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## **Second Order Properties: Why Kim's Reduction Does Not Work.**

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### ***Abstract***

In this paper I argue that recent reductionist's arguments marshaled by Jaegwon Kim on the causal status of mental properties do not get the point they are aimed at. In particular, in the first part, tackling epistemological issues, I show that Kim's arguments concerning the heterogeneity of disjunctive properties if accepted would undermine most scientific practice and that second order properties are compatible with the idea that the universe is a physically closed system; in the second part, devoted to metaphysical issues, I argue that Kim's reductive functionalism, if taken as a metaphysical thesis, cannot be applied neither to qualitative states nor to intentional ones. In particular, qualitative states cannot be reduced by Kim's admissions, while intentional states cannot be reduced given Kripke's argument concerning the nature of theoretical identifications. Finally, I argue that the mental properties can be interpreted as micro-based properties, so showing that the so-called 'generalization argument' either holds or licenses us in crediting mental properties with causal powers.

*Keywords:* mental properties; second order properties; reduction/reductionism; causality; natural laws

### ***1. Introduction***

The widespread consensus against reductionism is under attack. The weak point in the anti-reductionist front is the one that has been considered, for many years, the strongest: the causal status of mental properties. Do mental states have causal powers? Do our desires and beliefs affect the world in its physical properties? In a number of papers (Kim 1988; 1989; 1990; 1992; 1993) and lately in his book *Mind in a Physical World* Jaegwon Kim (1998) has maintained that the answer to these questions is in the negative (1). In particular, he thinks that real properties are those that have causal powers and that mental properties, being the result of a specific functional idiom, do not have causal powers. In the following I will present Kim's reasons for denying causal efficacy to mental properties, construed as second order properties.

These reasons, I will argue, can be divided into epistemological and metaphysical ones. However, no reason is compelling enough to establish a case in favour of reduction, even of functional kind.

## 2. *The General Argument*

In order to argue for the inefficacy of the mental, Kim presents three specific arguments: 1) *supervenience*, the relation often supposed to carry the weight of the solution to the mind body interaction, is sufficient only for a minimalist version of physicalism, one that cannot underwrite the causal efficacy of mental properties; 2) both physical and mental properties are sufficient to causally explain mental states. So, if there are mental states, these are the causal effect either of physical or of mental properties. However, it is useless to have two kind of properties doing the same causal work for any causal relation. So, either physical or mental properties must go (the causal exclusion argument); 3) mental properties can be identified with second order properties realized by one physical state, construed as its first order realizer. Because something cannot have a second order property without having one of its first order realizers, the causal efficacy of a given second order property is entirely "inherited" from the causal efficacy of its first order realizer (the causal inheritance principle). Given these specific arguments, the general reasoning is quite direct: supervenience does not establish the point of anti-reductionists (by 1). For a given causal relation there cannot be more than one kind of properties having causal efficacy (by 2); mental or second order properties inherit their causal efficacy from their first order realizers (by 3), hence only physical properties are causally efficacious, and mental properties are epiphenomenal. They can be reduced in a way or another and Kim's own way is through some sort of functional analysis. I think that the crucial issue concerns the robustness of second order properties. As I said, Kim's reasoning can be divided into a epistemological and a metaphysical part. I will consider epistemology first.

## 3. *Epistemology: close vs. open sets*

As is commonly assumed, properties are individuated through causal powers (2), that is to say, if two entities in the same occasions are specifically affected by the same entities in the same way and can specifically cause something else in the same way, then these two entities share the same property (3). Because mental states are identified with second order properties (4), we have to consider whether these properties are causally efficacious. Second order properties are so defined: "*F* is a *second order property* over set **B** of base (or first-order) properties iff *F* is the property of having some property *P* in **B** such that  $D(P)$ , where *D* specifies a condition on members of **B**" (p. 20). For instance, the property of being a *primary colour* is the property defined over the set **B** of base properties (*colours*) which satisfies a further condition, that is, if mixed with other primary colours produces the entire visible spectrum. So defined, second order properties admit *multiple realizations* in the sense that any such property admits that type-distinct entities could realize it. That this is

the case is intuitively evident: second order properties are, in most cases, functional properties because the further conditions are individuated through functional analysis. For instance, if you find a color that does "this and that" you have individuated a primary color. Doing "this and that" is a functional characterisation resulting from functional analysis and this characterisation, in the specific example of colours, is satisfied by red, blu and green.

Kim thinks that second order properties are not *real* properties. They are, so to say, generated by the functionalist idiom or, more in general, by functional analysis of the kind just exemplified. Because one of Kim's aim is to figure out the ontological structure of the mind so to assess its causal efficacy, he wants to point out that since mental properties are second order properties they do not have any causal powers. Consequently, we should avoid talking about second order properties when discussing causal powers, favoring instead a more austere idiom, one in which only first order properties are accepted. So, why are not second order properties *real* (*viz.* causally efficacious)?

Kim considers first a case in which a second order property has just one realizer. He says: "By quantifying over properties, we cannot create new properties any more than by quantifying over individuals we can create new individuals. Someone murdered Jones and the murderer is Smith, or Jones or Wang (5). That someone, who murdered Jones, is not a person in addition to Smith, Jones, and Wang, and it would be absurd to posit a disjunctive person, Smith-or-Jones-or-Wang, with whom to identify the murderer. The same goes for second order properties and their realizers" (Ibid., p. 104). The idea, here, is that the disjunction of many individual properties does not create a new property. Each disjunct could instantiate a property, in this case being or not the murderer of Jones, but the disjunction of these properties could not. Kim extends this analysis also for those cases in which a property is realised by more than one realizer. Consider property *M* (for instance being *jade*) that is realized by two physical properties P1 (being *jadeite*) and P2 (being *nephrite*). There is nothing in having *M* "over and above" having either P1 or P2. So, if something has *M* then it has either P1 or P2, where the "or" has to be intended in its exclusive reading (*aut*, not *vel*) (6). But then, nothing has the property of being jade. Rather, what there is are cases of jadeite or cases of nephrite, and summing them under a single property does not create a new property by itself. Cases like this one show that: "... multiply realizable properties are causally and nomologically heterogeneous kinds, and this at bottom is the reason for their inductive unprojectibility and ineligibility as causes" (Ibid., p. 110).

There seem to be, here, two different issues: one is whether disjunctive heterogeneous properties are, in general, banned from scientific causal explanations because of their unprojectibility. The other is what the realizers picked up by disjunctions have in common. I will tackle them in turn.

Consider such a hypothetical law as "All metals expand when heated". Both copper and iron are metals. However, "copper" identifies a different natural kind from "iron". If both are natural kinds it follows that "All metals expand when heated" can't be a law because the term "metal" picks an heterogeneous disjunction and is thus unprojectible. The reason for not considering the aforementioned a law, Kim's reason as a matter of fact, is the following: suppose that the law turns out to be confirmed only by instances of copper, and by no instance of iron, or of any other metal. Because the term "metal" is

identical to a disjunction which comprises also iron, the law is confirmed for iron too. But this seems absurd. So, heterogeneity at the level of realizers does not guarantee the appropriateness of the higher-level concept, and hence its projectibility.

Jerry Fodor has replied that this reasoning is based on a case of sampling mistake, not something that has to do with the notion of kind. If we discovered that we have tested just copper we would be ready to modify the scope of the term "metal" or of the law, for that matters. Secondly, Kim's argument seems unrealistic. In fact, it is natural to imagine that empirical research is conducted through some sort of recursive function. Researchers start by making the fast and dirty hypothesis that there is a class of entities, call them "metals" - some elements of which are known, such as iron, copper, and the like - that expand when heated. Then the hypothesis is tested on copper, iron and so on. When a certain degree of confirmation is reached the hypothesis is tested on other entities to check whether those too are metals, that is, if they expand when heated and show other properties shared by the other elements in the set. If they do, then these too are metals, and so on.

Projectibility, then, would indicate a practice on hypotheses rather than on concepts (7), that is, the practice of whether certain terms, laws and properties can be used as bases for experiments and tests. The issue of projectibility, then, does not have to do with the homogeneity vs. heterogeneity issue concerning kinds. Whether a specific property can be projected or not is something that depends on practice, and there can be many different reasons for justifying research and scientific practices. "Projectibility" is not a normative concept, rather a descriptive one.

The second problem is the following. It could be true that metals expand when heated but, a reductionist might observe, this could be for different causal mechanisms. So there will not be anything causal in common. This argument, though, has a unreasonable consequence for scientific practice. If every metal expands when heated, this phenomenon, expansion, is exactly what all metals have in common, and it has to be uniformly realized. That is, even if iron and copper expand for different mechanisms, they expand, that is, it is true of both of them that they show a certain metrical phenomenon. Otherwise we should distinguish between "copper expansion" and "iron expansion". However, we do not distinguish these cases, rather, we simply say that there is expansion, sometimes occurring in copper sometimes in iron (8). "Expansion" is a metrical and spatial concept that does not, and should not, take into account the possible ways in which it can be realized. Otherwise we would have to abandon so many properties, such as "mammal", "gene" or "subatomic particle", that constitute fundamental concepts in science.

The reductionist could reply: so much the worst for science, or for science as we know it. But this difficulty would remain in any case. What lies at the heart of this issue, in fact, is a problem concerning *induction*. Fodor has noticed that by insisting on properties that have a closed number of realizers, Kim is missing the important distinction between "a multiply based property that is *disjunctive*" and a multiply based property that is disjunctively *realized*. To wit: A multiply based property is disjunctive iff it has no realizer in any metaphysically possible world that it lacks in the *actual* world. Jade is disjunctive in that the only metaphysically possible worlds for jade are the ones which contain either jadeite or nephrite or both. By contrast, multiply based

properties that are disjunctively *realized* have different bases in different worlds. Pain is disjunctively realized in that there's a metaphysically possible, nonactual, world in which there are silicon-based pains" (Fodor 1998, p. 13).

By insisting in construing second order properties as having a closed set of realizers, Kim overlooks that properties that are multiply realizable can be realized in an endless number of ways. Consider, for instance, the property of being a *majority*. This is a second order property having as its first order base the number of individuals that vote in a certain way as opposed to the number of individuals that vote in the opposite way and, as a further characteristics, the fact that the two numbers satisfy some definition that specifies whether a majority has been reached. Now, it is possible to have voting both in open and closed sets. A Parliament, for instance, may represent a closed set (supposing that the number of people sitting in Parliament does not change). A population, vice versa, may represent an open set, because the number of voters may change at each voting session. Now, the majority could be determined in many ways. Consider a very simple way: the half of the votes cast plus one (9). The number of ways in which you can reach the majority is  $x/(y!(x-y)!)$  (where  $x$  is the number of votes and  $y$  is half votes plus one). Now, as long as  $x$  -the number of votes- and  $y$  - what we defined to be the majority - are always the same, the number of possibilities will be constant, otherwise it changes at every voting session as is the case with open sets. The property of being a majority, though, is independent on whether the voters form a closed or an open set. It is the property of having collected half votes plus one out of the votes cast. Now, if voting is performed in a closed set, the number of possible majorities is finite; if, on the contrary, it is performed in an open set, this number is not finite anymore, even if what a majority is is the same in any case (10).

Applying the case of majority to that of metals makes it evident that open sets are of crucial importance from an epistemic point of view. From such a perspective, open sets of realizers show that we cannot make complete descriptions and explanations of a given phenomenon by mentioning its subvenient realizers. Mentioning open lists or realizers would make science plenty of never-ending descriptions and explanations, instead of viable ones. In order to provide viable scientific statements one needs a unifying level, the one that is typically captured by many kind of generalizations, among which second order properties are often used. The possibility that a second order property has an open set of realizers does not entail that there is a spontaneous creation of realizing entities. In fact, the presence of open sets of multiple realizable properties is perfectly compatible with the idea that the universe is a physically closed system. So, saying "so much the worse for science as we know it" is not a good point for the reductionist because the reductionist would be forced to abandon science in its essential features, condemning also the very ideal of reduction.

There is a further point. When causal relations are individuated through scientific practice they are intimately connected with an analysis in terms of laws and generalizations. This is the case even when causal relations are isolated in the commonsensical and non scientific practice. The particular or singular causal relations that Kim is considering - as was the case with copper expansion as opposed to metal expansion - are the result, and not the starting point, of the generalizing practices mentioned. The possibility of asserting "this piece of copper expands when heated" depends on the very practice of testing

the reliability of the relation between expansion and heating in copper, not the other way round. For, suppose that when that piece of copper was heated someone was singing. Then the very same event would support the assertion "this piece of copper expands when someone is singing nearby". By testing this connection again, we exclude the singing as the proper factor for generating expansion in copper. So, every assertion concerning specific causal relation is the result of knowledge resulting from generalizations. Being the result of these practices, particular causal relations cannot be considered in isolation from generalization. Because Kim does not indicate any independent criterion for separating particular relations from general assertions from which they result, particular relations are on the same epistemological boat of their general summing counterparts. They will stand or fall together. So, particular or singular causal relations do not have any epistemologically special status with respect to generalizations and laws resulting from them.

I have considered these as epistemological questions. However, they are interconnected with more substantial issues, of metaphysical nature. It is time to proceed in their analysis.

#### ***4. Second order properties and causal powers***

In discussing epistemological issues I noticed that particular causal relations and general causal statements are interdependent. Kim, however, thinks that particular causal relations are ontologically prior. In particular, he seems to be convinced that epistemological considerations concerning causality depend on metaphysical issues, the proper domain where *real* causal relations take place. However, his arguments can, at most, show some kind of epistemological reduction, failing to make any point concerning metaphysics. Let us see why.

As I said, the heart of the matter lies in the possibility for second order mental properties to have causal powers. Kim, for the arguments exposed in the previous section, thinks that these properties cannot qualify for causal efficacy and proposes a particular reductive program: functional reduction. The first step in this reductive process is the "functionalization" of mental properties. Functionalizing is a procedure that, in Kim's view, should replace Nagel's bridge laws. Now, even if I have cast some doubts on the viability of Kim's argument against the eligibility of second order properties as causes, I will consider anyway the rationale for such a replacement first, and then we will see how this procedure is supposed to work.

Nagelian reduction proceeds through the individuation of so-called "bridge-laws". These are nomological correlations between entities at one level and entities at a lower level. "Temperature", for instance, could be reduced to "mean molecular kinetic energy" because there is a lawlike correlation stating that whenever the temperature in a given body is  $x$  its mean molecular kinetic energy is  $y$ . Once bridge-laws are individuated it is possible to substitute (hence reduce) every occurrence of the reduced term ("temperature" in our example) with its proper reducing one ("mean molecular kinetic energy"). Problems with this kind of reductive strategy have been raised by the argument of multiple realizability. The gist of it is that it is not possible to establish a one-to-one correlation because many entities or properties at a given level can be realized

by type-different entities or properties at a lower level. This is true for that matter temperature itself. In fact "temperature" is identical to mean molecular kinetic energy in gases, while it has to be identified with mean maximal molecular kinetic energy in solids, and to something else in plasma or in vacuum (where you do not have molecules and what is measured is blackbody temperature). So, according to some authors, bridge laws should be of local type (11). However, neither this restriction solves the issue, and in particular it doesn't solve it for that matter mind-body reduction. The reasons, spelled out by Kim, are three: 1) physical realizations of mental entities can be more different and heterogeneous than the realizers of physical properties (as temperature); 2) bridge laws, whether of general or of local type, take for granted what has to be explicated, namely why there is such a correlation between mental and physical properties; finally 3) correlating is not tantamount to ontological or epistemological reduction because bridge laws are contingent and hence the properties correlated have to be distinct.

The way out of all of this is to substitute correlation with identities, saying that a given mental property M is nothing but a physical property P. Here functionalization takes its role. Functionalizing a mental property means express it in terms of causal roles, and then comparing these roles with those of its realizers. If the realizers have the same causal roles of the mental property, it is possible to proceed in identification and hence in reduction. So the first problem is whether a given property can be functionalized or not.

Now, are all mental states functionalizable? Notoriously, qualitative states pose serious problems for the functionalist view. In specifying which are the causal roles of a given state we should avoid mentioning that very state. This requirement does not pose special difficulties for intentional states. For instance, if we want to functionalize the belief that *p* we may say that it is a state caused by a certain perceptual input and which may causes other beliefs and desires possibly prompting some behavioural output. In so doing we never mention the epistemic state in question. However, in the case of qualitative states this cannot be done. Consider a state of this kind generated by a sip of red wine. In that case one may write: "a state caused by a sip of red wine which causes a certain pleasure ... such that ..." but in so doing one will conclude either by mentioning some sensation, which was supposed to be functionalized, or by mentioning nothing specific enough, failing in properly identifying the state. This kind of difficulty has to do with the fact that qualitative states are intrinsic properties, that is, properties whose character depends exclusively on the individual that have them. Kim agrees that qualia constitute a special domain of difficulties. On this regard he says: "In any case it seems to me that if emergentism is correct about anything, it is more likely to be correct about qualia than about anything else" (Ibid., p. 103). Qualia, then, cannot be functionalized.

Let me notice that this is an admission that, as things stand now, not all mental states can be reduced. For instance, if we admit that pain states are qualitative in character, it follows that they cannot be reduced to their realizers. The same can be said for some kind of emotions. The reductionist program appears then to be limited just to intentional states.

Intentional states are taken to be functionalizable because their identity conditions can be stated in terms of causal roles (If you take any version of Role Semantics to be a good way of doing intentional analysis, something that,

one should admit, is not unquestionable.) Does functionalization entail reduction? Consider the case of "temperature" again. This property can be functionalized because it can be described in terms of its causal/nomic relations (for instance: it raises in X whenever X undergoes a combustion process; decreases in X when X is placed in freezer, and so forth). Once a property has been functionalized the process of reduction is almost done. In fact, functionalizing allows identification, and identification allows reduction. However, as Kim recognizes, functionalizing a property makes it nonrigid because its causal/nomic relations, that are essential in the functionalization process, are metaphysically contingent. In fact, a mental property can have different causal and nomological relations in different worlds. This fact, then, seems to threaten the reductive strategy through functionalization. Kim notices that even if metaphysically contingent, the causal relations are nomologically necessary, because they hold in all worlds in which our laws of nature hold. So, such relations are nomologically necessary. If this analysis is correct, argues Kim, functionalization is the only way in which we can make sense of the causal powers of mental properties. These properties have causal powers because they are identical to physical properties, where these identities are nomologically necessary. Hence, mental properties can, at least in principle, be reduced to physical properties (cf. *Ibid.*, p. 101).

However, this is, as a matter of fact, a second and serious limitation to Kim's program. What Kim has shown is that some mental properties are possibly functionalizable, and hence reducible, only through nomological identification because of the nonrigid character of the functionalization process. Such a character, in fact, excludes *ipso facto* the possibility of having metaphysical identification since this last is based on identity in all possible worlds. Now, when a nomological identification is available, the kind of reduction that follows is epistemological, that is, is a reduction that applies only *modulo* the present laws of nature and our knowledge of them in our actual world and in all other worlds in which the same laws hold. This is not at all metaphysical reduction, a reduction based on metaphysical identifications. If what is wanted is robust reductionism, of ontological kind, what has to be provided is an assert of identity independent from our laws of nature because of their contingent character. So, what Kim has shown is that nomological identification allows just for epistemological reduction. However, one of Kim's assumption does not match very well with his main result.

In discussing the ways in which Burge and Baker tackle the mind-body issue, Kim manifests his dissatisfaction because both the mentioned authors argue that mind-body causation would dissolve as a problem if we confine to epistemological considerations. On the contrary, Kim argues, mind-body causation is not an epistemological problem, rather "... the problem of mental causation is primarily a metaphysical problem" (*ibid.*, p. 61) so that "turning away from metaphysics to embrace epistemology, or away to causation to embrace explanation, will not dissipate the need for an account of mental causation" (*Ibid.*, p. 67).

Discarding epistemological solutions Kim, in a way, is arguing against his main result. As we saw, Kim cannot provide a metaphysically necessary identification but, at most, one that is nomologically necessary. This kind of identification is sufficient only for epistemological reduction. In this case, he has not addressed what he considers the very problem of mind-body causation,

namely the metaphysical one, unless he wants to say that epistemological solutions are metaphysical enough, a point of view he is not prepared to endorse. This objection goes hand in hand with the objection raised in the previous section. As you may remember, I noticed that multiple realization is perfectly compatible with the assumption that the universe is a physically closed system. At the same time, as the quotation by Fodor made evident, the closedness of the universe does not entail that mental properties have the same identity condition in every possible world. Now, functionalization, intended by Kim as the proper strategy for reducing mental properties, can at most be applied to intentional states given our present natural laws. As such, this strategy leaves untouched the metaphysical possibility of having silicon-based intentional states, not to mention qualitative states. If my analysis is correct, then, functionalization is not a sufficient strategy for that matter mental causation as a metaphysical problem.

### 5. Generalisation

I will turn now to a third problem for Kim's reductionism, one that is independent from metaphysical considerations. According to Kim, a supposedly second order property is just a functional concept which specifies that a given property satisfies a further condition. For instance, there are not primary colours, just colours satisfying some further condition. So, any instance of second order property reduces to instances of one or another of its first order realizers, which are the only ones endowed with causal powers.

Many writers (Block 1997, Burge 1993, Baker 1993, Lycan 1987, van Gulick 1992) have thought that this attack to second order properties can be generalized from psychological properties to any kind of property. Here is their argument: psychological states, as second order properties, supervene on neural states, interpreted as their first order realizers. Given that mental properties supervene on neural properties, these latter properties, according to Kim, preempt the causal powers of the former ones. However, this would be the case with any kind of supervening property, whose causal powers would be preempted by the subvenient properties. Since all special sciences properties supervene on basic physical properties we can either reiterate the argument again and again showing that only subatomic particles have causal powers, or we can stop worrying about mental causation because, for instance, there seems to be no problem for biological or chemical causation (12).

Kim thinks that his argument does not generalize. What is essential is to distinguish between "levels" and "orders". "Levels" are the proper way to individuate differences of scale. For instance, physics and chemistry are placed at different levels, and so their objects of study. On the other hand, Kim's arguments apply to "orders", these one defined as those that, while referring to the same entities or individuals pertaining to one and the same level, pick up properties differentiated by their increasing specificity, as is the case with colours as opposed to *primary* colours. So, it is essential to keep in mind the difference between levels and orders. As Kim says: "*..a second-order property and its realizers are at the same level in the micro-macro hierarchy; they are properties of the very same object*" (Ibid., p. 82), where the micro-macro hierarchy refers to differences of levels. For instance, if I have the belief that *p*

and the realizer of this mental state of mine is the neural state  $n$ , it is always a property of mine that of being in the neural state  $n$ . Because both properties are referred to the same individual, there is no passage from personal to sub-personal level and no movement from macro to micro; these two properties are at the same *level* even if they are of different *order*. The generalization argument, then, fails because it confuses levels with orders. Kim's argument against the causal powers of mental properties is not intended to show that properties at a lower level preempt the causal powers of properties at an higher level, rather that second *order* properties do not have their own causal powers, because these are preempted by their first order properties.

Kim argues that the illusion of the movement in the micro-macro hierarchy is generated by the fact that in many interesting cases second order properties are *micro-based* or *microstructural properties*. A micro-based property is "a property of a whole .. characterized in terms of its microstructure .. [that is] at the same level as those [properties] it realizes" (Ibid., p. 82). Specifically, a micro-based property is "the property of having such-and-such proper parts that have such-and-such properties and are configured by such-and-such relations" (Ibid., pp. 85-6) [\(13\)](#) . In this sense, a micro-based property is a property which is at the same level of its first order realizer [\(14\)](#) . Now, are mental properties micro-based or not?

On the one hand, as you may remember from the definition of second order properties, Kim says that these are at the same level of their realizers. So, primary colours are defined over the set of colours (and jade over the set of minerals), and they are all at the same level, even if of different order. On the other hand, for that matter mental properties he specifically says: "When mental properties are to be generated out of **B** as second order properties (where **B** is the set of first order base properties), we must of course take **B** to consist of nonmental properties (including physico-chemical, biological, and behavioral properties)" (Ibid., p. 20).

If we follow the first line of definition, what I would call the *same-level* line of definition, we have to define intentional states, the only one we can take into account given the argument in the preceding section, as mental states satisfying the further condition of having representational content. In this case, we have to postulate mental states in order to individuate intentional states. So, this interpretation encounters one difficulty. Since first order states must have causal powers, they are the ones that preempt the causal powers of the second order states for which they form the proper base, then mental states must be granted with causal powers, the opposite of what Kim wanted to argue. But there is a second difficulty: because of the very process of identification, according to which no kind of state has to be considered intrinsically second order, and given Kim's admission that first order states do have causal powers, either all kinds of state have causal powers, excluding the ideally highest one, or none has, excluding the ideally lowest one. Since Kim wants to defend the causal efficacy at many levels, not only at the microphysical one, causal efficacy must be granted also for mental states with the exception of the ideally highest ones, whatever they are.

Alternatively, if we follow what I would call the *different-level* line of definition, then the proper parts into which a mental state has to be decomposed are, as suggested by Kim himself, the neurons, modulators, behavioural states and the like that are tokened when a mental state is tokened. Now, does the

identification of second order properties with micro-based properties shows their causal inefficacy? In general, the answer is negative. Consider the property of being a *water molecule* or, better, an *H<sub>2</sub>O molecule*. This is a micro-based property because it is the property of having two hydrogen atoms and one oxygen atom in a certain bonding relation (cf. *Ibid.*, p. 84). Because of this relation, the micro-based property has causal powers that its proper parts do not have (15). Consider now the property of being an ice cube. This is a *second order micro-based property* because it is the property of being an aggregate of H<sub>2</sub>O molecules satisfying the further condition of being in a certain energetic state (the energetic state determines the degree of aggregation among molecules). As such, being an ice cube has different causal powers from being a water drop or a steam flow. The micro constituents are the same, what changes is their relation (16). Hence, second order properties have causal powers given the particular relations that hold among their constituents. In the case of a micro-based property *the parts realize the base property and the further condition is realized by the relations that hold among the parts*. Could the same reasoning be applied to mental states?

Kim thinks the answer is in the negative because "the causal role of a mental property had by me is threatened with preemption by another property, a neural property, also had by me" (*Ibid.*, p. 117). What is the difference with a physical micro-based property? Here is Kim's answer: "The causal powers of the supervenient property *P* may be fixed or determined by the causal powers of the properties and relations *P*<sub>1</sub>, *P*<sub>2</sub> ... *P*<sub>*n*</sub>, *R*, that figure in *P*'s construction as a micro-based property, but they need not be, and are not likely to be, *identical* with the causal powers of these constituent properties and relations" (*Ibid.*, p. 116-7). However, few lines below Kim adds "micro-based properties ... supervene on *specific mereological configurations* involving these microproperties" (*Ibid.*, p. 117). The idea is that specific configurations involving part/whole relations (i.e. mereological) of a higher level property which can be construed as micro-based completely determine its causal powers. So, the causal powers of a micro-based property are completely determined by its constituents and the relations holding among such constituents. Now, as far as I can see, there is no reason for not applying the same reasoning to mental properties. The causal powers of any mental state of mine are determined by the causal powers of the specific neurological configurations that realize it, even if, given the multiple realizability, they are not identical to such powers.

What reasons could have Kim for not accepting this interpretation? One is denying that a neural state could be identified with the microconstituents of a mental property interpreted as micro-based, the other is that both the mental and the neural properties pertain to the same level, and so we would have overdetermination. Both reasons can be discarded. When I have a mental state, so realizing a mental property, the subvenient physical state most probably correlated with it is the neural state present in the very moment that mental state is present. Because the neural states consist in the activation of many connected neurons, it is natural to consider the supervening mental states as micro-based in this sense. This is compatible with Kim's view. He says that "mental properties ... are macroproperties supervening on microproperties" (*Ibid.*, p. 18) and the relation among macroproperties and microproperties seems perfectly well matching with the idea of mental states as micro-based.

On the other hand, Kim could disregard the supposed identity of mental

states and physical states for that matters levels as plausible. But consider: the causal powers of an electric field in a given instance are completely determined by the causal power of the specific configuration of electrons that realizes it in that very moment, configuration that has to be considered as a whole. The causal powers of the electric field are determined by the causal powers of the specific configuration of electrons that realizes it. However, if that electric field is realized, then that specific electrons' configuration is realized.

So on both lines of definition either the generalization argument applies, and there are no causal powers beyond microphysics, or we should credit mental properties of causal powers.

## **6. Conclusion**

We have two main results: from the epistemological side we have seen that multiple realizability is compatible with the view that the universe is a physically closed system and that the epistemological interconnection between particular causal relations and general assertions concerning them is such that it is no possible to make sense of the firsts without invoking the seconds. On the metaphysical side I argued that functionalization is not a sufficient process for having metaphysical reduction. At most, through the functionalization process one can obtain an epistemological reduction just of intentional states. This means that Kim's project has failed because he thinks that epistemological solutions leave the metaphysical problem of the mind-body relation untouched.

Finally, I have tried to show that so-called generalization argument is another serious menace to Kim's program because either shows that Kim has to credit mental states with causal powers or that there are no causal powers beyond the domain of microphysics. In particular, mental properties have to be conceived as micro-based properties. So conceived, these properties have two degrees of freedom: one concerning the constitutive elements and their properties, the other concerning their relations.

So, not only second order properties have not being reduced. On the contrary, they still have causal powers and, most of all, play an essential role in most of our mental life.

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## NOTES

(1) Page numbering without further indication refers to this book.[back](#)

(2) As Kim himself says: "distinct properties must represent distinct causal powers" (Kim 1988, p. 103).[back](#)

(3) A definition of properties as causal powers along these lines can be found in

Shoemaker (1980).[back](#)

(4) See, for instance, Loar (1981).[back](#)

(5) Here I suppose that the second occurrence of "Jones" has a different reference from the first one, excluding suicide. I also exclude cases such as those imagined by Agatha Christie.[back](#)

(6) As Kim says: "For most purposes the 'or' that appears to disjoin predicates seems perfectly well understood as abbreviating sentence disjunctions; thus 'The ball is red or white' is short for 'the ball is red or the ball is white', and the semantic of sentences like this does not require disjunctive properties, like *being red v white*, any more than the sentence 'She ate a hamburger or a hotdog' requires disjunctive snacks" (Kim 1988, p. 107).[back](#)

(7) A point already made by Block (1997).[back](#)

(8) A similar point has been made by Block (1997) when he distinguishes between design properties and realization properties.[back](#)

(9) I am assuming for simplicity that each voter expresses a valid vote. Abandoning this assumption would increase the number of possibilities.[back](#)

(10) Here I am not considering the end of the universe, that would make the number finite for contingent reasons.[back](#)

(11) Local reductionism has been defended, among others, by Patricia Churchland (1986), Clifford Hooker (1981) and Berent Enç (1983).[back](#)

(12) I have reconstructed the argument following Kim's way (cf. Kim 1988, p. 112).[back](#)

(13) A more comprehensive definition is the following: "*P* is a *micro-based property* just in case *P* is the property of being completely decomposable into nonoverlapping proper parts,  $a_1, a_2, \dots, a_n$ , such that  $P_1(a_1), P_2(a_2), \dots, P_n(a_n)$ , and  $R(a_1, a_2, \dots, a_n)$ ." (Kim 1988, p. 84), where *ps* are parts' properties and *R* is the relation(s) holding among them.[back](#)

(14) The notion of "micro-based property" is equivalent to Armstrong's "structural property" (cf. Armstrong 1978, vol. 2 ch. 18).[back](#)

(15) Kim says that "Clearly, then *macroproperties can, and in general do, have their own causal powers, powers that go beyond the causal powers of their microconstituents.*" (Kim 1988, p. 85). So to say, among the causal powers of an oxygen atom there are those that we may appreciate when it is combined with two atoms of hydrogen, but these causal powers can be appreciated only when such combination is realized.[back](#)

(16) Suppose now that the relation that holds among these parts is nomologically necessary. In case of a water molecule this necessity is determined by physico-chemical laws. When a mental state is analysed in these terms, what is the scientific theory that determines the relation? Secondly, is the relation necessary? What Kim has failed to recognize is that both the process of functionalization and the micro-based view of properties favour a relational view of causal powers. In this perspective, being a water molecule is a second order property with respect to its micro constituents, because it is the property of having proper parts having certain properties in a relational bonding, where is the combination of the properties of the parts plus the nature of the bonding which confers to the molecule its causal powers. What is essential to notice is that having a certain

relation is not a property of the parts, but of the way they are combined together. This makes having a certain relation a property, a relational property, if considered at the higher order.[back](#)

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