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Physicalism and Supervenience: A Case for a New Sense of Physical Duplication

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Abstract: Physicalism is the view, roughly, that everything is physical. This thesis is often characterized in terms of a particular supervenience thesis. Central to this thesis is the idea of *physical duplication*. I argue that the standard way of understanding physical duplication leads—along with other claims—to a sub-optimal (and perhaps surprising) consequence for the physicalist. I block this consequence by shifting to an alternative sense of physical duplication. I then argue that physicalism is best characterized by a supervenience thesis that employs both the new sense of physical duplication and a new class of possible worlds.

Key Words: physicalism; mental-physical supervenience; physical duplication; nomological supervenience; metaphysical supervenience.

Physicalism is often characterized in terms of a particular supervenience thesis. I describe this thesis in detail in Section 1. Central to this thesis is the idea of *physical duplication*. I argue in Section 2 that the standard way of understanding physical duplication leads—along with other claims—to a sub-optimal (and perhaps surprising) consequence for the physicalist. In Section 3 I block this consequence by shifting to a new sense of physical duplication. Then, in Section 4, I argue that physicalism is best characterized by a supervenience thesis that employs both the new sense of physical duplication and a new class of possible worlds.

1. Physicalism, S-Physical Supervenience, and Mental-Physical Supervenience

Physicalism is the view, roughly, that everything is physical. Typically, this is interpreted as expressing, at the very least, the claim that everything supervenes on the physical. This latter claim is often expressed in terms of the following schematic thesis:

[Supervenience Physicalism] Any possible world of type *T* that is a minimal physical duplicate of our world is a duplicate of our world simpliciter.

This is a *global* supervenience thesis, given that it considers whole worlds rather than individuals in those worlds.¹

Four features of this thesis merit further explanation. First, the thesis makes explicit reference to *our world*. The physicalist does not wish to claim that physicalism is a necessary truth; there are possible worlds where, for example, minds float free from the physical. For this reason, the above thesis would be false if formulated in terms of any two possible worlds. By formulating the thesis in terms of our world, physicalism, if true, is true only contingently, in virtue of the way our world happens to be.² Second, the variable ‘*T*’ can take various values. It can range over metaphysically/logically possible worlds, i.e., those that are conceivable, non-

¹ For a discussion of the varieties of supervenience see McLaughlin (1995) and McLaughlin and Bennett (2011). I very briefly discuss individual supervenience theses at the end of Section 2.

² Horgan (1982, pp 34-35) and Lewis (1983, p 362) made this point early on. Chalmers (1996), Jackson (1998), and Stoljar (2010) each formulate supervenience theses in this way.

contradictory,³ it can range over nomologically possible worlds, i.e., those that are consistent with our world's laws of nature, and so on.

Third, and as already noted, the thesis involves the idea of *physical duplication*. According to Frank Jackson (1998), “a physical duplicate of our world is a world that ... is exactly like our world in every physical respect (instantiated property for instantiated property, law for law, relation for relation)” (p 13). For David Chalmers (1996), a physical duplicate of our world is a world that is identical to our world with respect to all physical facts, where “all physical facts” are “all facts about the instantiation of physical properties within the spatiotemporal manifold” (p 33). He goes on to write, in agreement with Jackson, that “the world’s physical facts include its basic physical laws” (p 33).⁴ Abstracting from these two sources, I will understand physical duplication as follows:

Physical Duplication (def): a possible world w is a physical duplicate of our world if and only if w (i) has all the same instantiations of physical properties and relations as our world and (ii) has all of our world’s basic physical laws.⁵

Fourth, the above thesis is formulated in terms of *minimal* physical duplication. The reason for this is fairly straightforward. The physicalist claims that everything in our world is physical. As noted above, this is consistent with there being other

³ Friends of *a posteriori* necessities believe that the realm of metaphysically possible worlds is narrower than that of logically possible worlds, and so would distinguish metaphysical from logical possibility. To simplify matters, I will ignore this distinction in what follows. My arguments in no way depend on my doing so.

⁴ Chalmers notes that, on some accounts, the basic physical laws are determined by the totality of the particular physical facts. I will not deal with such accounts in this paper.

⁵ This closely resembles the understanding of physical duplication found in Melnyk (2003). For Melnyk, a world is a physical duplicate of our world if and only if it has (a) exactly the same distribution of physical tokens as our world and (b) exactly the same laws of physics as our world (p 51).

possible worlds containing things that are not physical (for example, ectoplasm, angels, ghosts). Because ectoplasm, angels, and ghosts can be epiphenomenal with respect to the physical, there are possible worlds containing such (epiphenomenal) entities that are nevertheless physical duplicates of our world. The physicalist must deny that these worlds are duplicates of our world *simpliciter*, given that she denies that our world contains such non-physical entities. Daniel Stoljar (2010) refers to this problem as the ‘epiphenomenal ectoplasm problem.’

In response to this problem, Jackson (1998) restricts the scope of the physicalist’s supervenience thesis so that it concerns worlds that contain all and *only* that which is required to be a physical duplicate of our world. That is, he shifts from ‘physical duplication’ to ‘minimal physical duplication’:

Minimal Physical Duplication (def): a possible world *w* is a minimal physical duplicate of our world if and only if *w* (i) has all the same instantiations of physical properties and relations as our world, (ii) has all of our world’s basic physical laws, and (iii) *has nothing more*.

A minimal physical duplicate of our world will not contain any epiphenomenal ectoplasm, angels, or ghosts. It is *this* kind of world that the physicalist claims is a duplicate of our world *simpliciter*.⁶

Physicalism is often discussed relative to some particular set of properties, *S*. Using the framework provided above, to claim that *S*-properties are physical is to endorse the following schematic thesis:

⁶ Chalmers (1996) offers a different solution to the epiphenomenal ectoplasm problem. He takes the physicalist to claim that any physical duplicate of our world has all the *positive facts* of our world, as opposed to being a duplicate of our world *simpliciter*. This allows such worlds to have *extra* positive facts, including facts concerning epiphenomenal ectoplasm, angels, and ghosts. This solution does not make use of the notion of ‘minimal physical duplication.’

[S-Physical Supervenience] Any possible world of type *T* that is a minimal physical duplicate of our world is an S-duplicate of our world.

An important kind of S-physical supervenience thesis—one that will play a significant role in later sections of this paper—is a mental-physical supervenience thesis:

[Mental-Physical Supervenience] Any possible world of type *T* that is a minimal physical duplicate of our world is a *mental duplicate* of our world.

Most philosophers take physicalism about the mind to be committed to metaphysical mental-physical supervenience. That is, the relevant possible worlds are those that are metaphysically possible. Those characterizing it in this way include Chalmers (1996), Jackson (1998), Kallestrup (2006), Braddon-Mitchell and Jackson (2007), Bennett (2008), and Stoljar (2010).

The primary reason for this is that a mere nomological mental-physical supervenience thesis cannot rule out naturalistic dualism of the sort defended by Chalmers (1996).⁷ For Chalmers, there are basic psycho-physical laws that exist alongside our world's basic physical laws. These basic psycho-physical laws determine the way that mental properties relate to physical properties in our world. If this kind of dualism were correct, then all nomologically possible worlds would have our world's basic psycho-physical laws. Thus, any nomologically possible world that is a minimal physical duplicate of our world would be a mental duplicate of it as well.

⁷ By a 'mere' nomological mental-physical supervenience thesis I mean to express the thesis that the mental nomologically supervenes on the physical, but does not supervene on the physical in any stronger sense.

That is, naturalistic dualism is consistent with mere nomological mental-physical supervenience.⁸

The physicalist thus adopts the following metaphysical mental-physical supervenience thesis:

[Metaphysical Mental-Physical Supervenience] Any metaphysically possible world that is a minimal physical duplicate of our world is a mental duplicate of our world.

This thesis is certainly incompatible with naturalistic dualism.

I will return to physicalism about the mind at the end of Section 3. Until then, I will focus on the schematic S-physical supervenience thesis given above.

2. A Sub-Optimal Consequence for the Physicalist

The physicalist believes that all of our world's basic laws are physical laws; she thus rejects the naturalistic dualist's claim that there are basic psycho-physical laws. In addition, she would appear to believe that these basic laws—plus, perhaps, the instantiations of physical properties and relations in our world—determine all of our world's non-basic laws. She would appear to believe, for example, that the laws of

⁸ It might be thought impossible for a *minimal* physical duplicate of our world to have non-physical laws, and thus to have basic psycho-physical laws. Interestingly, if this is correct, then the truth of naturalistic dualism would make a mere nomological mental-physical supervenience thesis (formulated in terms of 'minimal physical duplication') *vacuously* true, for no nomologically possible world could be a minimal physical duplicate of our world. But perhaps minimal physical duplication should be understood as ruling out only additional non-physical *entities* (e.g., ectoplasm and ghosts), not non-physical entities and non-physical *laws*. So understood, a minimal physical duplicate of our world could have basic psycho-physical laws. I do not think much rides on this point and so will not pursue it any further here. (Notice that this issue does not arise if Chalmers' solution to the epiphenomenal ectoplasm problem is adopted.)

biology are determined by, but not necessarily reducible to, our world's basic physical laws. To deny this would be to claim that the laws of biology somehow "float free" from the laws of physics, or, to use a helpful metaphor from Chalmers (1996), that once God fixed all the physical facts of the world, he had to do *something more* in order to fix all the biological facts of the world. On the contrary, the physicalist maintains that there is nothing over and above the physical.⁹ This suggests that the following claim is true:

[Non-Basic Laws] If physicalism is true, then any possible world that is a minimal physical duplicate of our world is a duplicate of our world with respect to non-basic laws.¹⁰

Next, consider a possible world w that is a minimal physical duplicate of our world. Because w is a minimal physical duplicate of our world, w has all of our world's basic physical laws. Moreover, given [Non-Basic Laws], the physicalist ought to conclude that w is a duplicate of our world with respect to non-basic laws as well. But if w has all of our world's basic physical laws and non-basic laws, then the physicalist must conclude that w is a duplicate of our world with respect to laws (basic or non-basic), and so is a nomologically possible world. Because nothing specific was assumed about w , other than its being a minimal physical duplicate of our world, it follows that:

⁹ Both Chalmers (1996, p 41) and Bennett (2008, p 282) use the 'nothing over and above the physical' locution when characterizing physicalism.

¹⁰ If one prefers Chalmers' solution to the epiphenomenal ectoplasm problem over Jackson's, then [Non-Basic Laws] can be altered as follows: if physicalism is true, then any possible world that is a physical duplicate of our world has all of our world's non-basic laws (and perhaps other laws as well).

[Consequence 1] If physicalism is true, then any possible world that is a minimal physical duplicate of our world is a nomologically possible world.¹¹

From this it immediately follows that, if physicalism is true, there are no metaphysically possible, but nomologically impossible, worlds that are minimal physical duplicates of our world. That is, [Consequence 1] implies:

[Consequence 2] If physicalism is true, then any metaphysically possible world that is a minimal physical duplicate of our world is a nomologically possible world.

I suspect that a significant number of philosophers (physicalists and non-physicalists alike) will be surprised by [Consequence 2]. (Although no doubt many philosophers will not be surprised by it.) That is, they will be surprised that the physicalist is committed to the impossibility of nomologically impossible worlds that are minimal physical duplicates of our world. After all, the possibility of such worlds seems implicit in the very distinction between metaphysical and merely nomological S-physical supervenience theses. If [Consequence 2] is true, then, in the hands of a physicalist, a metaphysical S-physical supervenience thesis is true if and only if the

¹¹ Similar reasoning, when combined with the previous footnote's alternative formulation of [Non-Basic Laws], yields a formulation of [Consequence 1] that differs only in its omission of the word 'minimal.' Because a physical duplicate, *w*, of our world has all of our world's basic physical laws and, according to the physicalist, non-basic laws, any additional laws that it might have must be compatible with our world's laws. Consequently, all the laws of our world will hold in *w*, which is just to say that *w* is a nomologically possible world.

corresponding nomological S-physical supervenience thesis is true.¹² This is the main point of this section and is the ‘sub-optimal consequence’ included in its title.

To see why this is so, compare a metaphysical S-physical supervenience thesis with a nomological S-physical supervenience thesis:

[Metaphysical S-Physical Supervenience] Any metaphysically possible world that is a minimal physical duplicate of our world is an S-duplicate of our world; i.e., if a metaphysically possible world is a minimal physical duplicate of our world, then it is an S-duplicate of our world.

[Nomological S-Physical Supervenience] Any nomologically possible world that is a minimal physical duplicate of our world is an S-duplicate of our world; i.e., if a nomologically possible world is a minimal physical duplicate of our world, then it is an S-duplicate of our world.

As per [Consequence 2], if physicalism is true, then all the worlds satisfying the antecedent of [Metaphysical S-Physical Supervenience] are nomologically possible worlds; they are also worlds that are minimal physical duplicates of our world.

Trivially, all the worlds satisfying the antecedent of [Nomological S-Physical Supervenience] are nomologically possible worlds; again, they are also worlds that are minimal physical duplicates of our world. Thus, if physicalism is true, both conditionals are such that their antecedents can be satisfied only by nomologically

¹² A metaphysical S-physical supervenience thesis and a nomological S-physical supervenience thesis *correspond* to one another if and only if they replace the variable ‘S’ with the same set of properties.

possible worlds that are minimal physical duplicates of our world. Because the consequents of the conditionals are identical, the two conditionals cannot differ in truth-values, if physicalism is true:

[Consequence 3] If physicalism is true, then a metaphysical S-physical supervenience thesis is true if and only if the corresponding nomological S-physical supervenience thesis is true.

As with [Consequence 2], I suspect that a significant number of philosophers will be surprised by [Consequence 3].¹³ But much more important than whether [Consequence 3] elicits surprise from philosophers is the fact that it is both sub-optimal and easily remedied. In the remainder of this section I will explain why [Consequence 3] is sub-optimal. I will offer a remedy in the following sections.

Ideally, physicalists should have at their disposal an S-physical supervenience thesis that can be made false by certain kinds of nomologically impossible worlds. As things currently stand, this is not the case. If physicalism is true, only nomologically possible worlds can satisfy the antecedent of an S-physical supervenience thesis.

To appreciate the point, consider shape and length. Properties of these types include: *being square* (as in ‘the box is square’), *being triangular* (as in ‘the metronome is triangular’), *being at least two feet tall* (as in ‘the box is *at least two feet tall*’), and *being less than six inches wide* (as in ‘the metronome is less than six inches wide’). These properties seem to be related to the physical in a more intimate way than other properties. Consider a possible world, w , at a time, t' , that is a duplicate of our world at a time, t , with respect to the instantiations of physical

¹³ I will offer a guess as to why this is so, assuming that it is, in Section 3.

properties and relations, but not necessarily with respect to basic physical laws.

Plausibly, w (at t') will be a duplicate of our world (at t) with respect to shape and length, *regardless* of whether w has our world's basic physical laws, and thus regardless of whether w (at t') is a minimal physical duplicate of our world (at t).¹⁴

Properties such as shape and length seem to be related to the physical in a way that is independent of physical law.

Consider, for example, our world at the current time, t . Our world (at t) is such that Earth has exactly one man-made structure that is *at least 2,722 feet tall*.¹⁵ Now consider a possible world, w , at a time, t' , that is a duplicate of our world at t with respect to the instantiations of physical properties and relations. Plausibly, w (at t') will be such that its "Earth" has exactly one man-made structure that is *at least 2,722 feet tall*, regardless of whether w has our world's basic physical laws.¹⁶ If so, then to fully capture the way in which such a property is related to the physical, one needs to reference nomologically *impossible* worlds. That is, one needs to claim that those nomologically impossible worlds that are duplicates of our world with respect to the instantiations of physical properties and relations are necessarily duplicates of our world with respect to properties such as shape and length.

Unfortunately, a metaphysical S-physical supervenience thesis is not up to this task. In the hands of the physicalist, such a thesis cannot be made false by nomologically impossible worlds. The physicalist thus lacks a supervenience thesis

¹⁴ Recall that for w to be a minimal physical duplicate of our world, w must have our world's basic physical laws.

¹⁵ According to *Wikipedia*, this is the Burj Khalifa skyscraper in Dubai.

¹⁶ It might be thought that some possible worlds that have different basic physical laws than our world will be unable, in virtue of this difference, to be duplicates of our world with respect to the instantiations of physical properties and relations. This seems plausible to me. My argument, though, only requires that *some* possible worlds that have different basic physical laws than our world are duplicates of our world with respect to the instantiations of physical properties and relations.

capable of expressing the fact that properties such as shape and length supervene on the physical in a stronger way than other properties.

The properties that I have in mind here include causal/functional properties. These properties are certainly not independent of physical law in the sense described above. Consider *mousetraps*, for example. Whether an object is a mousetrap depends upon its causal/functional powers; if it cannot catch mice, even when functioning properly, it is not a mousetrap. Importantly, an object's causal/functional powers are a function of *both* its intrinsic physical properties and the laws that govern it.

Consider a possible world, w , at a time, t' , that is a duplicate of our world at a time, t , with respect to the instantiations of physical properties and relations. This world will have (at t') a number of physical objects that are intrinsically identical to the many mousetraps that exist in our world (at t). But, due to differences in the laws governing these objects, these objects might fail to have the causal powers definitive of the causal/functional kind *mousetrap*, and thus these objects might fail to be mousetraps. That is, if the laws governing w are different from the laws governing our world, it is possible that the "mousetraps" in w (at t') will not behave as mousetraps as events unfold (after t'). *Being a mousetrap* is less intimately related to the physical than *being at least X feet tall*.

The main point of this section is that the physicalist cannot use either of the two S-physical supervenience theses listed above to capture this alleged difference. A nomological S-physical supervenience thesis is true when applied to *being a mousetrap*, but so too is a nomological S-physical supervenience thesis when applied to *being at least X feet tall*.¹⁷ Likewise, while a metaphysical S-physical supervenience thesis is true when applied to *being a mousetrap*, so too is a

¹⁷ A *mere* nomological supervenience thesis relating mousetraps to the physical will be false since such a thesis denies that mousetraps metaphysically supervene on the physical.

metaphysical S-physical supervenience thesis when applied to *being at least X feet tall*. The reason for this parity is that, if physicalism is true, the antecedents of these four theses are satisfied only by possible worlds that are nomologically possible. If physicalism is true, then what is true of metaphysically possible, but nomologically impossible, worlds cannot affect the truth-values of these theses.

I wish to stress that there is nothing to prevent one from moving beyond these theses in order to capture the relevant difference between, for example, *being square* and *being a mousetrap*. Indeed, I have just done so! This is the reason that I have characterized [Consequence 3] as ‘sub-optimal,’ as opposed to ‘problematic.’ But surely it would be preferable to be able to capture this difference with something very much like the above S-physical supervenience theses. Fortunately, there is a fairly easy way to achieve this, which I will explain in sections three and four.

Before doing so, however, I would like to make a brief point. While the above discussion has focused solely on global supervenience theses, similar points can be made with respect to individual supervenience theses. Such theses focus on possible individuals, rather than possible worlds. A definition of a ‘minimal physical duplicate of an individual’ is thus needed.¹⁸ From the conjunction of this definition and a stronger version of [Non-Basic Laws],¹⁹ consequences analogous to [Consequence 1], [Consequence 2], and [Consequence 3] can be derived.²⁰

¹⁸ Minimal Physical Duplication’ (def): a possible individual *y* is a minimal physical duplicate of an individual *x* in our world if and only if *y* (i) has all the same instantiations of physical properties and relations as *x*, (ii) is governed by all of the same basic physical laws as *x*, and (iii) has nothing more.

¹⁹ [Non-Basic Laws’] If physicalism is true, then any possible world that has our world’s basic physical laws has our world’s non-basic laws (and possibly other laws, basic or non-basic). This principle is stronger because it concerns all possible worlds that have our world’s basic physical laws, not merely those possible worlds that are minimal physical duplicates of our world. [Non-Basic Laws’] is certainly more contentious than its weaker counterpart.

²⁰ To illustrate, the analogue of [Consequence 1] is the following: if physicalism is true, then any possible individual that is a minimal physical duplicate of an individual in our world is a nomologically possible individual (i.e., is an individual who resides in a nomologically possible world).

3. Physical Duplication Versus Physical Duplication*

Consider a definition of ‘physical duplication’ that is weaker than the definition given in Section 1:

Physical Duplication* (def): a possible world w is a physical duplicate* of our world if and only if w has all the same instantiations of physical properties and relations as our world.

This alternative definition omits the second condition from the original. The two senses of physical duplication differ in only one respect: a physical duplicate* of our world need not have our world’s basic physical laws.²¹ Minimal physical duplication* is defined as follows:

Minimal Physical Duplication* (def): a possible world w is a minimal physical duplicate of our world if and only if w (i) has all the same instantiations of physical properties and relations as our world, (ii) has *some* set of basic physical laws,²² and (iii) has nothing more.

²¹ An anonymous referee points out that if, for example, *inhabiting a world in which the laws of thermodynamics hold*, counts as a physical property, then a possible world that is a minimal physical duplicate* of our world will consequently be a world where the laws of thermodynamics hold, in which case I cannot separate (as I wish to do) duplication of instantiations of physical properties and relations from duplication of basic physical laws. However, recall from Section 1 that physical duplication (unstarred) is standardly formulated in terms of both the duplication of instantiated physical properties and relations, on the one hand, and the duplication of basic physical laws, on the other hand. Given this, there appears to be implicit in the literature on supervenience and physicalism an understanding of physical property on which facts about the laws governing a world (or laws governing an entity in a world) do not count as physical properties of the world. Surely, more needs to be said on this topic. However, it seems that since I am using ‘physical property’ in the standard way, this task need not be undertaken in this paper.

²² This should be understood as including the empty set, for perhaps a possible world with all the same instantiations of physical properties and relations as our world can have no basic physical laws. I thank an anonymous referee for making this point.

Importantly, the physicalist has no reason to think that a minimal physical duplicate* of our world must be nomologically possible. A possible world with the same instantiations of physical properties and relations as our world might have basic physical laws that are incompatible with our world's basic physical laws. For this reason, shifting from physical duplication to physical duplication* gives the physicalist a potentially useful distinction between *a kind* of metaphysical S-physical supervenience thesis and *a kind* of nomological S-physical supervenience thesis:

[Metaphysical S-Physical Supervenience*] Any metaphysically possible world that is a minimal physical duplicate* of our world is an S-duplicate of our world; i.e., if a metaphysically possible world is a minimal physical duplicate* of our world, then it is an S-duplicate of our world.

[Nomological S-Physical Supervenience*] Any nomologically possible world that is a minimal physical duplicate* of our world is an S-duplicate of our world; i.e., if a nomologically possible world is a minimal physical duplicate* of our world, then it is an S-duplicate of our world.

The truth of physicalism is compatible with there being nomologically impossible worlds that satisfy the first conditional's antecedent; that is, physicalism is compatible with metaphysically possible, but nomologically impossible, worlds that are minimal physical duplicates* of our world. Of course this is not true of the second conditional's antecedent, for there can be no world that is both nomologically possible

and nomologically impossible. For this reason, the truth-values of these two conditionals/theses *can* differ, even if physicalism is true. [Metaphysical S-Physical Supervenience*], but not [Nomological S-Physical Supervenience*], can be made false by certain kinds of nomologically impossible worlds.

The move to physical duplication* thus yields a new strength of supervenience, viz., [Metaphysical S-Physical Supervenience*]. This thesis is stronger than [Metaphysical S-Physical Supervenience] in that the former can be false while the latter is true.

This thus solves the issue articulated in Section 2. Plausibly, [Metaphysical S-Physical Supervenience*] is true when instantiated with properties such as *being square* and *being at least two feet tall*. It is false, in contrast, when instantiated with causal/functional properties.²³ The physicalist now has a set of supervenience theses capable of expressing the fact that *being square* is more intimately related to the physical than *being a mousetrap*. In addition, [Nomological S-Physical Supervenience*], like [Nomological S-Physical Supervenience], is true when instantiated with *both* causal/functional properties and properties such as *being square* and *being at least two feet tall*.

Thus are the virtues of moving from physical duplication to physical duplication*. Indeed, I suspect that some philosophers have at times had the latter in mind when reading, writing, and speaking about S-physical supervenience. More specifically, I suspect that some philosophers have unconsciously *shifted* from physical duplication—when thinking, for example, about physicalism about the mind—to physical duplication*—when thinking about the distinction between metaphysical and

²³ Recall that [Metaphysical S-Physical Supervenience] is true when instantiated with both kinds of properties.

nomological S-physical supervenience theses. But whether this claim about usage is true is much less important than the optimality of shifting to physical duplication*.

This cannot, however, be the whole story, for neither [Nomological Mental-Physical Supervenience*] nor [Metaphysical Mental-Physical Supervenience*] can do the work required of it by the physicalist about the mind. First, [Nomological Mental-Physical Supervenience*] (like its un-starred counterpart) fails to rule out naturalistic dualism. The naturalistic dualist will agree that nomologically possible worlds that are minimal physical duplicates* of our world are mental duplicates of our world;²⁴ according to the dualist, such worlds will have our world's basic psychophysical laws.

Second, [Metaphysical Mental-Physical Supervenience*] (unlike its un-starred counterpart) unacceptably rules out *functionalism* in the philosophy of mind. Metaphysically possible worlds that are minimal physical duplicates* of our world need not have our world's basic physical laws. But differences in these laws could surely lead to causal/functional differences. Thus, if functionalism were true, such worlds could fail to be mental duplicates of our world, and thus [Metaphysical Mental-Physical Supervenience*] would be false. Although the physicalist is free to reject functionalism, physicalism should not be incompatible with functionalism.

Recall from Section 1 that [Metaphysical S-Physical Supervenience] (un-starred) *can* do the work required of it by the physicalist about the mind. It can be used to rule out naturalistic dualism without ruling out functionalism. My final task is to offer a starred thesis (i.e., one formulated in terms of physical duplication*) that can do the work of [Metaphysical S-Physical Supervenience], thereby offering the physicalist a uniform set of supervenience theses with which to articulate her views.

²⁴ See footnote eight for a complication.

4. Physi-Nomological S-Physical Supervenience

The key to this thesis is that it ranges over a new class of possible worlds, namely, those whose basic laws are exactly the same as our world's basic physical laws; for lack of a better term, I call such worlds 'physi-nomologically possible worlds.' These worlds need not be (minimal) physical duplicates* of our world, for they might differ from our world with respect to the instantiations of physical properties and relations. Moreover, they need not be nomologically possible worlds, for, if naturalistic dualism is true, they will lack our world's basic psycho-physical laws. The desired thesis is as follows:

[Physi-Nomological S-Physical Supervenience*] Any physi-nomologically possible world that is a minimal physical duplicate* of our world is an S-duplicate of our world; i.e. if a physi-nomologically possible world is a minimal physical duplicate* of our world, then it is an S-duplicate of our world.

[Physi-Nomological Mental-Physical Supervenience*], like [Metaphysical S-Physical Supervenience], rules out naturalistic dualism. A physi-nomologically possible world that is a minimal physical duplicate* of our world will not have our world's basic psycho-physical laws (if such laws exist). For this reason, if naturalistic dualism is true, such worlds might fail to be mental duplicates of our world. Moreover, [Physi-Nomological Mental-Physical Supervenience*], like [Metaphysical S-Physical Supervenience] is compatible with functionalism. A physi-nomologically possible world that is a minimal physical duplicate* of our world will be a

causal/functional duplicate of our world as well. Thus, if functionalism is true, such worlds will be mental duplicates of our world.

There is thus no significant cost to shifting from physical duplication to physical duplication*. [Physi-Nomological S-Physical Supervenience*] and [Nomological S-Physical Supervenience*] can do the work of [Metaphysical S-Physical Supervenience] and [Nomological S-Physical Supervenience], respectively. Moreover, the introduction of [Metaphysical S-Physical Supervenience*] solves the issue described in Section 2. There is thus good reason to shift to physical duplication*.

Of course the issue raised in Section 2 could be solved simply by supplementing [Metaphysical S-Physical Supervenience] and [Nomological S-Physical Supervenience] with [Metaphysical S-Physical Supervenience*]. Arguably, though, it is preferable to have a set of supervenience theses that are formulated in a common terminology. For this reason, I suggest that philosophers formulate S-physical supervenience theses in terms of physical duplication*.

5. Concluding Remarks

The resulting picture is one on which there are three main kinds of S-physical supervenience: metaphysical*, physi-nomological*, and nomological*. The physicalist about the mind should adopt either metaphysical or mere physi-nomological mental-physical supervenience*.²⁵ The naturalistic dualist should adopt mere nomological mental-physical supervenience*. Both the physicalist and the

²⁵ Identity theorists should adopt the former, non-reductive physicalists should adopt the latter.

dualist can adopt metaphysical S-physical supervenience* for properties such as *being square* and *being at least two feet tall*.

Finally, if the general thesis of physicalism is to be spelled out in terms of a single supervenience thesis, it should be formulated in terms of physi-nomological supervenience*, for otherwise it will rule out functionalism and other physicalist, yet non-reductivist, accounts of the mind. This leaves us with the following statement of physicalism:

[Supervenience Physicalism*] Any physi-nomologically possible world that is a minimal physical duplicate* of our world is a duplicate of our world simpliciter.

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