

Pereboom's Robust Non-reductive Physicalism

Abstract

Derk Pereboom has recently elaborated a formulation of non-reductive physicalism in which supervenience does not play the central role and realization plays no role at all; he calls his formulation "robust non-reductive physicalism". This paper argues that for several reasons robust non-reductive physicalism is inadequate as a formulation of physicalism: it can only rule out fundamental laws of physical-to-mental emergence by stipulating that there are no such laws; it fails to entail the supervenience of the mental on the physical; it appeals to two relations that are physicalistically unacceptable; and it rules out certain epistemically possible ways that the world might turn out to be according to current physics. This paper further argues that the difficulties faced by Pereboom's robust non-reductive physicalism can all be avoided if physicalism is instead formulated by appeal to a carefully-defined relation of realization.

In many attempts to formulate non-reductive physicalism, the central role has been played by supervenience (see, e.g., Jackson 1998, 6-21) or by realization (see, e.g., Boyd 1980).¹ In a recent book, however, Derk Pereboom has elaborated a formulation of non-reductive physicalism in which supervenience does not play the central role and realization plays no role; he calls his formulation “robust non-reductive physicalism” (Pereboom 2011; for his earlier version, see his 2002). To a first approximation, robust non-reductive physicalism consists of the following three claims:

P1 Mental types are not identical with either neural or microphysical types; and mental tokens are not identical with either neural or microphysical tokens (Pereboom 2011, 134).

P2 “...mental properties...are identical to broadly physical compositional properties, properties that things have solely by virtue of intrinsic features of their parts, either proper or improper, and relations these parts have to one another.” (Pereboom 2011, 148; see also 127).

What is distinctive about P2 is that it says that to have a mental property is to be in a state that itself has a certain internal structure. According to orthodox

¹ I endorse an objection to supervenience formulations of physicalism given in, e.g., Jessica Wilson’s (2005): supervenience formulations fail to suffice for physicalism, because supervenience might hold as a brute, modal fact between physical states and mental states dualistically conceived. To rule out this possibility, formulations of physicalism must invoke such relations as constitution, realization, or reduction (*pace* Brown and Ladyman 2009, 34). Robert Howell replies to the objection in his (2009).

functionalism, of course, to have a mental property is to be in a state that stands in certain causal relations to *other* states, and that therefore forms one element in a larger structure.

P3 “...each mental entity is constituted by...some microphysical entity.”

(Pereboom 2011, 171)

Under the heading of “entity”, Pereboom includes states, events, property instances, and token causal powers, which he identifies with property instances (Pereboom 2011, 127). As we shall see, he gives a detailed account of how to understand the key expression, “constituted by” (Pereboom 2011, 135-141).

Obviously one question about robust non-reductive physicalism is whether it is true; but I will not address that question. Instead, I will ask whether robust non-reductive physicalism, whether true or not, is adequate *as a formulation of physicalism*. And I will argue that it is not, by identifying a series of difficulties that it faces: it can only rule out fundamental laws of physical-to-mental emergence by stipulating that there are no such laws; it fails to entail the supervenience of the mental on the physical; it appeals to two relations that are physicalistically unacceptable; and it rules out certain epistemically possible ways that the world might turn out to be physically. As I present these difficulties, I will also draw

attention to an alternative formulation of physicalism (appealing to a carefully-defined relation of realization) that avoids all of them.²

1. Is P2 Sufficient For Physicalism?

Robust non-reductive physicalism is meant to count as non-reductive because it contains P1. But why is it meant to count as a version of physicalism?

Pereboom writes as follows:

...in this position [i.e., in robust non-reductive physicalism] the physicality of mental state types is twice grounded, first by way of constitution of each token of the type in the microphysical, and second by way of identity to sufficiently abstract physical compositional properties. (Pereboom 2011, 127; see also 172)

Clearly, then, Pereboom holds that P2 alone is sufficient for the physicalistic acceptability of mental properties.

In P2, of course, he calls the compositional properties with which he identifies mental properties “broadly physical”, and elsewhere he endorses “the

² A major question in formulating physicalism is how to characterize the base notion of the physical (see, e.g., Wilson 2006); but since Pereboom does not address it, neither will I. For the same reason, I will not discuss issues raised by the possibility that nature contains no fundamental level; for discussion, see, for example, papers by Barbara Montero and by Robin Brown and James Ladyman (Montero 2006; Brown and Ladyman 2009).

identification of a mental property with a physical property more abstract than the neural” (Pereboom 2011, 165). But what does he mean by “broadly physical” or “more abstract than the neural”? He never explains, and obviously he cannot mean that mental properties (identified by him with certain compositional properties) are neural or microphysical, since P1 implies that mental properties are distinct from both neural and microphysical properties. However, he characterizes compositional properties as “properties that things have solely by virtue of intrinsic features of their [*sc.* the things’] parts, either proper or improper, and relations these parts have to one another”. So it is possible that what he means is that mental properties are “broadly physical” in the sense that the “intrinsic features” and “relations” in terms of which, as compositional properties, they are defined can be specified in folk-physical language or in the proprietary language of the physical sciences.

The trouble with this suggestion is that the physicality of a property is not ensured by its being “broadly physical” in this sense. Mental properties might be “broadly physical” in this sense without its being the case that actual instances of the properties are physicalistically acceptable, i.e., consistent with physicalism. The possibility exists because a physicalistically acceptable role might be played by a physicalistically unacceptable entity. For example, the causal role definitive of being a neuron can presumably be specified in impeccably physical terms. But it seems metaphysically possible that an immaterial angel should play that role in someone’s brain—and a possible world in which it did would not be a physicalist world. The same principle applies to Pereboom’s compositional properties. A compositional

property of an object might be “broadly physical” in the sense that the “intrinsic features” and “relations” in terms of which it is defined can be specified in physical terms, even though the parts actually composing the object, i.e., the parts that have the relevant intrinsic features and that stand in the relevant relations, are immaterial and hence physicalistically unacceptable.

This objection to the suggestion is highly abstract, and it leaves open the (epistemic) possibility that, once it has been determined what the defining intrinsic features and relations actually are in the case of mental properties, it is only metaphysically possible for objects composed of physicalistically acceptable parts bearing physicalistically acceptable properties to have mental properties. But no reason has been given for thinking that this possibility obtains, and it seems far-fetched. I provisionally conclude, therefore, that P2 does not entail the physicalistic acceptability of actual mental property instances (or mental state tokens in general). So, if robust non-reductive physicalism counts as a version of physicalism, then that must presumably be, at least in part, because it includes P3, the claim that “...each mental entity is constituted by...some microphysical entity.”³ So let us turn to P3.

2. Sufficiency For Physicalism And Fundamental Laws Of Emergence

³ I think Pereboom would accept the substance of this conclusion. For he writes: “In my view, mental property types are identical to higher-level compositional property types *all of whose instances are materially constituted*” (see §7 of Pereboom’s Unpublished). However, the italicized clause (or an equivalent expression) does not appear in his book.

Pereboom provides an elaborate definition of the relation that he calls “constitution” or, more commonly, “material constitution” in terms of two other relations, the *material coincidence* relation, and the *made up of* relation. In his words, the definition is this:

(C1) x materially constitutes y at t if and only if

(a) y is made up of and materially coincident with x at t;

(b) necessarily, if x exists at t, then y exists at t and is made up of and materially coincident with x at t; and

(c) possibly, y exists at t and it is not the case that y is made up of and materially coincident with x at t. (Pereboom 2011, 139)

Pereboom also provides a variant definition of constitution designed to cover those cases where x’s material constitution of y depends on the holding of certain environmental conditions, e.g., the case of a lump of marble’s constituting a bust of Napoleon (Pereboom 2011, 139). Since none of my points appeal to such cases, I shall ignore them.

To understand C1, we need to know what the *material coincidence* relation and the *made up of* relation are. Pereboom explains that “Entities x and y are materially coincident just in case they, at some level, are made out of the same parts” (Pereboom 2011, 139). He says that “the core of the *made up of* relation is

unanalyzable and thus primitive”; all he says about the relation is that it is asymmetric and irreflexive, and that it holds between “the less fundamental” and “the more fundamental”—though he does not explain what “less fundamental” and “more fundamental” mean in this context (Pereboom 2011, 138).

Pereboom adds to C1 an important codicil, which I have so far not mentioned. As Pereboom notes, if *x* materially constitutes *y* in the sense of C1, then the existence of *x* *necessitates* the existence of *y*. But he acknowledges that, if the existence of physical *x* necessitates the existence of mental *y* in virtue of the holding of some “fundamental law of physical-to-mental emergence”, then “genuine physicalism is precluded” (Pereboom 2011, 136-137). That is, for the material constitution of a mental entity by a physical entity to make the mental entity physicalistically acceptable, the necessitation entailed by C1 must be necessitation “without the supplementation of [*x*] by a fundamental law of physical-to-mental emergence” (Pereboom 2011, 136). Hence, “...ruling out emergence would require a separate condition on physicalism” (Pereboom 2011, 137). We should therefore think of robust non-reductive physicalism as containing a fourth claim:

P4 There are no fundamental laws of physical-to-mental emergence.

Pereboom’s view, then, is that the conjunction of P3 and P4 is logically sufficient for the physicalistic acceptability of the mental, even though P3 alone is not.

The addition of P4, however, is something of a kludge. P4 is essential to making robust non-reductive physicalism physicalist, but it must presuppose some account of fundamental laws of emergence (which is not provided), and that account must go beyond P2 and P3 or else P4 cannot rule out possibilities that P2 and P3 fail to rule out. Nor is the provision of such an account a trivial task. As a first try, one might simply suggest that fundamental laws of physical-to-mental emergence are laws, relating physical to mental properties, that cannot be *explained*. But a law relating physical to mental properties could have a *theistic* explanation of its holding, and yet still be a fundamental law of emergence. So the first try will not do. One might therefore suggest that fundamental laws of physical-to-mental emergence are laws, relating physical to mental properties, that cannot be given a *reductive* explanation in terms of other laws. But spelling out the crucial and contested word “reductive” would take real work. It can be done; indeed, a schema for the reductive explanation of a law is in effect given below at the end of Section 3. But, for reasons that will become apparent, it is not a schema that Pereboom is in a position to use.

It would be more elegant, therefore, if ruling out fundamental laws of emergence were a *consequence* of a positive account of what it takes for mental phenomena to be physicalistically acceptable, rather than being a bolted-on addition. Pereboom would, I think, agree, but he holds that no such positive account exists: “no one, to my knowledge, knows how to rule out emergence by way of a more fundamental condition on physicalism” (Pereboom 2011, 137). In the next

section, however, I show how fundamental laws of emergence *can* be ruled out by a more fundamental condition on physicalism.

3. How To Rule Out Fundamental Laws Of Emergence

Fundamental laws of physical-to-mental emergence are ruled out if physicalism is formulated as the view that each mental entity is *realized* by some or other physical entity, in a particular sense of “realized”.⁴ Let me first explain what that sense is.

Let “*p*” name a particular actual physical state token, and “*m*” a particular actual mental state token. Then *p* realizes *m* (in the intended sense) only if

- i) *m* is a token of a mental state type with a certain *higher-order essence*; that is, *m* is a token of a mental state type *M* such that for a token of *M* to exist *just is* for there to exist a token of some (lower-order) state type such that tokens of that (lower-order) state type play role *R_M*, the role distinctive of *M*;
- ii) *p* is a token of a physical state type *P* such that, necessarily, given the physical laws, tokens of *P* under physical circumstances *C* play role *R_M*; and

⁴ The precise form of this formulation comes from Andrew Melnyk (Melnyk 2003, 20-32), but Sydney Shoemaker develops a related account, the subset account (Shoemaker 2007). On the relations between the two accounts, see (Melnyk 2009).

iii) the physical laws hold and physical circumstances C obtain.

Four glosses are in order. First, the identity claim implicit in claim i)—that mental state type $M =$ a certain higher-order state type—is assumed to be metaphysically necessary, but a posteriori. Second, the word “necessarily” in claim ii) is meant to express the idea that the claim that tokens of P under physical circumstances C play role R_M is in principle *derivable* from statements of the physical laws. Third, claim i) speaks of *playing a role* only for the sake of the notion’s familiarity; it would be better to speak in broader terms of *meeting a condition*, where the condition could indeed be met by playing a causal role, but could also be met in other ways, e.g., by standing in certain spatio-temporal relations or having a certain history or having a certain bio-function. Indeed, an entity could meet the condition by its having parts that have certain intrinsic features and that stand in certain relations to one another; thus instances of the “broadly physical compositional properties” envisaged in Pereboom’s P2 could be physically realized in the sense defined. Finally, the term “higher-order” is used in claim i) instead of the standard “functional”. This is partly because the connotations of “functional” are unnecessarily narrow, but mostly because “higher-order” draws attention to the metaphysical heart of this definition of realization: its construal of mental state types as higher-order types.

As can easily be seen, claims i) through iii) jointly entail that *some* token of mental state type M exists. But they do *not* entail that this token of mental state type

M is one and the same as the particular token of mental state type M that we have called “ m ”. Hence, though claims i) through iii) do jointly entail that p realizes *some* token of mental state type M , they do not jointly entail that p realizes m in particular. But this difficulty is easily removed. Claims i) through iii) *do* entail that p realizes m in particular if they are conjoined with the further claim that

iv) the token of mental state type M whose existence is entailed by claims i) through iii) = m .⁵

Thus, p realizes m (in the intended sense) if and only if claims i) through iv) are all true. It is worth noting that realization in this sense is an *internal* relation, in the sense that when p realizes m , it is not the case that there holds between p and m a certain relation that might not have held between them, even if they and everything else had remained the same. For this reason, realization in the present sense is immune to Chase Wrenn’s recent objections to positing an *external* relation of realization (Wrenn 2010).

Since Pereboom intends his formulation of physicalism to be non-reductive, it is natural to ask whether a formulation of physicalism as the view that each mental entity is realized by some or other physical entity is also non-reductive.⁶ In the sense of “non-reductive” that has been commonest in discussions of non-

⁵ Note that this clause does not affirm that $p = m$, nor that any other psychophysical identity claim is true.

⁶ I thank an anonymous referee for pressing me to address this important question.

reductive physicalism over the past 45 years, a formulation of physicalism is non-reductive iff it is not committed to the thesis that mental types are identical with (some subset of the non-disjunctive) physical types. In this sense, a formulation of physicalism as the view that each mental entity is realized by some or other physical entity is clearly non-reductive, since it allows for the possibility that mental types are multiply realized and hence not identical with any (non-disjunctive) physical types. In a more demanding sense of “non-reductive”—the sense in which Pereboom considers his own position to be non-reductive—a formulation of physicalism is non-reductive iff it is not committed *either* to the thesis that mental types are identical with (some subset of the non-disjunctive) physical types *or* to the thesis that mental tokens⁷ are identical with (some subset of the) physical tokens. In this more demanding sense, too, a formulation of physicalism as the view that each mental entity is realized by some or other physical entity is non-reductive. For its claim that mental tokens are physically realized in the sense spelled out above does not entail that mental tokens are identical with (some subset of the) physical tokens.⁸ Now some philosophers might hold out for an even more demanding sense of “non-reductive”, according to which a formulation of physicalism is only non-reductive if it allows the *causal powers* of mental tokens to be *basic*, in the sense of not supervening on how things are physically. But Pereboom does not claim that his robust non-reductive physicalism is non-reductive in this very demanding sense: he

⁷ To include token causal powers.

⁸ On the contrary, it may entail that mental tokens are *distinct* from their realizers, since, to use Sydney Shoemaker’s terminology (Shoemaker 2007), the forward-looking causal powers of a mental token form a proper subset of those of its physical realizer.

is well aware that, if mental causal powers are basic in this sense, then physicalism is simply false (Pereboom 2011, 146-147).

How are fundamental laws of physical-to-mental emergence ruled out if physicalism is formulated as the view that each mental state token is realized (in the sense explained earlier) by some or other physical state token? The mental state tokens subsumed by the consequent of a fundamental law of physical-to-mental emergence must be physicalistically unacceptable, since if they were not, then fundamental laws of physical-to-mental emergence would be consistent with physicalism, which, by assumption, they are not; Pereboom and I agree that physicalism must somehow rule out such laws. Intuitively, however, if mental m is realized by physical p in the sense explained above, then m is physicalistically acceptable; there may be other ways for m to be physicalistically acceptable (e.g., by being identical with p), but being realized by p is one way. It follows that m cannot be subsumed by the consequent of a fundamental law of physical-to-mental emergence. And the point can be generalized: if *every* mental state token is realized by a physical state token, then *no* mental state token is subsumed by the consequent of a fundamental law of physical-to-mental emergence, i.e., there are no fundamental laws of physical-to-mental emergence. So if physicalism is formulated as the claim that every mental state token is realized (in the sense above) rather than materially constituted (in Pereboom's sense) by a physical state token, then an additional clause, like Pereboom's P4, that explicitly rules out fundamental laws of physical-to-mental emergence is unnecessary.

Now it is true that a certain physical-to-mental law holds if p realizes m . For from claim ii) of the definition of “ p realizes m ” it follows that

(P-H) Necessarily, if a token of P exists, circumstances C obtain, and the physical laws hold, then there exists a token of some type (namely, P) such that tokens of that type play role R_M ,

where “necessarily” expresses the necessity of logical derivability, as it does in claim ii). And from claim i) of the definition of “ p realizes m ” it follows that

(H-M) Necessarily, if there exists a token of some type such that tokens of that type play role R_M , then a token of M exists,

where “necessarily” expresses the necessity of identity, as it does in claim i). From the conjunction of P-H and H-M it follows that

(P-M) Necessarily, if a token of P exists, circumstances C obtain, and the physical laws hold, then a token of M exists,

which can be rewritten as

(P-M*) As a matter of physical law, if a token of *P* exists and circumstances *C* obtain, then a token of *M* exists.

But while P-M* arguably counts as an expression of a physical-to-mental law, it does not express a *fundamental* physical-to-mental law. Its derivability from P-M, hence from P-H and H-M, hence from claims i) and ii) of the definition of “*p* realizes *m*”, means that it holds in virtue of *p*’s realizing *m*.

4. Failing To Entail Supervenience

Physicalism, intuitively conceived, entails that the mental supervenes on the physical: if a system has a mental property, then it has physical properties which, given relevant physical circumstances and the physical laws, metaphysically necessitate its having that mental property—so that, if there is a second system just like the first regarding its physical properties and circumstances, then it too metaphysically must have that mental property.⁹ Accordingly, any precise formulation of physicalism must also entail the supervenience of the mental on the physical.¹⁰ Now physicalism formulated as the view that each mental entity is realized by some or other physical entity indeed entails the supervenience of the mental on the physical. For, as we saw, if physical *p* realizes mental *m*, then the existence of *p*, the holding of the physical laws, and the existence of physical

⁹ This is Kim’s strong supervenience thesis with its first necessity operator removed to reflect what I take to be the contingency of physicalism.

¹⁰ Which is not to say (what would be false; see note 1) that the supervenience of the mental on the physical entails physicalism.

circumstances C metaphysically necessitate the existence of some token of mental state type M , and hence of m in particular, since if p realizes m , then that token of $M = m$. Therefore, if physical p realizes mental m , then, given the physical laws, the existence of a second (non-overlapping) state token p' , physically indiscernible intrinsically from p and likewise in physical circumstances C , metaphysically necessitates the existence of a second token of mental state type M . Pereboom's robust non-reductive physicalism, however, as I will now argue, fails to entail the supervenience of the mental on the physical and hence is insufficient for physicalism.

Pereboom himself happily concedes that P3 (the claim that each mental entity is constituted by some microphysical entity) does not entail the supervenience of the mental on the physical—happily, because he does not claim that P3 is logically sufficient for physicalism (Pereboom Unpublished, §3). But it will turn out to be worthwhile nonetheless to explain why. Suppose, then, that there are two non-overlapping physical state tokens, p and p' , which are physically indistinguishable intrinsically, in exactly similar physical circumstances, and with the same physical laws; that p materially constitutes a token mental state m ; that p' materially constitutes a token mental state m' ; but that m and m' belong to *distinct* mental state types. The situation just described is, of course, one in which supervenience does not hold. So for P3 by itself to entail that the mental supervenes on the physical, it would have somehow to rule this situation out. But how? Any answer will have to derive from the nature of material constitution in Pereboom's

sense; and C1 above tells us that, for p to materially constitute m , m must be both made up of and materially coincident with p .¹¹

However, the most that can be said about the *made up of* relation, according to Pereboom, is that m is made up of p iff m stands to p in a certain relation whose core is primitive, which is asymmetric and irreflexive, and which holds between a “less fundamental” and a “more fundamental” state token. And none of these features of the *made up of* relation, either singly or in combination, rules out a situation in which each of two tokens of two distinct mental state types is made up of a token of the same physical state type in exactly similar physical circumstances with the same physical laws. For even if m does in fact stand in the *made up of* relation to p , if we were to learn *merely* that p exists in such-and-such physical circumstances and that the physical laws are so-and-so, we would not even be able to work out that there *is* a token mental state which is made up of p , let alone what mental type it belongs to. Nor does there seem to be any a posteriori identity claim ignorance of which would account for our inability to work these things out.¹²

Consider, now, material coincidence. According to Pereboom, m is materially coincident with p iff m and p are, at some level, made out of the same parts. And it is reasonably clear that, even though m and p are *states*, Pereboom means by “parts”

¹¹ What about clause (b) of C1? It cannot entail supervenience, since it asserts a necessary connection between the constitutor and the constituted merely as state *tokens*, not as tokens of state *types*.

¹² One might suggest *stipulating* that the primitive core of the *made up of* relation is such as to guarantee supervenience; but Pereboom does not make this move, and it would in any case have all the advantages of theft over honest toil.

parts that are *objects* (e.g., particles).¹³ Now obviously p and p' are made out of exactly the same physical objects, since they are physically indistinguishable intrinsically. So if their only parts are physical objects, and if m and m' are materially coincident with them, respectively, then m and m' must both be made out of the same (types of) physical objects. But even so, m and m' might still fail to be instantiations of the same mental property.¹⁴ They might fail to be instantiations of the same mental property because mental properties are emergent, and different fundamental laws of emergence hold in different possible worlds in which the actual laws of physics hold. But m and m' might *also* fail to be instantiations of the same mental property because a version of property dualism is true on which mental properties are distributed over token physical systems *randomly*,¹⁵ rather than in accordance with universal laws of emergence. Were such a form of non-emergentist property dualism true, then m might be an instantiation of one mental property and m' an instantiation of a distinct mental property, even though m and m' materially coincide with physical state tokens of exactly the same intrinsic physical state type, in exactly similar physical circumstances, and with the same physical laws.

So neither the *made up of* relation nor material coincidence individually entails the supervenience of the mental on the physical. One might wonder whether

¹³ The context—the problem of material constitution—strongly suggests this reading (see Pereboom 2011, 138); in his (Unpublished), he says that emergentists could accept that entities (to include states) are materially constituted—which they presumably could not if the parts in question were themselves states; and he does not flag that he is adopting a highly unorthodox idea—that states can have parts that are other states.

¹⁴ Pereboom treats state tokens as property instances.

¹⁵ Or in accordance with merely *probabilistic* laws of emergence.

perhaps the *conjunction* of the *made up of* relation with material coincidence entails the supervenience of the mental on the physical, even though neither relation does so alone. Perhaps; but it is not at all obvious, and would need to be shown.

As noted in Section 2, Pereboom does not claim that P3 is logically sufficient for physicalism. But he does claim that the conjunction of P3 with P4 (i.e., the denial of fundamental laws of physical-to-mental emergence) is logically sufficient for physicalism.¹⁶ So does the conjunction of P3 with P4 entail the supervenience of the mental on the physical? It does not. P4 *alone* does not entail the supervenience of the mental on the physical. For although the non-existence of fundamental laws of physical-to-mental emergence obviously rules out any emergentist version of property dualism, it is consistent with the non-emergentist version of property dualism described two paragraphs back, and hence with non-supervenience. Neither does P4 entail supervenience when conjoined with P3. For there is no reason to think that P4 makes any difference to whether the holding of the *made up of* relation entails supervenience. In particular, P4 cannot rule out the possibility of non-emergentist property dualism, the possibility of which is enough to show that material coincidence does not entail supervenience. Contrary to Pereboom, then, the conjunction of P3 with P4 is not logically sufficient for physicalism.

For the sake of completeness, let us ask whether P2 of robust non-reductive materialism (i.e., the claim that mental properties are identical to broadly physical

¹⁶ As he confirms in an email.

compositional properties) entails the supervenience of the mental on the physical. The answer is negative if the conclusion of Section 1 is correct that P2 does not entail the physicalistic acceptability of actual mental property instances. For if P2 does not even entail the physicalistic acceptability of actual mental property instances, then it cannot entail the supervenience thesis that, if a system has a mental property, then it has *physical* properties which, given relevant physical circumstances and the physical laws, metaphysically necessitate its having that mental property.

5. Problems For The *Made Up Of* Relation

As we saw in Section 2, P3 of robust non-reductive physicalism posits the existence of the *made up of* relation, which Pereboom characterizes as a certain relation whose core is primitive, which is asymmetric and irreflexive, and which holds between a “less fundamental” and a “more fundamental” state token. This commitment, however, gives rise to two objections to robust non-reductive physicalism. The first objection is that, other things being equal, we should not formulate physicalism by positing a new primitive relation if we can do so without positing such a relation. But we saw in Section 3 that we can formulate physicalism without positing a new primitive relation. So, other things being equal, we should not formulate physicalism by positing the primitive *made up of* relation.

The second objection cannot be treated so briefly. No formulation of physicalism can consistently appeal to a relation that is not itself physicalistically acceptable.¹⁷ But the *made up of* relation falls foul of this requirement, thus making robust non-reductive physicalism actually inconsistent with (and not just insufficient for) physicalism. For obviously the *made up of* relation is not a physical relation in the sense of a relation expressed by a two-place predicate of physics. Nor is it a relation that can be analyzed in physical terms, or in physical plus topic-neutral terms, since its core is meant to be primitive and hence unanalyzable in *any* terms. Does the *made up of* relation count as physicalistically acceptable because the state of affairs that is *m*'s being made up of *p* is *itself* materially constituted? It does not. Suppose that *m*'s being made up of *p* is materially constituted—presumably by some physical relation. If so, then by Pereboom's definition of *material constitution* there must exist a *second* instance of the *made up of* relation—the one that holds between *m*'s being made up of *p* and the physical relation that materially constitutes it. But in order for this second instance of the *made up of* relation to be physicalistically acceptable, it too must be materially constituted—which entails the existence of a *third* instance of the *made up of* relation; and so on. Hence, the chain of material constitution is either infinitely long or else terminates in an instance of the *made up of* relation that is not materially constituted and therefore not physicalistically acceptable.

¹⁷ This requirement is forcefully articulated by Michael Lynch and Joshua Glasgow (Lynch and Glasgow 2003, 206), inspired by Terry Horgan (Horgan 1993).

Another suggestion for vindicating the physicalistic acceptability of the *made up of* relation requires broadening the category of the physicalistically acceptable. The suggestion is to treat the *made up of* relation as one might perhaps treat the relation of causation, i.e., to grant that it is neither physical nor materially constituted, but to argue that it counts as physicalistically acceptable because it is a topic-neutral relation to which the claims of physics itself are committed. I accept that a relation is physicalistically acceptable if it is a topic-neutral relation to which the claims of physics itself are committed. But I deny that the *made up of* relation is something to which the claims of physics itself are committed. Physicists think that, in principle, current physical theories have the expressive power to characterize any physical system whatever, no matter how large or complex (so physics is the science of the very large as well as the very small); but current physics apparently does not speak of Pereboom's *made up of* relation. Of course, when physicists speak informally, they often use the *expression* "made up of" (or similar expressions) to describe the relationship between, say, molecules of H₂O and atoms of hydrogen and oxygen. But there is no reason whatever to think that they are using the expression in Pereboom's proposed sense rather than some other. Moreover, it is plausible that they are merely alluding to an account of the relationship between H₂O molecules and atoms of hydrogen and oxygen that is expressible in the proprietary language of physical theories. A toy illustration of such an account is this: an H₂O molecule in isolation is (i.e., =) an oxygen atom to which is covalently bonded each of two hydrogen atoms, with an angle between the bonds of 104.500 ° and a distance of

0.957854 Å between the center of each hydrogen atom and the center of the oxygen atom.

So Pereboom's robust non-reductive physicalism posits the existence of a relation that appears to be physicalistically unacceptable.¹⁸ But, one might ask, what if *every* formulation of non-reductive physicalism has to posit *some* kind of relation that is physicalistically unacceptable? In that case, Pereboom's formulation would be at no disadvantage in relation to its rivals.

It is doubtful, however, that every formulation of non-reductive physicalism has to posit a relation that is physicalistically unacceptable, since the formulation in terms of realization seems not to. As we saw in Section 3, *p* realizes *m* if and only if

i) *m* is a token of a mental state type with a certain *higher-order essence*; that is, *m* is a token of a mental state type *M* such that for a token of *M* to exist *just is* for there to exist a token of some (lower-order) state type such that tokens of that (lower-order) state type play role *R_M*, the role distinctive of *M*;

ii) *p* is a token of a physical state type *P* such that, necessarily, given the physical laws, tokens of *P* under physical circumstances *C* play role *R_M*; and

¹⁸ It might be noted that the *made up of* relation is at least not proprietary to any of the non-physical sciences. But this is not enough to make it physicalistically acceptable. If bizarre ectoplasmic auras in interstellar space were discovered next week, they would not be proprietary to any of the non-physical sciences, but they would still not be physicalistically acceptable.

iii) the physical laws hold and physical circumstances C obtain.

iv) the token of mental state type M whose existence is entailed by claims i) through iii) = m .

The realization relation is physicalistically acceptable, because its holding between m and p just *is* the truth of claims i) through iv); and the truth of claims i) through iv) is physicalistically acceptable. Claims ii) and iii) state only physical facts. Claims i) and iv) make (metaphysically necessarily) true identity claims, but identity (i.e., metaphysically necessary self-identity) is physicalistically acceptable. So long as physics says that anything at all exists, whether it be a particle, a field, spacetime, or even the physical universe as a whole, it is thereby committed to saying that the thing is metaphysically necessarily self-identical. Hence identity (i.e., metaphysically necessary self-identity) is something to which the existence claims of physics itself are committed.

It might be wondered whether, even if the formulation of physicalism in terms of realization does not have to posit a physical-to-mental relation that is physicalistically unacceptable, it might still have to posit other physicalistically unacceptable items.¹⁹ I doubt, however, that it does. Claim (i) above uses the term “higher-order essence”, but it is immediately spelled out in topic-neutral terms to

¹⁹ I am indebted to an anonymous referee for this query.

whose use we are committed in making the claims of physics itself. (I have already granted that a relation is physicalistically acceptable if it is a topic-neutral relation to which the claims of physics itself are committed.) Likewise, the terms “higher-order” and “lower-order” can be spelled out in terms of properties of properties, which are physicalistically acceptable if true things can be said in the language of physics about physical states. The expression “the role distinctive of *M*” that appears in claim (i) serves merely to indicate that for every mental state type there is one and only one role (or, better, condition).

6. Further Problems For Pereboom's Relation Of Constitution

According to clause (b) of Pereboom’s definition of material constitution, *x* materially constitutes *y* at *t* only if

necessarily, if *x* exists at *t*, then *y* exists at *t* and is made up of and materially coincident with *x* at *t*.

The displayed claim asserts the holding of some sort of necessary connection between *x* (the constituter) and *y* (the constituted). But what sort of necessary connection is it? By Pereboom’s lights, it cannot be metaphysically necessary self-identity, since P1 of his formulation of non-reductive physicalism entails that $x \neq y$. Nor can it be the necessity of a law of nature, since P4 denies that there are laws of physical-to-mental emergence.

What else could it be? Kripke famously claimed that, if an object is in fact made of molecules (or whatever), then it is necessarily made of molecules (or whatever) (Kripke 1980, 126-127; 114, n. 57).²⁰ Now, according to clause (a) of Pereboom's definition of material constitution, x materially constitutes y at t only if:

y is made up of and materially coincident with x at t.

So perhaps something like the converse of Kripke's claim is true: if x actually makes up and materially coincides with y at t, then it necessarily makes up and materially coincides with y at t. If this is true, then the satisfaction of clause (a) entails the satisfaction of clause (b), and the necessity expressed by clause (b) is explained as analogous to Kripke's metaphysical necessity of composition. There is a problem, however, with trying to explain the necessity of clause (b) in this way. Kripke is able to argue that there is such a thing as the necessity of composition by noting that we cannot imagine a particular object that is in fact made of molecules—that very object—not having been made of molecules. Could Pereboom argue that there is such a thing as the necessity of the *making up and materially coinciding with* relation by appeal to what we cannot imagine? Certainly it is plausible to claim that if in the everyday sense of “makes up” an entity makes up and materially coincides with a second entity, then it does so necessarily. But whether “makes up” in the everyday

²⁰ It is unclear whether Kripke has in mind the very individual molecules that make up the object, the kinds of molecules that make up the object, or just molecules—as opposed to (his example) “some ethereal entelechy” (Kripke 1980, 126).

sense refers to the same relation as does “makes up” in Pereboom’s sense, a sense in which the core of the relation is primitive, is at best an open question. And if “makes up” in the everyday sense does not refer to Pereboom’s putative relation, then the plausible claim, which speaks of “making up” in the everyday sense, implies nothing about “making up” in Pereboom’s sense.

In fact, Pereboom seems to think that “makes up” in the everyday sense does refer to the same relation as does “makes up” in his sense, for in response to the charge that he is being obscurantist in appealing to a relation whose core is primitive he writes as follows:

It is sufficiently clear what we mean when we say that the diamond is made up of a lattice of carbon atoms, and that the brain is made up of a configuration of various kinds of neurons, even if no reductive analysis is provided for this relation. (Pereboom 2011, 138)

But it is not clear at all. There are many competing philosophical accounts of such everyday expressions as “makes up”, so Pereboom must give evidence that his *made up of* relation is the relation expressed by everyday uses of “made up of”.²¹ But he does not do so. I doubt, therefore, that the necessity expressed by clause (b) of his definition of material constitution can be explained as analogous to Kripke’s metaphysical necessity of composition.

²¹ Of course, “made up of” in everyday usage may not be univocal.

A final suggestion is that the necessity expressed by clause (b) is conceptual or analytic. Now there is no sign of this suggestion in the chapters of Pereboom's book (Chs. 7 and 8) that he officially devotes to the formulation of robust non-reductive physicalism (Pereboom 2011). Earlier, however, in Ch. 3 he does tentatively endorse so-called "a priori physicalism", i.e., the view that physicalism requires the a priori derivability of the non-physical truths from the physical truths. And this derivability must presumably be explained in terms of conceptually necessary connections between these two classes of truths. If so, then the necessary connection expressed by clause (b) of Pereboom's definition of material constitution could be construed as conceptual. But for Pereboom to endorse a priori physicalism presents three drawbacks. First, it compromises the spirit of his non-reductivism. Second, it exposes him to major difficulties, as elaborated by, for example, Brian McLaughlin (McLaughlin 2007). Finally, it threatens to render his official formulation of physicalism redundant, since a priori physicalism most naturally suggests the formulation of physicalism that David Chalmers gives, in terms of what he calls "global logical supervenience" (Chalmers 1996, 41).

If Pereboom does not adopt a priori physicalism, then he must treat the "necessarily" in clause (b) as expressing the holding of a fundamental relation of metaphysical necessitation between x (the constituter) and y (the constituted), where, by P1, $x \neq y$. This commitment, like the commitment to the *made up of* relation, faces two objections. First, other things being equal, it is undesirable to

formulate physicalism by positing a novel kind of metaphysical necessity if an alternative formulation exists—which it does. As we saw in Section 3, physicalism can be formulated in terms of realization so that the formulation neither appeals to nor entails any fundamental relation of metaphysical necessitation between distinct existences. It does, of course, appeal implicitly, via the identity claims to which it is committed, to the metaphysical necessity of *identity*, but not to any fundamental relation of metaphysical necessitation between *distinct* existences.²² Second, however, a fundamental relation of metaphysical necessitation between distinct existences seems physicalistically unacceptable. It is obviously not a physical relation in the sense of a relation expressed by a two-place predicate of physics. Nor, surely, is it a relation analyzable into physical terms, or into physical plus topic-neutral terms. Nor, as far as I can see, is a fundamental relation of metaphysical necessitation between distinct existences a topic-neutral relation to which the claims of physics itself are committed.²³

7. Material Coincidence And The Possibility Of A Physical World With No Parts

Let me conclude by mentioning a potential difficulty of a quite different kind for Pereboom's robust non-reductive physicalism. Since it is not clear exactly what

²² This is why a formulation of physicalism in terms of realization is not open to the objection against supervenience formulations of physicalism mentioned in note 1.

²³ If laws of nature, including the laws of physics, hold as a matter of metaphysical necessity, then what is metaphysically necessary is the possession of the *physical properties*, or the holding of the *physical relations*, that the laws of physics describe (e.g., it is metaphysically necessary that any two massive bodies exert a certain force on one another). But this is not self-evidently the same thing as the holding of a fundamental relation of metaphysical necessitation between distinct existences.

physics is telling us about the nature of the world, a formulation of physicalism should be consistent with all (epistemically) possible ways that the physical world (i.e., the world according to physics) might turn out to be. Now according to robust non-reductive physicalism, of course, “...each mental entity is constituted by...some microphysical entity” (Pereboom 2011, 171), and microphysical state p 's materially constituting m requires that p be materially coincident with m , where “Entities x and y are materially coincident just in case they, at some level, are made out of the same parts” (Pereboom 2011, 139). But this requirement of material coincidence may be problematic, for it seems inconsistent with the possibility that the physical world should turn out to have no (proper) parts. If the physical world has no such parts, and hence no *local* bearers of properties, then the only possible candidate to be the physical constituter of mental state m —your having a headache now, as it might be—is some state of the physical world as a whole, i.e., the *world's* instantiating some property. Intuitively, however, a state of the physical world as a whole is simply too big to be made out of the same parts, whether proper or improper, as your having a headache.²⁴

Is it really possible that the physical world should turn out to have no (proper) parts? I cannot answer this question; but here are some straws in the wind. Terry Horgan and Matjaž Potrč have defended the *philosophical* coherence of the view that the world consists fundamentally of a single, partless object (Horgan and Potrč 2008, Ch. 7); the particle interpretation of quantum field theory—roughly,

²⁴ Recall that by “parts” Pereboom means parts that are *objects*; see note 13.

the unification of quantum mechanics and special relativity—is highly controversial (see Kuhlmann 2009); and spacetime itself may not be fundamental (Siegfried 2011; Ladyman and Brown 2009, 29). On the positive side, James Ladyman and Don Ross have argued that the best understanding of the ontology of current physics is provided by their doctrine of ontic structural realism, whose slogan is, “There are no things. Structure is all there is.” (Ladyman, Ross, *et al.* 2007, Ch. 3); this *sounds* like a partless view.

However, if physicalism formulated as the view that each mental entity is realized (in the sense of Section 3) by some or other physical entity, then it seems to be consistent with the possibility (if it really is one) that the physical world should turn out to have no (proper) parts. For claims i) through iv), which are individually necessary and jointly sufficient for a physical state p to realize a mental state m , do not require that p be a *local* physical state; p could be a *global* physical state, a state of the physical world as a whole. If it was, we would admittedly still need to vindicate, or to explain away, our commonsense conviction that m is a local state; but perhaps we could do so.²⁵

²⁵ I am very grateful to Derk Pereboom both for supplying me with a copy of his “Responses to commentary on my *Consciousness and the Prospects of Physicalism* by Brie Gertler, Terry Horgan, and Andrew Melnyk” and for helpful correspondence subsequently; to my fellow critics Brie Gertler and Terry Horgan for their remarks when an ancestor of the present paper was presented at the February 2012 meeting of the Central Division of the American Philosophical Association; and to an anonymous referee for provoking valuable improvements in the final draft of the paper.

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