ‘micro-properties’ of P and $a_1 \dots a_n$ the ‘micro-constituents’ of a .²⁰

The issue is now whether one can run the supervenience argument to reduce micro-based properties to their micro-properties, and considerable attention has been devoted to the status of claim 2 (the supervenience claim) in that hypothetical argument. Kim claims that a micro-based property does not supervene on its micro-properties, since

²⁰ Kim (1998), p. 84.

supervenience is a two-place relation between properties of the same object.²¹ Thus, if we try to run the supervenience argument for micro-based properties, we will not be able to get it started.

The first reaction in the literature has been the following. Some philosophers have replied that strong supervenience is not necessary to get the supervenience argument started. Other relations of dependence between properties, which hold between micro-based properties and their micro-properties, can be used to run it.²² The suggestion is to replace the supervenience claim 2 with a different thesis that preserves the intuitive idea of dependence between properties: There cannot be a difference between the properties of two whole objects without a difference in either the properties of their parts or the ways in which those parts are put together. It has been proposed that this one-to-many relation of dependence holds between micro-based properties and their micro-properties, and it is therefore possible to run the supervenience argument by reading the supervenience thesis 2 in this way.²³ Now, instead of trying to settle the issue of whether the strong supervenience thesis is essential to the causal exclusion argument, we would like to highlight a different line of defense against the generalization worry which Kim himself has sometimes pursued. We propose that a case could be made for dropping the causal closure principle.

Consider a micro-based property *P* at some level *L* and its micro-properties *P*₁ ... *P*_{*n*} at a lower level *L**. What would it take to show, by using the supervenience argument, that properties at *L* such as *P* must reduce to properties at *L** such as *P*₁ ... *P*_{*n*}? We would need to show, at least, that a conditional equivalent to C2 holds for micro-based properties just like C2 held for mental properties. For that purpose, we would need a principle that requires the instantiation of properties at *L** to be caused by the instantiation of other properties at *L** (if that instantiation has any cause at all). But micro-based properties can be at any level above the level of elemental particles. Thus, what we would ultimately need is a principle stating that each level is causally closed. Presumably, the overall principle would be that, for any level *Λ*, if a property at *Λ* is

²¹ Kim raises this point in an exchange with Paul Noordhof in (1999), p. 117. On the same point, see (1998), pp. 85-86 as well.

²² See Bontly (2002), Gillett and Rives (2001) and Noordhof (1999).

²³ For details, see Bontly (2002), pp. 83-84.

instantiated and its instantiation has a cause, then it is caused by the instantiation of some property at level Λ . But such a principle seems highly counter-intuitive. It would require, for instance, that if I wave my hand to hail a taxi and I displace some molecules of air in the process, then my hand did not displace those molecules of air in virtue of its having a certain mass. Instead, the principle requires that the molecules of air must have been displaced by the instantiation of properties in the *molecules* that constitute my hand, which is counter-intuitive. This means that if we try to run the supervenience argument to reduce micro-based properties to their micro-properties, it will put no pressure on us to drop claim 1. We can drop causal closure instead.

However, Kim's appeal to micro-based properties has provoked a second reaction in the literature on mental causation. And this reaction needs to be addressed differently. Ned Block has objected that a micro-based property of some object is related by Kim's own notion of supervenience to those properties that compete with it for causal powers. It is just that none of the relevant causal competitors is one of its micro-properties. Let us explain. Consider an object O at some level L , and the following property of O :

Fully decomposing into two non-overlapping parts, Part 1 and Part 2, such that Part 1 has a property P_1 , Part 2 has a property P_2 , and Part 1 is in a particular configuration R to Part 2.²⁴

This is a micro-based property of O (call it 'micro 1-2'). Thus, micro 1-2 is at level L .²⁵ Now, suppose that Part 1 fully decomposes into two non-overlapping parts, Part A and Part B, put together in configuration R_1 . Part 2 also fully decomposes into two non-overlapping parts, Part C and Part D, put together in configuration R_2 . Suppose that Part A has property P_a , Part B has property P_b , Part C has property P_c , and Part D has property P_d . Consider the following property now:

²⁴ By 'non-overlapping', what we mean is that Part 1 and Part 2 do not have parts in common. More generally, for any objects x and y , let us say that x 'overlaps' y just in case there is an object z such that z is a part of x and z is a part of y .

²⁵ We will assume that Part 1 and Part 2 are not at the level of elemental particles.

Fully decomposing into, on the one hand, Part A (which has Pa) and Part B (which has Pb) put together in configuration R1 and, on the other hand, Part C (which has Pc) and Part D (which has Pd) put together in configuration R2.

This property is a micro-based property of O as well (call it ‘micro A-D’). So micro A-D, like micro 1-2, will be at L. Notice that properties such as micro 1-2 meet the necessary conditions to supervene on properties such as micro A-D. If an object has micro 1-2, then its parts decompose into some parts with their own properties. Object O, for instance, instantiates micro 1-2 by instantiating micro A-D. Furthermore, any object that has the latter property should have the former property as well. It is hard to see how there could be an object such that it decomposes into Part A and Part B (with their respective properties) put together in configuration R1 as well as Part C and Part D (with their respective properties) put together in configuration R2 and yet that object fails to instantiate micro 1-2. How could such an object fail to have, for instance, Part 1 as one of its parts once it has Part A and Part B put together in R1? It seems that, once a certain fine-grained decomposition of an object is in place, any coarse-grained decomposition of the relevant object is fixed as well.

The new generalization worry raised by Block is the following. It seems that properties like micro A-D preempt properties like micro 1-2 as causes. These are properties of the same object so they are at the same level. Furthermore, they are all properties of the same order, since none of them is construed by existential generalization over the other one. So this concern remains in spite of the levels/orders distinction. Basically, the worry now is that the causal powers of, let us say, my having c-fibers firing may drain away to my having some chemical configuration, and further to having some atomic configuration, and so on.

To address this worry, Kim has suggested that we can identify properties such as micro 1-2 with properties such as micro A-D:²⁶ If having parts 1-2 in configuration R *just is* having parts A-D in configurations R1 and R2, then the latter cannot threaten to take away the causal powers of the former. Block, however, has replied that there can be no such identities due to the possibility of ‘multiple decomposition’: An object may be

²⁶ In Kim (2003).

decomposable into non-overlapping parts in two or more different ways.²⁷ The thought is that if Part 1 and Part 2 can be decomposed in different ways, then micro 1-2 is not identical to micro A-D, since O can have the former property without having the latter. Our position is that the right answer to the question ‘Do micro-based properties reduce to their supervenience bases if the supervenience argument is right?’ may simply be ‘It depends on the micro-based property.’

Two different kinds of properties are put forward as examples of micro-based properties in the literature on generalization. Properties like being a certain temperature in a gas, or having a mass of 1 kg, seem to be of one kind whereas properties like being a water molecule (or, perhaps, constituting a certain pattern) seem to be importantly different. Consider, for instance, having a certain temperature in gases. Such a property cannot be identified with any particular configuration of micro-constituents and micro-properties: No particular kinetic energy in each of the molecules in a gas, or relation among them, is necessary for it to have a determinate temperature. On the other hand, the property of being a water molecule is identical to decomposing into certain proper parts, namely three atoms bonded in a particular way, where each part has its own properties (being an oxygen atom and being a hydrogen atom). Call properties of the second type ‘relationally structural properties’ and properties of the first type ‘non-relationally structural properties’.²⁸ It may be possible to push the generalization worry against Kim when it comes to non-relationally structural properties because multiple decomposition would be a possibility for the relevant objects. On the other hand, it may not be possible to push it for relationally structural properties because it seems that the relevant object can only be decomposed in a unique way. Thus, we should focus on what kinds of properties the special sciences are concerned with. To the extent that those are relationally structural properties, the supervenience argument will not threaten the causal import of explanations that appeal to those properties in the special sciences.

To conclude our discussion on generalization, we have seen that the concern that reduction generalizes to all the special sciences if the supervenience argument is right about psychology is ambiguous. The argument does entail that all second-order properties

²⁷ Block (2003), pp. 145-146.

²⁸ We borrow this terminology from David Armstrong, who draws the distinction in (1978), p. 71.

should be reduced to first-order properties. But that would not show that higher-level properties should reduce to lower-level properties. The argument does suggest that non-relationally structural properties in the domain of any special science are causally inefficacious. But that would not show that relationally structural properties are.

5. Higher-order properties and mental causation

Let us keep zooming out, as it were, from Schröder's argument against Kim's inheritance principle and consider now a different issue that our assessment of that argument left open. We claimed that Schröder attributes the wrong notion of second-order property to Kim. But the more interesting issue about second-order properties and mental causation, one might argue, is what notion of second-order property is the right notion to adopt. Our contention in this section is that, interestingly, each of the three notions above will serve different explanatory purposes quite well. But they will do so at the cost of facing different difficulties. This should become apparent by considering the virtues and defects of M2M, M2P and M2C in order.

Suppose that we endorse M2M. The view that if a given property *Q* is mental then *Q* is identical to having some property that plays a certain causal role has an obvious virtue, namely, it can nicely account for the intuition that multiple realization is possible. Multiple realization is taken to occur when two systems have a certain mental property by having different physical properties that realize or implement it.²⁹ The intuition that a given mental property *M* can be multiply realized in two different physical properties in different systems *S*1 and *S*2 is easy to account for if we take *M* to be the property of having some property or other that plays a certain causal role in the system that has *M*. For it certainly seems possible that, in *S*1, the property that plays the appropriate causal role is different from the property that plays that causal role in *S*2. As we have seen, though, the advocate of M2M is not going to have an easy time accounting for the intuition that mental properties are causally efficacious. The reason why Kim's supervenience argument is interesting is precisely that, provided certain assumptions, it

²⁹ Putnam (1991).

constitutes a serious challenge to the view that M2M is consistent with the intuitive causal efficacy of the mental.³⁰

Suppose that we endorse M2P. Then, our predicament will be the converse to that of the advocate of M2M. The view that if a given property Q is mental then Q is the property that plays a certain causal role in the relevant system squares with the causal efficacy of mental properties neatly. Quite simply, mental properties are identical to physical properties if M2P is correct. Thus, mental-to-physical and physical-to-mental causation turns out to be not more problematic than everyday physical-to-physical causation. Assuming M2P, if there are reasons to be skeptic about mental causation, then there are reasons to be skeptic about causation *simpliciter*. And this is something that reductivists and non-reductivists alike will not easily concede. The problem for the advocate of M2P is multiple realizability. The intuition that a given mental property M can be multiply realized in two systems S1 and S2 is not easy to account for if we assume M2P. How could a single mental property M be realized by two physical properties in different systems S1 and S2 if M is the property that plays a certain causal role in a certain system? If S1 and S2 are such that the property that plays C in S1 is different from the property that plays C in S2, then it is impossible that both S1 and S2 have M. (If M is the property that plays C in S1, then S2 does not have M, and *vice versa*.)³¹

Suppose that we endorse M2C. Is there any advantage to that view over M2P and M2M? We believe that there is. It is sometimes argued that a further challenge to M2P is that it needs to face the so-called ‘*qua* problem’.³² The objection is sometimes put in terms of whether, assuming that a mental property is a physical property that plays a certain causal role, the mental property will be causally efficacious *qua* the mental property that it is or not. The claim is that, even if we identify mental property M with the physical property P that has a certain causal role in the relevant system, the question whether this property causes what it does in virtue of its being a mental property or in virtue of its being a physical property remains open. This is the interesting question to

³⁰ For a different sort of worry about the causal efficacy of mental properties assuming M2M, see Block (1990).

³¹ The advocate of M2C may, of course, try to either individuate mental types more finely or individuate physical types more broadly. These two moves are explored in Kim (1993a). For difficulties with them, see Fodor (1974).

³² Jackson (1996), p. 25

address in the mental causation debate, the objection goes, and the advocate of M2P has made no progress towards an answer.³³ As we see it, the only way to make sense of the question at issue is by assuming that property M/P itself has properties, some of which are causally relevant for certain effects of its instantiation, some of which are causally relevant for other effects of it. If we think of M/P this way, then it makes sense to ask whether a certain property of M/P, say, its being mental, is causally relevant for a certain effect of its instantiation. Thus, the advocate of M2C has a way of making perfect sense of the *qua* challenge. For she is working within a framework where second-order properties are properties of other properties, which is what we seem to need in order to make sense of the question that is raised in the *qua* problem. As far as we can see, neither the advocate of M2P nor the advocate of M2C will be able to make sense of that question easily.

This means that, in so far as one sees the *qua* problem as a legitimate worry that can be raised against M2P, one should feel some intuitive pull towards the view of second-order properties that Schröder seems to have in mind. Nevertheless, it is not clear to us that M2C really does justice to the intuition that mental properties are causally efficacious. If M2C is correct, then the generalizations of folk-psychology, where we invoke such properties as ‘being in pain’ to causally explain someone’s wincing, are fundamentally wrong. For properties like being in pain are not really causally efficacious for such effects as wincing. Properties of those properties, such as being a mental property, are causally efficacious for effects like wincing if M2C is correct, which seems quite counter-intuitive. Neither is it clear to us how the advocate of M2C would handle multiple realizability. Thus, the advocate of M2C seems to be better off *vis à vis* the *qua* problem but she does not seem to be better off *vis à vis* accounting for the intuitions of multiple realizability and the causal efficacy of the mental. The advocate of M2P can easily account for the latter intuition, but not the former. And the advocate of M2M can easily account for the former intuition, but not the latter.

³³ It is interesting to note that the move here is analogous to the traditional move according to which overcoming substance dualism does not solve many of the interesting problems of mental causation, since those problems reappear at the level of properties. According to the *qua* theorist, overcoming property dualism does not solve them either. For they reappear at the level of meta-properties.

6. Conclusion

Let us take stock. We have examined the causal inheritance principle, its role in Kim's reductionist program, and Schröder's argument against it. We have distinguished several notions of second-order properties and we have argued that Schröder's critique of Kim's causal inheritance principle relies on an equivocation of two of them. We have then examined the issue of whether, independently of Schröder's argument, the supervenience argument generalizes. We have distinguished three versions of this worry. Regarding generalization across orders, we have suggested that the argument does generalize. Regarding generalization across levels, we have also agreed with Kim that the argument does not generalize. The interesting worry about the generalization of the supervenience argument, we have seen, is the generalization to all micro-based properties. We have proposed that, in some cases, the micro-based property of having a certain decomposition will indeed have to be reduced to the micro-based property of having, so to speak, a more fine-grained decomposition but, in other cases, this will not necessarily need to happen. The crucial point, in each case, will be whether the object has a unique possible decomposition or not. Finally, we have taken a look at the reasons in favor and against each of the notions of second-order properties that we have distinguished while discussing Schröder's argument. And we have concluded that each of them will be quite useful to deal with some of the issues in the mental causation literature but none of them seems to be able to handle three of those issues satisfactorily.³⁴

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³⁴ We are very grateful to Peter Menzies for comments on earlier versions of this paper. One of us also wishes to acknowledge support from a grant from the Spanish Ministry of Science and Technology for the project *Modal Aspects of Materialist Realism* (HUM2007-61108).

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