

## ***More on Global Supervenience***

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Global supervenience is seen as an important version of non-reductive materialism. It is especially attractive for non-reductivists with anti-individualistic inclinations. But there are also worries that global supervenience falls short of establishing important aspects of a material picture of the mind. Jaegwon Kim<sup>1</sup>, for example, argues that there are non-materialist scenarios that are compatible with global supervenience. More recently, Paull and Sider<sup>2</sup> and Terence Horgan<sup>3</sup> attempt to defend global supervenience from these charges. I argue that their defense is only partially successful. It succeeds in meeting one challenge to global supervenience, but fails to meet others. I then suggest that global supervenience can be salvaged if it is combined with weak supervenience. The combination of global and weak supervenience, I argue, is a serious option for non-reductive materialists who are also anti-individualists.

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<sup>1</sup>Kim 1987, 1989.

<sup>2</sup>Paull and Sider 1992.

<sup>3</sup>Horgan 1993.

## I

Let us start with a quick review of the familiar concepts of supervenience, as defined by Kim<sup>4</sup>. Given a set of properties M and a set of properties P, we would say that M *strongly supervenes* on P just in case:

Necessarily, for any object x and any property  $M_i$  in M, if x has  $M_i$ , then there exists a property  $P_j$  in P such that x has  $P_j$ , and, *necessarily*, if any object y has  $P_j$ , it has  $M_i$ .

The P properties are meant to be complex. Complex properties are disjunctions of maximal properties, where a maximal property is a conjunction of “simple” properties or their negations. For example, assume that the set P consists of  $P_1$ ,  $P_2$ , and  $P_3$ . One *maximal property*  $P^*$  is  $P_1 \ \& \ -P_2 \ \& \ P_3$  (there are eight such maximal properties), and a complex property is a *disjunction*,  $\vee(P_1^*, \dots, P_n^*)$ , of one or more such maximal properties.

We would say that M *weakly supervenes* on P just in case:

Necessarily, for any object x and any property  $M_i$  in M, if x has  $M_i$ , then there exists a property  $P_j$  in P such that x has  $P_j$ , and if any object y has  $P_j$ , it has  $M_i$ .

The only difference between the two definitions is the second 'necessarily' in the definition of strong supervenience. The first 'necessarily', which appears in both definitions, establishes *intra-world* correlations between  $M_i$ s and  $P_j$ s; namely, that any two inhabitants of a world w who have the same property  $P_j$  must also have the same property  $M_i$ . The second modal operator, which occurs only in the definition of strong supervenience, establishes *across-world* correlations between  $P_j$ s and  $M_i$ s; namely, that any two inhabitants of *any* worlds who have the same property  $P_j$  must have the same property  $M_i$ . Since weak supervenience lacks the second modal operator, it cannot guarantee that the intra-world correlations between  $P_j$ s and  $M_i$ s also hold across worlds.

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<sup>4</sup>Kim 1984.

Both concepts of strong and weak supervenience are meant to capture 'local' dependency relations, that is, relations between the M and the P properties of *individuals*. As such, strong and weak supervenience differ from *global supervenience*, the claim that a set of M properties supervenes on a set of P properties just in case:

Any two worlds that are indiscernible with respect to their P properties are also indiscernible with respect to their M properties.

What makes this supervenience relation "global" is that the dependency relation is defined over the distribution of properties in the set of all individuals in a world (throughout space and time) rather than in a single individual. For example, assume that there are only four P properties,  $P_1$ ,  $P_2$ ,  $P_3$ , and  $P_4$ , and only three M properties,  $M_1$ ,  $M_2$ , and  $M_3$ . Also consider a world  $w$  with only three individuals,  $x$ ,  $y$ , and  $z$ , such that  $x$  has  $P_1$  and  $M_1$ ,  $y$  has  $P_2$  and  $M_2$ , and  $z$  has  $P_3$  and no M properties. Global supervenience is the claim that in every world  $w_i$  with three individuals,  $x'$ ,  $y'$  and  $z'$ , such that  $x'$  has  $P_1$  (and no other P property),  $y'$  has  $P_2$ , and  $z'$  has  $P_3$ , it must be the case that  $x'$  has  $M_1$  (and no other M property),  $y'$  has  $M_2$ , and  $z'$  has no M properties.

It is by now familiar that, at least in the psychophysical context, global and strong supervenience differ only if we delimit the sets of physical and mental properties<sup>5</sup>. Imagine, for example, that the *relational* physical properties of an object include its spatio-temporal relations with all other objects, its causal relations with all other objects, and its causal history. In such case, *no* two individuals in a world could have the same physical properties. Moreover, no two individuals in different worlds could have the same properties unless the worlds are physically indiscernible. Weak supervenience becomes, then, trivially true (for there are no two objects alike in their physical properties), whereas strong supervenience collapses into global supervenience. It thus seems that strong and weak supervenience can

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<sup>5</sup> For a detailed discussion of this issue see Macdonald, 1989, pp. 194-197, and Kim 1993.

keep the 'locality' dimension which they were meant to capture only when defined over *selected* properties.

One way to select the sets of P and M properties is to consider only monadic properties or intrinsic properties of individuals. This restriction, however, makes the concepts of supervenience vacuous for anyone who thinks that the M or P properties are essentially individuated by their *relations* to the individual's environment. A better proposal is to define the supervenience relations over sets of qualitative or kind properties (e.g., the ones expressed by causal laws). This proposal puts the local notions of supervenience back to work. As we will see shortly, it even leaves room for a real difference between strong and global supervenience. In addition, the proposal locates the concepts of supervenience close to the familiar pictures of inter-theoretic reduction in where reduction is seen as a relation between *kinds*. In short, it seems that it is more fruitful to attempt to characterize the determinative relations between physical and mental qualitative (or kind) properties. This is the strategy taken by Paull and Sider and by Horgan, and I adopt it here. In what follows, then, 'properties' refer to qualitative or kind properties, unless explicitly stated otherwise.

## II

Strong supervenience is a good candidate for capturing the determinacy relations between physical and mental properties. It captures the materialist's idea that the mental properties of individuals are determined by their physical properties. It is compatible with reductionism: bridge laws of the form  $(x)(P_i x \leftrightarrow M_i x)$  require, at a minimum, that the  $M_i$ s *strongly* supervene on the  $P_i$ s. It is also compatible with non-reductivism: in Fodor's version of token physicalism, for example, mental properties strongly supervene on, but are not reducible to,

physical properties<sup>6</sup>. Strong supervenience is incompatible, however, with the influential conviction that mental properties are typically extrinsic whereas physical properties are intrinsic. The view that mental properties are extrinsic is often equated with anti-individualism - the claim that mental states are essentially individuated by their relations to the individual's environment (e.g., by causal histories). The view that physical properties are intrinsic is motivated by the view that physical phenomena are somehow grounded in the intrinsic microphysical properties of individuals. Thus imagine, as before, that the world  $w$  inhabits only three individuals,  $x$ ,  $y$ , and  $z$ , such that  $x$  has  $P_1$  and  $M_1$ ,  $y$  has  $P_2$  and  $M_2$ , and  $z$  has  $P_3$  and no  $M$  properties. Also consider a world  $w'$  with three individuals  $x'$ ,  $y'$  and  $z'$ , such that  $x'$  has  $P_1$ ,  $y'$  has  $P_2$ , and  $z'$  has  $P_4$ . You can think of  $P_3$  as  $H_2O$  and of  $P_4$  as  $XYZ$ . Assuming that the  $P$ s are intrinsic and the  $M$ s are extrinsic, it is possible that  $y'$  has just  $M_3$  (e.g., the belief that twater is wet) whereas  $y$  has just  $M_2$  (the belief that water is wet). Strong supervenience is, however, incompatible with this scenario. According to strong supervenience, individuals with the same physical properties, such as  $y$  and  $y'$ , must have the same mental properties.

Global supervenience does better with anti-individualistic scenarios like this one. Global supervenience allows individuals to differ in their mental properties as long as the worlds are physically discernible. In our toy example,  $w$  and  $w'$  are physically discernible. Thus, according to global supervenience,  $y$  and  $y'$  may have different mental properties, even though they have the same intrinsic physical properties. Global supervenience is therefore compatible with the scenario in which  $y$  has only  $P_2$  and  $M_2$  in  $w$ , and  $y'$  has only  $P_2$  and  $M_3$  in  $w'$ . The example also shows that global supervenience is compatible with the denial of bridge psychophysical laws, for  $P_2$  is co-extensive with  $M_2$  in  $w$  but with  $M_3$  in  $w'$ . Thus global supervenience is compatible with non-reductivism.

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<sup>6</sup> See Fodor 1974. Fodor's idea is that mental kinds  $M_i$ s are co-extensive with disjunctions of physical kinds  $P_j$ s.  $M_i$  strongly supervenes on  $VP_j$  because whenever an object instantiates one of the disjuncts  $P_j$  it also instantiates  $M_i$ .  $M_i$  is not reducible to physical kinds because the  $VP_j$ s, as disjunctions of physical kinds, are not kinds by themselves (or so Fodor claims).

The complaint against global supervenience is that it does not establish the minimal determination relations between the mental and the physical that the materialist seeks. Global supervenience surely preserves *some* cross-world dependencies<sup>7</sup>. There are concerns, however, that it falls short of establishing *all* the dependency relations required by materialism. In "The Myth of Nonreductive Materialism", Kim points out that global supervenience is consistent with certain types of non-materialist scenarios. In what follows we will examine these concerns more closely. As others have shown, one concern can be dealt within the scope of global supervenience (section III). Other concerns, I will argue, cannot (section IV). These concerns can be eliminated if we combine global supervenience with weak supervenience (section V).

### III

It has been argued that global supervenience allows two worlds to differ radically in their mental properties, even if they differ only slightly in their physical properties. Kim asks us to imagine a world w that differs from ours in that "in that world one lone hydrogen atom somewhere in deep space is slightly displaced relative to its position in this world"<sup>8</sup>. Presumably, this slight difference should not make a difference in the distribution of mental properties. However, Kim argues, it is consistent with global supervenience there aren't any mental properties in w. Since our world and w are physically discernible, "they could, under global supervenience, differ radically from this world in psychological characteristics"<sup>9</sup>.

Philosophers have tackled with this problem in different ways. Kim introduces a

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<sup>7</sup>See Hellman and Thompson (1975) for a detailed analysis of the determination relation provided by (what is now called) global supervenience.

<sup>8</sup>Kim, 1989, p. 41. Kim relies here on an example given by Petrie (1987).

<sup>9</sup>Kim, 1989, p. 41.

similarity measurement into the definition of global supervenience<sup>10</sup>. He suggests replacing "indiscernability" with a notion of "similarity-degree" that encompasses many different dimensions. According to the revised version, a set of M properties globally supervenes on a set of P properties if:

Worlds that are pretty much alike in P properties are pretty much alike in M properties.

Thus, according to the revised version, worlds that differ in one displaced hydrogen atom may show only slight differences, if any, in their mental properties. Likewise, worlds that physically differ from ours only in that their 'water' refers to XYZ rather than to H<sub>2</sub>O differ in only some mental properties<sup>11</sup>.

Horgan suggests defining the notion of global supervenience over spatio-temporal regions instead of over worlds<sup>12</sup>. The strengthened notion, called *regional physical supervenience*, asserts that:

There are no two P-regions that are exactly alike in all qualitative intrinsic physical features but different in some other qualitative intrinsic features<sup>13</sup>.

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<sup>10</sup>Kim, 1987, pp. 325-27.

<sup>11</sup>Needless to say that we would have been happier with a more precise notion of similarity-basis. As Kim (1987) points out, however, the familiar counterfactual and semantic theories rest on no less vague notions of similarity. We have therefore no more reason to deny the viability of the revised definition of global supervenience than to reject those theories.

<sup>12</sup>Horgan, 1993, pp. 570-72.

<sup>13</sup>'Intrinsic' here refers to the region and not to the individuals in the region. Thus an individual may have a mental property that is extrinsic to the individual but intrinsic to the region.

It takes some effort to show that regional supervenience is incompatible with the hydrogen atom example, but the general idea is simple: Assume that no mental property in our world depends on the remote hydrogen atom. Then there is a P-region  $w$ ,  $R$ , that does not include the hydrogen atom but is like our world in all mental properties. Likewise, there is a P-region of  $\underline{w}$ ,  $\underline{R}$ , that is physically indiscernible from  $R$ , but is like  $\underline{w}$  in all mental properties. According to regional supervenience, however,  $R$  and  $\underline{R}$ , as two indiscernible regions must be mentally indiscernible. Thus it follows from regional supervenience that either (a) our world and  $\underline{w}$  are mentally indiscernible too or that, contrary to the assumption, (b) some mental properties are really dependent on the hydrogen atom. Thus either regional supervenience is inconsistent with the hydrogen-atom example (case (a)) or regional supervenience is consistent with a scenario in which the mental does depend on the physical (case (b)).

Paull and Sider point out that isolated regions of worlds may be, by themselves, possible worlds that should also satisfy the indiscernability requirement<sup>14</sup>. Their point, in other words, is that global supervenience is already very close, if not identical, to Horgan's notion of regional supervenience. They thus conclude, like Horgan, that the hydrogen atom example is inconsistent with global supervenience unless some mental properties are really dependent on the hydrogen atom<sup>15</sup>.

Overall, then, scenarios like the hydrogen atom example can be resolved within the scope of global supervenience. These scenarios do not challenge the improved versions of

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<sup>14</sup>Paull and Sider, 1992, pp. 841-47.

<sup>15</sup> Paull and Sider (1992, p. 842) also point out that the hydrogen atom problem is not peculiar to global supervenience. Consistent with *strong supervenience* is the scenario in which my twin physically differs from me only in having an extra neuron in his temporal lobe, but has no mentality whatsoever. Also consistent with *weak supervenience* is the scenario in which an inhabitant of our world differs from me in having an extra neuron in the temporal lobe, but has no mentality at all. This shows that the available concepts of supervenience do not capture an important feature of the dependency relation: that objects/worlds similar in their physical properties are also similar in their mental properties. It thus seems that we should also amend the definitions of strong and weak supervenience.



global supervenience, and, *pace* Paull and Sider, they do not even challenge global supervenience itself. It is also worthwhile to note that the improved versions of global supervenience still accommodate anti-individualistic intuitions. Take, for example, regional supervenience. According to it, my twin and I must have the same intrinsic mental properties (assuming that our bodies conform P-regions), but we can differ in our extrinsic qualitative mental properties (since the environments are different).

#### IV

A second difficulty with global supervenience is that it imposes no intra-world dependency relations: "it is consistent with global supervenience for there to be two organisms in our actual world which, though wholly indiscernible physically, are radically different in mental respects... This is consistent with global supervenience because there might be no other possible world that is just like this one physically and yet differing in some mental respects"<sup>16</sup>.

My aim in this section is to point out that the improved versions of global supervenience cannot resolve this difficulty. Kim's version surely does not help here. Kim's similarity measurement is defined across worlds, not within a world. But the individuals in the example inhabit the same world. According to Horgan's regional supervenience, the two organisms, as two identical P-regions, must have the same intrinsic mental properties. Still, the two organisms may differ radically in their extrinsic mental properties. When the organisms inhabit distinct P-regions (e.g., different rooms, cities, or countries), their mental properties (which are intrinsic to these regions) may differ radically, since, by assumption, the P-regions are physically discernible. And when the two organisms inhabit the same P-region (e.g., they stay in the same city), then, as two *distinct* individuals in the same P-

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<sup>16</sup> Kim, 1989, p. 42.

region, the two organisms may also have very different mental properties.

Paull and Sider correctly claim that a world that consists of one isolated organism must have, according to global supervenience, the same mental properties as the world consisting of the other isolated organism<sup>17</sup>. From this they rightly conclude that the two organisms (in our world) must have the same intrinsic mental properties. But what about the organisms' extrinsic mental properties? Paull and Sider suggest that the case here is analogous to the hydrogen-atom example. If the extrinsic mental properties are different, then "the supervening properties do depend on the base properties, albeit in a rather strange way"<sup>18</sup>. But the case is actually different. The problem is not that the mental does not depend on the physical, but that the mental does not depend on the physical *uniformly*. The problem, in other words, is that global supervenience is consistent with scenarios where the mental properties of the two organisms depend on the same physical properties in different ways. For example, it is consistent with global supervenience that organism<sub>1</sub> has an extrinsic mental property M by virtue of organism<sub>2</sub>'s intrinsic physical property P, but organism<sub>2</sub> does not have M although organism<sub>1</sub> has P. When a world w includes both organisms, then organism<sub>1</sub>, but not organism<sub>2</sub>, may have M because the organisms are two *distinct* individuals of this world (global supervenience can only ensure that, in a physically indiscernible world to w, organism<sub>1</sub> but not organism<sub>2</sub> has M). And when w includes only one of the organisms, then this organism does not have M. Thus w is mentally indistinguishable from any physically indistinguishable world that includes the other organism.

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<sup>17</sup>Paull and Sider, 1992, pp. 846-47.

<sup>18</sup>Paull and Sider, 1992, p. 846.

Global supervenience is actually also consistent with scenarios where mental properties do not depend on physical properties at all. It is consistent, for example, with the possibility that we have in our world nonmaterial creatures such as ghosts, angels, nonmaterial souls and the like. Global supervenience ensures that worlds which are physically indiscernible are also mentally indiscernible, but it does not ensure that all *individuals* in these worlds must have physical properties. In fact, it does not even ensure that there are *any* physical properties in these worlds! Horgan's, as well as Paull and Sider's, versions of global supervenience face the same problem. They can guarantee only that individuals with the same (intrinsic) physical properties have the same (intrinsic) mental properties, but they fail to exclude the cases where the individuals have no physical properties at all. At best, they guarantee that individuals with no physical properties will have the same mental properties. But this is a far cry from what we demand from a materialist picture of the mind.

## V

We have observed that global supervenience fails to account for important local dependency relations. There is, however, a way out of these difficulties. We can simply complement global supervenience with weak supervenience. It is not hard to see why weak supervenience is incompatible with the problematic local scenarios. According to weak supervenience, two individuals with the same subvenient properties that inhabit the same world *must* have the same supervenient properties. Thus if organism<sub>1</sub> and organism<sub>2</sub> have the same physical properties, as we assumed they do, they must also have the same intrinsic and extrinsic mental properties. It is thus incompatible with weak supervenience that organism<sub>1</sub> has M and P but organism<sub>2</sub> has only P. It is also *inconsistent* with *weak* supervenience that individuals have mental properties without having physical properties. Weak supervenience ensures that every individual with mental properties also has physical

properties. It thus ensures that there are no non-material floating souls. Overall, then, the combination of global and weak supervenience is inconsistent with scenarios in which organisms that inhabit the same world are physically alike but mentally different, and with the cases where individuals have mental properties without having any physical properties. Thus the global-weak picture looks quite promising.

It is important to see that the global-weak picture is still hospitable to anti-individualistic and non-reductive claims. Weak supervenience entails only intra-world dependency relations, and, as such, it is perfectly consistent with the anti-individualistic scenarios considered above, and in particular, with the case in which  $y$  has solely  $P_2$  and  $M_2$  in  $w$ , and  $y'$  has solely  $P_2$  and  $M_3$  in  $w'$ . Thus the conjunction of global and weak supervenience is consistent with the view that mental properties are extrinsic whereas physical properties are intrinsic. The combination of global and weak supervenience is compatible with non-reductivism, since, again, weak supervenience does not add any *cross-world* dependency relations to those entailed by global supervenience. We thus see that the combination of global and weak supervenience is weaker than strong supervenience. Strong supervenience entails both global and weak supervenience, but, as we now see, the combination of global and weak supervenience does not entail strong supervenience.

Before we can safely say that the global-weak picture is materialistically respectable we need to deal with another concern. Following Kim, one may argue that the global supervenience of the mental on the physical "cannot be a brute and unexplainable fact, something we would want to accept as a fundamental, primitive fact about the world"<sup>19</sup>. This is because, Kim thinks, "we would find global determination without local determination mysterious and difficult to understand"<sup>20</sup>. Likewise, it can be argued that the weak supervenience of the mental on the physical is difficult to understand without strong

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<sup>19</sup>Kim, 1987, p. 321.

<sup>20</sup>Kim, 1987, p. 322.

supervenience. It is mysterious how organisms that are physically alike can be mentally alike within a world but not across worlds. It thus seems that both the global and the weak supervenience of the mental on the physical cannot be explained unless the mental strongly supervenes on the physical.

There are two ways to meet this challenge. One is to argue that the *combination* of global and weak supervenience does capture primitive determinative psychophysical relations. Mental properties are determined partly by local physical features and partly by global physical features. Weak supervenience captures the local relations whereas global supervenience captures the global ones. Thus weak and global supervenience complement one another. The modal force of global supervenience ensures that twins (who presumably have the same psychophysical local relations) will have the same mental properties if the global relations are the same. The local force of weak supervenience ensures that individuals who live in similar environments and who are microphysically alike are also mentally alike.

The other way to meet the challenge is to admit that the global-weak determinacy relations are grounded in more primitive, strong determinacy relations, but to deny that this undermines the viability of the global-weak picture. Assuming that strong determinacy relations satisfy materialists, the concession guarantees that the global-weak picture is materialistically respectable. But the concession does not make the global-weak picture redundant. What is admitted is not that mental kinds strongly supervene on physical kinds, but that mental properties strongly supervene on the entire physical structure of the individual, where the entire physical structure includes physical relations to other individuals, physical histories, etc.. Such strong relations, as we saw, may be of little interest to anyone, since it is hard to believe that we can ever find two individuals with the same entire physical structure. The global-weak picture, in contrast, provides a characterization of the relations between mental and physical *kinds*, and, as such, it is of interest at least to those who study inter-theoretic and psychophysical reduction.

In sum, the combination of global and weak supervenience has much to commend it. It is no less materialistically respectable than strong supervenience. It is consistent with non-reductivism. And, unlike strong supervenience, it meets important anti-individualistic intuitions. The global-weak picture is therefore an important option available to non-reductive materialists who are also anti-individualists<sup>21</sup>.

### References:

- Fodor, J.A. (1974). "Special Sciences, or the Disunity of Science as a Working Hypothesis", *Synthese*, **28**: 97-115.
- Hellman, G. and Thompson, F. (1975). "Physicalism: Ontology, Determination, and Reduction", *Journal of Philosophy*, **72**: 551-564.
- Horgan, T. (1993). "From Supervenience to Superdupervenience: Meeting the demands of a Material World", *Mind*, **102**: 555-586.
- Kim, J. (1984). "Concepts of Supervenience", *Philosophy and Phenomenological Research*, **45**: 153-176.
- Kim, J. (1987). "'Strong' and 'Global' Supervenience Revisited", *Philosophy and Phenomenological Research*, **47**: 315-328.
- Kim, J. (1989). "The Myth of Nonreductive Materialism", *Proceedings and Addresses of the American Philosophical Association*, **63**: 31-47.
- Kim, J. (1993). "Postscripts on Supervenience" in Kim, J., *Supervenience and Mind*, (Cambridge: Cambridge University Press), pp.161-171.
- Macdonald, C. (1989). *Mind-Body Identity Theories* (London: Routledge).
- Paull, C.R. and Sider, T.R. (1992). "In Defense of Global Supervenience", *Philosophy and Phenomenological Research*, **52**: 833-854.
- Petrie, B. (1987). "Global Supervenience and Reduction", *Philosophy and Phenomenological Research*, **48**: 119-130.

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