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REALIZATION AND THE FORMULATION OF PHYSICALISM

ABSTRACT. Twenty years ago, Richard Boyd suggested that physicalism could be formulated by appeal to a notion of realization, with no appeal to the identity of the non-physical with the physical. In (Melnik 2003), I developed this suggestion at length, on the basis of one particular account of realization. I now ask what happens if you try to formulate physicalism on the basis of other accounts of realization, accounts due to LePore and Loewer and to Shoemaker. Having explored two new formulations of physicalism, I conclude that my 2003 formulation remains the most promising.

In an important paper now 25 years old, Richard Boyd proposed that physicalists about the mental don't have to hold that mental phenomena, whether types or tokens, are *identical* with physical phenomena; it's enough for physicalism about the mind, he said, if "in the actual world all mental phenomena are *physically realized*" (Boyd, 1980, p. 87; my italics). Now Boyd's proposal – to formulate physicalism about mental phenomena by appeal to physical realization rather than identity – is obviously an interesting one. But its scope needn't be limited to mental phenomena: it can be generalized. So philosophers interested in formulating physicalism about *all* – not just mental – phenomena should explore formulations that generalize Boyd's proposal. Such formulations, which I'll call *realization-based* formulations of physicalism, are those that elaborate the following schema:

[RBFP] Everything that exists is either *identical* with the physical (in a certain narrow sense of 'physical') or *realized by* the physical (in the same narrow sense of 'physical').

Elaborating this schema obviously requires giving an account of (i) the exact scope of the phrase 'everything that


exists,' (ii) the narrow sense of 'physical,' and (iii) the all-important relation of realization. In this paper, however, my exclusive focus will be on (iii), realization. Now elsewhere I have elaborated a realization-based formulation of physicalism – *realization physicalism* – that relies on one particular account of realization (Melnik, 2003, Chs. 1 and 2). But other accounts of realization may also be found in the literature, and it is this fact that prompts the question that the present paper will address: what happens if you try to develop a realization-based formulation of physicalism that relies on one of these other accounts of realization? In particular, how attractive are the resulting formulations in comparison with realization physicalism?

The plan is as follows. In the first section, I'll provide a sketch of realization physicalism minimally sufficient for the present purposes of contrast and comparison. In the second section, I'll investigate a realization-based formulation of physicalism that relies on an account of realization suggested by Ernest LePore and Barry Loewer (LePore and Loewer, 1989). In the third and fourth sections, I'll investigate two realization-based formulations of physicalism that rely, respectively, on one or the other of two accounts of realization recently proposed by Sydney Shoemaker (Shoemaker, 2001, 2003, and unpublished). My overall conclusion will be that realization physicalism is still the most promising of the realization-based formulations of physicalism considered here.

I

Realization physicalism presupposes much fuller accounts of the exact scope of 'everything that exists' and the narrow sense of 'physical' than I have space to present here (see Melnik, 2003, Ch. 1). It will suffice for present purposes, however, to say that (i) the scope of realization physicalism is restricted (roughly) to object-, property-, and event-tokens that are contingent or causal; and that (ii) phenomena are physical in the narrow sense of 'physical' when (again roughly) they are expressible using the predicates of current physics. But the

account of realization on which realization physicalism relies needs a longer treatment. According to it, realization is a relation that holds not between *types* (e.g., between properties or event-types) but between *tokens* of types (e.g., property-instances or event-tokens).¹ Moreover, a realized token can be realized only if it's a token of a *functional* type. Note, however, that the account uses 'functional type' very liberally indeed, to refer to any type whose tokening just is the tokening of some or other type that meets a specific associated condition, where this condition could be of *any* kind, and needn't be the playing of a causal role. Finally, a realizing token realizes a token of a given functional type by being a token of some or other type that *meets* the specific associated condition for that functional type. Here, then, is the account of realization on which realization physicalism relies:

- [RP-R] Token *x* realizes token *y* (or: token *y* is realized by token *x*) iff 
- (i) *y* is a token of some *functional* type F (i.e., some type whose tokening just is the tokening of some or other type that meets a certain condition, C);
 - (ii) *x* is a token of some type that in fact meets C; and
 - (iii) the token of F whose existence is necessitated (in the strongest sense) by the holding of clause (ii) is numerically identical with *y*.

I should perhaps further explain the definite description in clause (iii). If, as clause (i) implies, the tokening of some or other type that meets condition C metaphysically necessitates a tokening of functional type F, and if, as clause (ii) asserts, *x* is a token of some type that in fact meets condition C, then the existence of *x* necessitates (in the strongest sense) the existence of a certain token of F. And it is *that* token of F to which the definite description in clause (iii) refers.

Here is how the realization physicalist's account of realization might apply to a concrete case. Suppose that my present headache is realized by some simultaneous neurophysiological event in my brain. Then, according to the account, (1) a headache must turn out to be a functional event-type of some specific kind, e.g., an event of some or other kind that non-conceptually represents disorder in some region of one's head²; (2) the neurophysiological event in my brain must be of some

type that in fact meets the special condition that characterizes the functional nature of a headache (e.g., it must be of some type that non-conceptually represents disorder in some region of my head); and (3) my present headache must be the very same headache as the headache whose existence is necessitated by the neurophysiological event in my brain.

Three negative features of the realization physicalist's account of realization bear emphasis. First, whether a functional token (e.g., my present headache) is *identical* with the physical token that realizes it (e.g., the event in my brain) is, on this account, a question left open by the fact that the former is realized by the latter; identity between realizer and realized is neither required nor forbidden by the account. Secondly, the account is not restricted in its applicability to cases of same-subject realization. So if the instantiation of a certain physical property realizes the instantiation of a distinct mental property, then, according to the account, the two properties may be instantiated in the same object, but they needn't be. Thirdly, nothing in the realization physicalist's account of realization – and nothing in realization physicalism more generally – requires that the functional nature of any non-physical type be discoverable a priori. In particular, realization physicalism isn't a semantic thesis; it neither asserts nor requires the existence of any functional *concepts* or *predicates*. So if any non-physical types (e.g., folk psychological, biological, or geological types) turn out to be identical with functional types (in the very liberal sense intended), then those identities will have to be discovered a posteriori.

With realization physicalism's account of realization in hand, let us turn next to its account of what it takes for a functional token to be realized *by the physical*, as schema RBFP has it. Realization physicalism identifies the property of being realized by the physical with that of being *physically realized*, where this latter property is defined as follows:

[RP-PR] A token y of a functional type, F , is *physically realized* iff
 (i) y is realized, in the sense of RP-R, by a token of some physical type, T ; and

(ii) T meets the special associated condition for F solely as a logical consequence of (a) the distribution in the world of physical tokens and (b) the holding of physical laws.³

The rationale for including clause (ii), and its precise understanding of physical laws, are important matters, but we can safely ignore them here (see Melnyk, 2003, Ch. 1).

Equipped with RP-PR, however, we can at last provide a statement of realization physicalism that is adequate for present purposes:

[RP] Every causal or contingent token of any type – whether an object, property-instance, or event – is either (1) a token of a physical type or (2) a physically realized token of a functional type.⁴

II

Let's now explore the prospects for a formulation of physicalism based on the understanding of realization offered by LePore and Loewer. That understanding is expressed in a single paragraph, quotations from which I will discuss in detail (LePore and Loewer, 1989, pp. 179–180; all quotations to follow come from this passage). LePore and Loewer begin by asking, “Exactly what is it for one of an event’s properties to *realize* another?”, which perhaps makes it sound as if they conceive of realization as a relation that holds between properties, or between other types such as event-types. But not so, for they begin their answer to the question by saying that “The usual conception [*sc.* of realization] is that *e’s being P realizes e’s being F* iff... [my italics]”, which makes it clear that they conceive of realization as, or primarily as, a relation between tokens, presumably events. Iff what? “...iff e is P and e is F and there is a strong connection of some sort between P and F.” And they immediately add: “We propose to understand this connection as a necessary connection which is *explanatory* [their italics]”.

Exactly what does this explanatory necessary connection amount to for LePore and Loewer? The part about a necessary connection between P and F is clear enough: an

explanatory necessary connection between P and F requires that it be physically necessary that $\forall x (Px \rightarrow Fx)$. However, the further requirement that this necessary connection be explanatory isn't clear at all, although the envisaged explanandum is certainly an event (or state), not a regularity, because they speak of e's being P explaining *e's being F*. That is, they take it that e's being P can explain e's *simultaneously* being F. But how precisely do they envisage this sort of synchronic explanation of an event by an event?

They say two things relevant to this question. The first is that "For e's being P to explain its being F it may be necessary for there to be a *system* of connections between realized and realizing properties of property kinds to which P and F belong [their italics]". This remark suggests the following more or less deductive-nomological view of the explanation in question: e's being P can explain e's simultaneously being F, given that (a) e's being P and e's being F fall under the physically necessary generalization that $\forall x (Px \rightarrow Fx)$ and (b) this physically necessary connection between P and F isn't a lone, isolated connection, but rather one element in a system of such connections between P-type properties and F-type properties.

Unfortunately, even if e's being P can in this way explain e's being F, the realization relation as understood by LePore and Loewer doesn't seem – at least thus far – strong enough to serve in a realization-based formulation of physicalism. Here's why. There are (at least) two intuitively necessary conditions that any proposed formulation of physicalism must meet for it to qualify as authentically physicalist.⁵ First, there is the *constitution* condition: a formulation of physicalism is authentically physicalist only if it yields some sense in which non-physical phenomena are *constituted* by (narrowly) physical phenomena. Secondly, there is the *truthmaking* condition: a formulation of physicalism is authentically physicalist only if it yields some sense in which true talk about non-physical phenomena is *made true* by (narrowly) physical phenomena.⁶ Now, suppose that P is a (narrowly) physical property, that F is a mental property, and that e's being P realizes e's being F

in LePore and Loewer's sense. Now suppose that being realized in this sense by a physical event were sufficient for physicalism to be true of the non-physical event that is so realized. Then, because of the constitution and truthmaking conditions, the fact that *e*'s being *F* is realized in this sense by *e*'s being *P* ought to yield (1) some sense in which *e*'s being *F* is *constituted* by *e*'s being *P* and (2) some sense in which the claim that *e* is *F* is *made true* by *e*'s being *P*. But in fact it seems to yield neither result. Certainly, if *e*'s being *F* is realized by *e*'s being *P* in LePore and Loewer's sense, then (i) it's physically necessary that $\forall x (Px \rightarrow Fx)$ and (ii) this physically necessary connection between *P* and *F* is but one element in a system of such connections. But the truth of (i) and (ii) appears quite compatible with the falsity of (1) and (2). Such compatibility would be plain if the necessary connections invoked between *P*-type properties and *F*-type properties were claimed to be *nomologically* necessary (i.e., such as to hold in all worlds in which the actual laws of nature hold) rather than *physically* necessary (i.e., such as to hold in all worlds in which the actual laws of *physics* hold). For in that case the realization (in the sense of LePore and Loewer) of *e*'s being *F* by *e*'s being *P* would obviously be compatible with *F*'s being an entirely non-physical property that is instantiated whenever a suitable physical base property is simultaneously instantiated, in accordance with certain fundamental laws of emergence. But now suppose (as LePore and Loewer actually do, of course) that the necessary connections between *P*-type properties and *F*-type properties are instead *physically* necessary. Why would that make any difference? It's hard to see how it could. (But I will shortly return to this question.)

LePore and Loewer say a second thing relevant to how they envisage the synchronic explanation of *e*'s being *F* by *e*'s being *P*. "[I]t may require," they say, "that the central laws and principles governing the realized properties be explained by [i] the connections between basic and non-basic properties and [ii] laws governing the basic properties." But can this additional requirement save LePore and Loewer's understanding

of realization from the charge that isn't strong enough to serve in a realization-based formulation of physicalism? It would appear not. The original difficulty was that even a system of physically necessary connections between P-type properties and F-type properties doesn't appear to ensure the meeting of the constitution and truthmaking conditions. But requiring that the F-type laws be explained by appeal to those very same physically necessary connections plus the P-type laws does nothing to strengthen or supplement those connections; the original difficulty remains. So requiring that the F-type laws be explained by appeal to physically necessary connections plus the P-type laws still leaves LePore and Loewer's understanding of realization too weak to serve in a realization-based formulation of physicalism.

However, this result doesn't make all that LePore and Loewer say about realization false. It's perfectly true, I claim, just as they say, that realization by the physical is a physically necessary connection that's explanatory. But this truth, I suggest, is a *consequence* of realization physicalism's account of physical realization. So LePore and Loewer's fundamental understanding of realization can be *incorporated* by a realization-based formulation of physicalism – realization physicalism. But it yields no *rival* to realization physicalism. Let me now justify these remarks.

First let me show how LePore and Loewer's claim that realization by the physical is a physically necessary connection is a consequence of realization physicalism's account of physical realization. Suppose, again, that P is a physical property and that F is a distinct mental property. But now suppose that e's being F is physically realized *in the realization physicalist's sense*, and realized, in particular, by e's being P. Then e's being F just *is* e's having a certain functional property – the property of having some or other property that meets associated condition C. And e's being P realizes e's being F because being P meets condition C. But, and here's the crux, since being P must – by RP-PR – meet that condition in virtue of the laws of physics, it's *physically*

necessary that if e is P , then e has some or other property that meets C . But, of course, it's *metaphysically* necessary that if e has some or other property that meets C , then e is F . Hence, it's *physically* necessary that if e is P , then e is F . And likewise for *any* event whose being F is realized by its being P .

So the realization physicalist's understanding of physical realization entails LePore and Loewer's claim that realization by the physical is a physically necessary connection. Now for a further point: presumably, because of this entailment, the realization physicalist's account can also *explain* why, given that e 's being P realizes e 's being F , it's physically necessary that $\forall x (Px \rightarrow Fx)$. And that's a nice bonus, since the physically necessary connection between e 's being P and e 's being F sorely needed explaining: LePore and Loewer assume that P and F are distinct properties, physical and mental, and obviously no *physical* law can connect a physical property to a mental one. So it was *prima facie* mysterious all along how it could be *physically* necessary that $\forall x (Px \rightarrow Fx)$. But a physically necessary connection between a physical property and a mental property can be explained, as we've just seen, if LePore and Loewer's claim that realization by the physical is a physically necessary connection is viewed as a consequence of realization physicalism's account of physical realization.

Now let me show how LePore and Loewer's claim that realization by the physical is *explanatory* is also a consequence of realization physicalism's account of physical realization. Suppose that e 's being P realizes e 's being F – in the sense of realization physicalism's account of physical realization. Then we can say the following: e is F because it's (simultaneously) P , the physical laws ensure that P meets condition C , and an event's being F is its having some or other property that meets C . And this certainly *sounds* like an explanation of e 's being F . Indeed, since the only *contingent* facts that an explanation of this kind appeals to are physical facts, I am prepared to say that an explanation of this kind is a *physically reductive* explanation of e 's being F .⁷

III

Let me turn now to the prospects for a realization-based formulation of physicalism that appeals to the first of two kinds of realization recently defined by Sydney Shoemaker (see Shoemaker, 2001, 2003, pp. 2–3); in the next section, I'll do the same for the second kind of realization. First, however, a caveat. Shoemaker didn't introduce his notions of realization with a view to formulating physicalism, and so the questions I will be asking are not ones to which he has published answers. In consequence, I shall call certain views 'Shoemakerian' to indicate that, although Shoemaker's ideas inspired them, he can't be held responsible for them.

Although Shoemaker considers himself to be a kind of functionalist, his (first) definition of realization differs from that of the realization physicalist in three important ways. First, whereas the realization physicalist views realization as, in the first instance, a relation between tokens, Shoemaker views it as, in the first instance, a relation between *properties*, for example, between a physical property and a mental property (see, e.g., Shoemaker, 2001, p. 86). Secondly, whereas the realization physicalist understands a functional property as a higher-order property (i.e., as essentially the property of having some or other property that meets condition C), Shoemaker understands a functional property in a not merely different but incompatible way, as a property that essentially confers certain *causal powers* on the objects that possess it, and hence as a first-order property (2001, p. 77). One consequence of this difference is that whereas the realization physicalist's functional properties are *essentially* such as to be instantiated in virtue of the instantiation of other properties, Shoemaker's functional properties are only *contingently* so. Even though Shoemaker's functional properties, if they're not fundamental, are instantiated in the actual world in virtue of the instantiation of other properties, there are other worlds in which they're instantiated, but not in virtue of the instantiation of other properties.⁸ Finally, Shoemaker defines the realization relation between two properties by appeal to a

relation of inclusion between the causal powers conferred by the realizer property and those conferred by the realized property (Shoemaker, 2001, p. 78).⁹ The realization relation relied on by realization physicalism, on the other hand, is defined without reference to such entities as causal powers.

Shoemaker outlines his definition of realization as follows, where a ‘conditional power’ is a power of an object to cause some effect *if* that object possesses some further property or properties (Shoemaker, 2001, p. 77):

...property X realizes property Y just in case the conditional powers bestowed by Y are a subset of the conditional powers bestowed by X (and X is not a conjunctive property having Y as a conjunct). (Shoemaker, 2001, p. 78).

Two remarks on this definition of realization. (1) The parenthetical condition it contains is designed to avoid having to say, counterintuitively, that conjunctive properties count as realizers of their conjuncts; but since this condition is irrelevant to present purposes, I’ll henceforth ignore it. (2) Because this definition of realization says ‘subset’, and not ‘proper subset’, it allows as an example of realization the special case where the conditional powers conferred by X and by Y are *identical*, so that, given Shoemaker’s principle that “no two properties confer exactly the same conditional powers” (Shoemaker, 2001, p. 78), X and Y are one and the same property. Fully aware of this, Shoemaker adds that, if Y is *multiply* realized, then the conditional powers that it confers must be a *proper* subset of the conditional powers conferred by any property that realizes it (Shoemaker, 2001, p. 79). Since we are interested in precisely those cases where realization is invoked as an alternative to type-type identity, we should modify Shoemaker’s account of realization accordingly:

[SR1] Property X realizes property Y (where $X \neq Y$) iff

- (i) every conditional causal power conferred by Y, the realized property, is *identical* with some conditional causal power conferred by X, the realizing property; and
- (ii) some conditional causal power conferred by X, the realizing property, is *distinct* from every conditional causal power conferred by Y, the realized property.

Now let's try to formulate a version of physicalism based on this understanding of realization. Since SR1 explicates realization as a relation between *properties*, a natural suggestion is to flesh out the schema for realization-based formulations of physicalism – RBF – as follows:¹⁰

[ShoePhys] Every (instantiated) property is either identical with a physical property or such that every property that actually realizes it – in the sense given by SR1 – is a physical property.

There's a small problem with this suggestion. To see it, consider an (instantiated) mental property, *M*, that is not identical with any physical property, that is actually realized by a physical property, and that is *also* actually realized by a neurobiological property (one that is in its turn realized by a physical property). Then, although *M* is actually realized by a physical property (so that physicalism is true as far as *M* is concerned), not every property that actually realizes it is a physical property, which contradicts ShoePhys. The problem is easily avoided, however. One only need replace 'is a physical property' in ShoePhys with 'is a physical property or a property that stands in the ancestral of the *is realized by* relation to a physical property'. But I'll ignore this complication in what follows.

The question that I want to ask about ShoePhys is whether it meets a *third* intuitively necessary condition on any proposed formulation of physicalism, which I'll call the *necessitation* condition: a formulation of physicalism is authentically physicalist only if it entails that the physical properties of an object (perhaps together with other physical conditions, including physical laws) *necessitate* in the strongest sense the object's non-physical properties.¹¹ Answering this question, as we'll see, will lead to refinements of ShoePhys. But how best to answer it? My approach will be, first, to determine what is involved in the realization – in Shoemaker's sense – of an *instance* of a non-physical property by an *instance* of a physical property, and then to enquire whether, in such a case, the object's possession of the physical property necessitates its possession of the realized non-physical property in the way

required by the necessitation condition. If (and only if) the answer is that it doesn't, then ShoePhys itself cannot meet the necessitation condition.

To start with, then, here is a plausible account of the realization of a non-physical property-instance by a physical property-instance, an account that keeps faith with the spirit of Shoemaker's account of realization between properties:

[SR2] *a*'s being P realizes *a*'s being N (where $P \neq N$) iff

- (i) *a* is P and N;
- (ii) every conditional causal power conferred on *a* by N is *identical* with some conditional causal power conferred on *a* by P; and
- (iii) some conditional causal power conferred on *a* by P is *distinct* from every conditional causal power conferred on *a* by N.¹²

However, talk of causal powers admits of the type/token distinction. If object *a* and object *b* both have the power to cause an explosion of exactly the same kind, do *a* and *b* have the *same* causal power? Yes and no. Yes, because they each have a causal power of the same *type*; but also no, because *a*'s power to cause an explosion isn't the same power-*token* as *b*'s power to cause an explosion. What is the best way to apply this distinction to the talk of causal powers in SR2? It is, I suggest, as follows:

[SR3] *a*'s being P realizes *a*'s being N (where $P \neq N$) iff

- (i) *a* is P and N;
- (ii) every token of a conditional causal power-type conferred on *a* by N is identical with some token of an identical conditional causal-power type conferred on *a* by P; and
- (iii) some token of a conditional causal power-type conferred on *a* by P is distinct from every token of any conditional causal power-type conferred on *a* by N.

Let's now ask whether, if *a*'s being P realizes *a*'s being N in the sense of SR3, it follows that *a*'s being P (perhaps together with other physical conditions, including physical laws) necessitates in the strongest sense *a*'s being N.

The answer is that it doesn't. Suppose that *a* is P. It certainly follows that *a* possesses a certain number of causal power-tokens of certain causal power-types, namely, those causal power-tokens conferred on it by P. It also follows that

among those power-tokens are power-tokens of the very same power-types as are the power-tokens that *would* be conferred on *a* were *a* to be N. But it doesn't follow that *a* actually is N. Why should it? Why assume that along with possession of power-tokens of certain types there automatically comes possession of a property (or even the property) that would have conferred them? Even if being N *essentially* confers causal power-tokens of certain types on objects that possess it, it doesn't follow – at least from anything that SR3 says – that causal power-tokens of those types are essentially such as to be conferred by being N. The property of being N is one thing, the causal powers that it confers are another, and nothing in SR3 entails that the presence of the latter guarantees the presence of the former.

This failure to meet the necessitation condition, however, can be remedied. The failure arises because of an apparent metaphysical gap between (i) the possession by an object of certain causal power-tokens and (ii) the possession by that object of the property that *would* have conferred precisely such power-tokens. And so the failure can be remedied by closing that gap. The key move is to *identify* property-instances with something like clusters of causal power-tokens of particular types; perhaps *a*'s being X should be identified with *a*'s possessing a cluster of causal power-tokens of one (collective) type, while *a*'s being Y should be identified with *a*'s possessing a cluster of causal power-tokens of another (collective) type.¹³ When this move is incorporated into SR3, the result is this:

[SR4] *a*'s being P realizes *a*'s being N (where $P \neq N$) iff

- (i) *a* is P and N;
- (ii) every instance of P is *identical* with some cluster of causal power-tokens of collective type T1, and every instance of N is *identical* with some cluster of causal power-tokens of collective type T2;
- (iii) every token of a conditional causal power-type conferred on *a* by N is identical with some token of an identical conditional causal-power type conferred on *a* by P; and
- (iv) some token of a conditional causal power-type conferred on *a* by P is distinct from every token of any conditional causal power-type conferred on *a* by N.

In an equivalent formulation, clauses (iii) and (iv) can be replaced by

(iii*) the causal power-tokens possession of which by *a* is identical with *a*'s being N form a *proper subset* of the causal power-tokens possession of which by *a* is identical with *a*'s being P.

This alternative formulation clearly brings out an important feature of realization in the sense of SR4. When *a*'s being P realizes *a*'s being N in this sense, then, precisely because clause (iii*) is met, *a*'s being P – that is, *a*'s possessing a cluster of causal power-tokens of type T1 – is *partially constituted* by *a*'s being N – that is, *a*'s possessing a cluster of causal power-tokens of type T2. Thus, SR4 is one way to develop Shoemaker's rather concise discussion of realized property-instances as *parts* of realizing property-instances (Shoemaker, 2001, pp. 80–81).

Let's now ask of SR4 the same question we asked earlier of SR3. If *a*'s being P realizes *a*'s being N in the sense of SR4, does it follow that *a*'s being P (perhaps together with other physical conditions, including physical laws) necessitates in the strongest sense *a*'s being N? The answer in the case of SR4, however, is that it does. Suppose once again that *a* is P. Then, solely in virtue of being P, *a* must possess a cluster of causal power-tokens of a certain collective type.¹⁴ But since *a* possesses this cluster of causal power-tokens, and since this cluster includes as a proper subset a cluster of power-tokens the possession of which by an object *is* that object's being N, *a* must also be N. So, given that *a*'s being P realizes *a*'s being N in the sense of SR4, *a*'s being P does necessitate in the strongest sense *a*'s being N.

It might be objected that it isn't necessary to turn SR3 into something as strong as SR4 in order to secure conformity with the necessitation condition. Although identifying property-instances with clusters of power-tokens is sufficient for securing this conformity, it's not necessary. Suppose that property-instances are identified with items distinct from clusters of power-tokens, items for whose existence the existence of such clusters is nonetheless a metaphysically sufficient (as

well as necessary) condition. In that case, realization in the sense of SR3 but modified to include this supposition will still meet the necessitation condition. Suppose yet again that *a* is P. Then, just as before, *a* must possess a cluster of causal power-tokens of a certain collective type. But since *a* possesses this cluster of causal power-tokens, and since this cluster includes as a proper subset a cluster of power-tokens the possession of which by an object is a metaphysically sufficient condition for (i.e., metaphysically necessitates) that object's being N, *a* must also be N.

The trouble with this objection, however, is that it takes us from the frying pan to the fire. The account of realization proposed by the objection indeed meets the necessitation condition, but it fails to meet both the constitution condition (a formulation of physicalism is authentically physicalist only if it yields some sense in which non-physical phenomena are constituted by physical phenomena) and the truthmaking condition (a formulation of physicalism is authentically physicalist only if it yields some sense in which true talk about non-physical phenomena is made true by physical phenomena). And it fails to meet both these conditions for fundamentally the same reason: since it denies that a property-instance is *identical* with a cluster of causal power-tokens (though it does metaphysically *require* such a cluster), it must hold that there's *more* to a property-instance than a cluster of causal power-tokens; it must hold that a property-instance is a cluster of causal power-tokens plus *something else*.¹⁵

Consider, first, the constitution condition, and suppose that *a*'s being P realizes *a*'s being N in the sense proposed by the objection. The question is whether this supposition entails that *a*'s being N is constituted (i.e., wholly constituted) by *a*'s being P. And the answer is that it doesn't, since the 'something else' that goes into *a*'s being N is not constituted by *a*'s being P, nor by any other physical condition. True, *a*'s possessing the cluster of causal power-tokens conferred by its being N is indeed constituted – and wholly so – by its possessing causal power-tokens that it possesses because it is P

and, of course, *a*'s possession of that N-conferred cluster metaphysically necessitates *a*'s being N. But because *a*'s possession of the cluster is still *distinct* from *a*'s being N, that metaphysical necessitation doesn't bring it about that *a*'s being N is constituted by its being P. The story is very similar for the truthmaking condition. If *a*'s being P realizes *a*'s being N in the sense proposed by the objection, then an ascription of being N to *a* is certainly made true *in part* by *a*'s possession of a certain cluster of causal power-tokens that it possesses because it is P. But an ascription of being N to *a* is true only if *a* possesses the 'something else', and that part of the ascription is apparently made true only by *a*'s possession of the 'something else', and not by anything physical.

I conclude, then, that if we seek a realization-based formulation of physicalism that relies on a Shoemakerian account of realization but that meets the necessitation condition, then that account must be SR4. Here is what such a formulation of physicalism would most naturally be taken to say:

[ShoePhys*] Every (actual) property is either identical with a physical property or such that every (actual) instance of it is realized – in the sense given by SR4 – by an instance of some or other physical property.

It is worth stressing the novelty of ShoePhys* as a formulation of physicalism. It disagrees with all familiar formulations of physicalism in what it claims about property-instances that aren't physical in the narrow sense. It doesn't require that every non-physical property fail to exist, as eliminative physicalism requires. It doesn't require that every non-physical property-instance be identical with a physical property-instance, as type-type and token-token identity formulations of physicalism both require. And it doesn't require that every non-physical property-instance be identical with a physically realized *functional* property-instance (i.e., an instance of some property that's essentially the property of having some or other property that meets condition C), as realization physicalism requires.¹⁶ It is, however, still a kind of non-physical-to-physical token identity theory, for it requires that every non-physical property-instance be identical with some *part* of

a physical property-instance. How so? ShoePhys* entails that every non-physical property-instance is realized – in the sense of SR4 – by a physical property-instance. But what this amounts to – as inspection of SR4 makes clear – is that a realized non-physical property-instance just *is* a certain cluster of causal power-tokens, and that this cluster just *is* a cluster that partially constitutes, hence is a part of, the realizing property-instance. It sounds odd at first to say that every non-physical property-instance should be identical with some part of a physical property-instance, since we don't usually think of property-instances as *having* parts. But they *do* have parts if the metaphysics of property-instances that ShoePhys* assumes is true. Are these parts *physical* parts? I think so. If a causal power-token (or cluster of such tokens) is an *essential* part of a physical property-instance, then it is physical enough. Any theory that posits physical property-instances can't help but also posit the causal power-tokens that are its essential parts; those causal power-tokens are therefore as much the posits of the theory as are the property-instances.

So ShoePhys* is a novel formulation of physicalism. How attractive is it, especially in comparison with realization physicalism? ShoePhys* has the important virtue of meeting the necessitation, constitution, and truthmaking conditions. We have already seen that it meets the necessitation condition; indeed, it was contrived precisely so that it could. Here's how ShoePhys* meets the constitution condition. If it's true, then every non-physical property-instance is realized in the sense of SR4 by some physical property-instance and hence, as we saw in the last paragraph, every non-physical property-instance must be identical with some *part* of the physical property-instance that realizes it. In that case, however, ShoePhys* yields a good sense in which, if physicalism is true, then non-physical property-instances are constituted by physical phenomena, since, given ShoePhys*, non-physical property-instances turn out to be entirely constituted by (physical) *parts* of physical property-instances. Finally, let's see how ShoePhys* meets the truthmaking condition. If ShoePhys* is true, then every non-physical property-instance is identical with some part of

the physical property-instance that realizes it, so that any true ascription to an object of a non-physical property must be made true by that object's instantiation of the realizing physical property. So ShoePhys* also yields a good sense in which true talk about non-physical phenomena is made true by physical phenomena. That ShoePhys* can meet the necessitation, constitution, and truthmaking conditions gives it an advantage over pure supervenience formulations of physicalism, since they cannot (see Melnyk, 2003, Ch. 2). But it gives ShoePhys* no advantage over realization physicalism, since realization physicalism can also meet the three conditions (see Melnyk, 2003, Ch. 1).

However, there are problems that ShoePhys* faces and must successfully address, but that realization physicalism doesn't face in the first place. I'll discuss four. The first is whether ShoePhys* really does meet the necessitation condition. Certainly it appears to do so, as we have seen, but there may be a difficulty with the account provided above of how it does so. What makes it appear to do so is the explicit assumption of (SR4) that a subcluster of a given cluster of P-conferred causal power-tokens constitutes an instance of non-physical property N. The possible difficulty arises because – plausibly – not just any old subcluster of a given cluster of causal power-tokens constitutes a genuine property-instance (otherwise we'd end up with too many property-instances). Hence, some *further* condition must be met by those subclusters that do (see Shoemaker, 2001, pp. 85–86). And it is presumably a task for metaphysics to say what this further condition is. But now reconsider *a*, which is P and which therefore possesses a certain cluster of power-tokens. In order for *a*'s being P to necessitate its being N, there must be a subcluster of the P-conferred cluster of power-tokens such that (i) the subcluster meets the further condition noted above and (ii), given that (i) is met, possession of that subcluster by an object just is the possession by that object of N. However, the meeting of the further condition must be a purely physical affair, entirely specifiable in (narrowly) physical terms, for if it isn't, then the SR4-type realization of *a*'s being N by *a*'s being P won't entail

that *a*'s possession of the non-physical property N is necessitated by *purely physical* states of affairs, even though *a*'s being P is physical. So, for a frivolous example, suppose that a subcluster of a given cluster of causal power-tokens constitutes a genuine property-instance only if it is divinely classified as natural. Then, since being divinely classified as natural is not a physical property, the SR4-type realization of *a*'s being N by *a*'s being P won't entail that *a*'s possession of N is necessitated by purely physical states of affairs, and so ShoePhys* will fail to meet the necessitation condition. The first problem for ShoePhys*, then, is to provide an account of the further condition which implies that, in the cases of interest, the condition can be met by a subcluster of causal power-tokens solely in virtue of physical states of affairs. And it isn't obvious how this might be done. By contrast, realization physicalism meets the necessitation condition without difficulty (see Melnyk, 2003, Ch. 2).

The second problem that ShoePhys* faces arises because, on the account of realization – SR4 – that ShoePhys* assumes, a property-instance is a candidate to be physically realized only if it can be identified with a cluster of causal power-tokens. The problem is that, for some non-physical properties, it's implausible to identify their instances with clusters of causal power-tokens. For example, some properties seem to be such that possession of them requires having not just causal *powers* but an *actual causal history* of some particular kind; perhaps *having such-and-such a biological function*, *being a member of a species*, *being a virgin*, and *being a mother* are such properties. In response to this difficulty, it might be suggested that properties could still be understood causally, but in a broad enough sense that actual causal histories, rather than just causal powers, could help constitute properties. But the trouble with this suggestion is that ShoePhys* assumes an account of realization – SR4 – that apparently applies only to properties that can be understood as clusters of causal powers. Hence, if some properties are understood as constituted by other things too, then ShoePhys* is left with no account of what the realization of such

properties would amount to. It's possible, of course, that SR4 could be *extended* to cover such properties, but that would need to be shown.¹⁷ Another example of properties whose instances it's implausible to identify with clusters of causal power-tokens are those properties whose possession by an object requires the object to stand in some actual but non-causal relation to something; perhaps *being to the right of a dog*, *being taller than the President*, and *residing in Bowling Green, Ohio* are such properties. Interestingly, Shoemaker claims explicitly that non-causal properties can be realized in his sense. However, his only examples of such properties are determinables realized by their determinates (e.g., red and scarlet), and he always treats these as causal (see Shoemaker, 2001, p. 74 and p. 78). I see no hint from Shoemaker of a solution to the present problem.

No such problem, however, afflicts realization physicalism, for its account of realization allows that any higher-order property is a candidate to be physically realized, and a higher-order property, as we saw in section one, needn't have an associated condition that takes the form of a causal role. Of course, it would always be open to a supporter of ShoePhys* to address this second problem by retreating to a hybrid formulation of physicalism that supplements ShoePhys* with some other notion of realization (e.g., that of realization physicalism) to handle the properties that it apparently can't handle. However, such a solution would need to meet a new obligation: to explain why it doesn't abandon SR4 completely, and simply adopt realization physicalism instead of ShoePhys*.

The third problem that ShoePhys* faces arises because, as we saw earlier, in order to meet the necessitation condition while also meeting the constitution and truthmaking conditions, ShoePhys* must take a certain view about the nature of property-instances, namely, the view that, for any actual property P, a thing's possession of P is identical with its possession of a cluster of causal power-tokens of a certain type. Now this view entails a claim of necessitation, namely, the claim that, for any actual property P, there's a type of cluster of causal power-tokens such that the possession by any object of a

cluster of that type metaphysically necessitates the object's possession of P. This necessitation claim, however, as John Hawthorne has argued, is not true for all *possible* properties (Hawthorne, 2001, pp. 373–374). For, in order to define properties in terms of causal powers in a way that avoids both circularity and the positing of properties that can't be causally defined, one must define properties by applying the Ramsey–Lewis technique to the set of causal laws that completely describes the properties' causal inter-relations; in this way, all properties are defined simultaneously in terms of their powers to cause and be caused by one another. But then, because properties so defined are defined purely structurally, Hawthorne can describe a case of two possible properties that are distinct, even though, because their Ramsey–Lewis definitions are the same, they can only be associated with a single cluster of causal power-types. If Hawthorne's case is genuine, then it's not true that, for any *possible* property P, there's a type of cluster of causal power-tokens such that the possession by any object of a cluster of that type metaphysically necessitates the object's possession of P. Now Hawthorne's result doesn't itself discredit ShoePhys*, since ShoePhys* isn't committed to a claim about all *possible* properties, only to the corresponding but weaker claim about all *actual* properties. And Hawthorne doesn't present any pairs of *actual* properties that are exactly alike in causal powers yet still distinct. But ShoePhys* is still left in a problematic position, for if it *does* turn out that there are no pairs of actual properties that refute the weaker claim to which it's committed, then this will be (it seems) sheer good luck for ShoePhys*. As a result, endorsement of ShoePhys* before we have any reason *at all* to think there are no such pairs seems irresponsible.¹⁸

The final problem that ShoePhys* faces concerns the question what sorts of things causal power-tokens are supposed to *be*. At first glance, one might think to construe power-tokens in some reductive Humean way – perhaps in terms of cause-constituting regularities that objects *would* fall under if they *were* in circumstances of various different kinds. Realization physicalists could construe power-tokens in this way. But

partisans of ShoePhys* could not. For such construal would have to identify an object's power to cause so-and-so with the object's falling under (or potentially falling under) a regularity between the object and so-and-so. But objects fall under regularities in virtue of their instantiating *properties*. Therefore, since, according to the metaphysics with which ShoePhys* is shot through, property-instances are *constituted* by causal power-tokens, any reductive Humean construal of power-tokens would be circular, ultimately construing causal power-tokens in terms of causal power-tokens.

What else might causal power-tokens be? It's conceivable that they might be reduced in some hitherto unknown non-Humean way. But until such a way is proposed, the only coherent alternative would be to abandon reductionism and instead treat them as fundamental and hence unanalyzable elements of reality – perhaps as the *sui generis* categorical bases for the holding of certain counterfactuals about the objects that have them. But such a view obviously raises pressing questions. Are causal power-tokens – construed as fundamental elements of reality – supposed to be items to whose existence we're already committed, perhaps because of common-sense or scientific claims that we endorse? If so, then how exactly does the commitment arise? And if they're not, then what warrant do we have for positing their existence – aside from their utility in formulating ShoePhys*? It's a virtue of realization physicalism, as compared with ShoePhys*, that it's free of the metaphysical commitments – to power-tokens and to their role in constituting property-instances – that generate the third and fourth problems that ShoePhys* faces.¹⁹

IV

Finally, let me turn to the prospects for a realization-based formulation of physicalism that appeals to the second kind of realization of which Shoemaker has recently given an account (Shoemaker, 2003, pp. 13–16; Shoemaker, unpublished, pp. 7–11). Now Shoemaker doesn't discuss this second kind of realization because he thinks it might serve in formulating

a version of physicalism; his project is a different one. However, I think it's still worth enquiring whether this second kind of realization *could* serve in a realization-based formulation of physicalism. Why? Because Shoemaker says that this second kind of realization can hold in cases where "the properties of fundamental particles and the like, and their relations to one another, realize the properties of entities composed of these" (Shoemaker, 2003, p. 6); and he adds that the realizers are microphysical states of affairs, while what gets realized are instantiations of properties (Shoemaker, 2003, p. 6). A realization relation with these features is worth investigating, because it might yield a realization-based formulation of physicalism that could handle cases *other* than those of same-subject realization; such a formulation could perhaps supplement ShoePhys*, which otherwise suffers the disadvantage, not hitherto mentioned, of being restricted to cases of same-subject realization. I shall argue, however, that Shoemaker's second kind of realization is too weak to serve in a formulation of physicalism, for a property instantiation can be realized in this second way by a microphysical state of affairs and yet, intuitively, fail to be (broadly) physical.

Let me begin my argument by sketching Shoemaker's account of this kind of realization. It can be expressed with sufficient accuracy for present purposes, I think, like this:

Microphysical state of affairs m realizes non-physical property-instantiation p iff

- (1) the microparticles involved in m are among the microparticles that make up the subject of property-instantiation p ; and
- (2) m belongs to a type of microphysical state of affairs M and p is an instantiation of a property P such that M is paired with P in accordance with a one-one mapping between a series of types of microphysical states of affairs and the properties that a persisting thing has over time, where, relative to this mapping, there is an isomorphism between the causal profiles of the types of microphysical states of affairs and the causal profiles of the properties.

Types of microphysical states of affairs have causal profiles in the sense that, alone and in combination, their tokens

enter into causal relations with one another; properties have causal profiles in the sense that their instances, alone and in combination, enter into causal relations with one another.

Let me now explain why the realization – in this sense – of non-physical property-instantiation p by microphysical state of affairs m is not sufficient for the (broad) physicality of p . I note, first, that the holding of condition 1 doesn't suffice for the (broad) physicality of p . Even if the subject of property-instantiation p were *exhaustively* decomposable into the microparticles involved in microphysical state of affairs m (so that condition 1 was certainly met), the subject's instantiation of P (i.e., p) might still be the instantiation of a property that wasn't, even in a broad sense, physical. For P might be distinct from any physical property, distinct from any property constructible out of physical properties, and distinct from any property functional in the realization physicalist's sense; it might, for example, be strongly emergent relative to M, i.e., such as to be instantiated whenever M is tokened, in accordance with a fundamental (hence irreducible) law of synchronic emergence connecting M to P.

So the holding of condition 1 doesn't suffice to make p physical in a broad sense. I now ask, therefore, what difference, if any, the addition of condition 2 makes. The answer, however, as far as I can see, is none. And the reason is that condition 2 would make a difference only if it ruled out the possibility of P's being (e.g.,) a strongly emergent property by implying the holding of some substantive metaphysical relationship between M and P. But it doesn't imply the holding of any substantive metaphysical relationship between M and P. All that condition 2 requires is that an isomorphism of a certain kind hold between the set of properties to which P belongs and the set of types of microphysical states of affairs to which M belongs; but because such an isomorphism requires only a mapping – a purely formal relation – between individual properties and individual types of microphysical states of affairs, it requires no substantive metaphysical relation to hold between them; so, a fortiori, it requires no relation to hold

between them that would ensure the (broadly) physical character of instantiations of the properties.

I don't wish to discourage the exploration of formulations of physicalism that rival my own – far from it. But if what you're looking for is a realization-based formulation of physicalism, realization physicalism still looks to be the best game in town.²⁰

NOTES

¹ If needed (e.g., to discuss multiple realization), a type-type realization relation, corresponding to the token-token realization relation mentioned in the text, could easily be characterized.

² For the sake of concreteness, my example assumes Michael Tye's representationalist account of headaches (see Tye, 1995); but realization physicalism is not committed to representationalism.

³ And possibly (c) the existence in certain spacetime regions of *nothing* – not just nothing physical, but nothing of *any* kind. Such a clause might be needed to account for *perforated* tokens, such as cheese graters.

⁴ John Hawthorne, responding to an ancestor of this paper, pointed out that if *any* set of possible individuals counts as a property, and if membership in a set of possible individuals suffices for the member to possess the property, then, contrary to RP, individuals in the actual world will turn out to possess any number of strange properties unlikely to be either physical or physically realized. Though I have no positive theory of properties to offer, I am happy to block this objection by denying that any set of possible individuals counts as a property. However, Hawthorne's comment does raise an important but neglected question that I can only state roughly here: does RP need a *third* clause which specifies sufficient conditions for various *Boolean combinations* of physically realized properties to count as physicalistically acceptable?

⁵ Necessary conditions for the *truth* of a formulation of physicalism are, of course, another matter entirely.

⁶ For a fuller discussion, and some defense, of these two conditions, and explanation of how realization physicalism satisfies them, see (Melnik, 2003, Ch. 1 and 2).

⁷ For elaboration and defense of this last move, see the discussion of reduction and explanation in (Melnik, 2003, Ch. 3).

⁸ In correspondence, Shoemaker claims that his view makes *realized* properties second-order in the sense that they are instantiated in virtue of the instantiation of other properties. But his claim is consistent with his

view's allowing the possibility that those very properties that are (not just instantiated but) realized in the actual world should in other worlds be simply instantiated, i.e., instantiated but not in virtue of the instantiation of other properties.

⁹ Shoemaker modifies this account in a later paper (2003, pp. 2–3), adding the requirement that the causal liabilities of X (i.e., the ways in which instances of X can be caused) should be a proper subset of the causal liabilities of Y. However, since this modification – I believe – makes no difference to the points I want to make, I shall ignore it for the sake of a more digestible exposition.

¹⁰ I am indebted for this suggestion to Shoemaker himself in private correspondence.

¹¹ Or, in other words, only if the object's non-physical properties *supervene* on its physical properties (perhaps together with other physical conditions, including laws). For full discussion of this third condition, see (Melyk, 2003, Ch. 2).

¹² SR2 is logically equivalent to an account of the realization of a property-instance suggested to me by Shoemaker himself in private correspondence: for a property-instance to be realized by another on a particular occasion "...is for the realized property-instance to be an instance of a property having as one of its realizers a property of which the other instance is an instance, where both the realized property and the realizer are instantiated in the same thing at the same time".

¹³ This move is, of course, at least Shoemakerian (see Shoemaker, 1998, pp. 63–66)

¹⁴ The claim that *a*, solely in virtue of being P, *must* possess a certain cluster of causal power-tokens seems to entail that the actual causal powers bestowed by P are essential to P. Without this claim, however, realization in the sense of SR4 couldn't meet the necessitation condition, and neither could any of its relatives. So, although Shoemaker (2003, 2, note 2) may be right to hold that his account of property realization doesn't in itself require that properties' causal features be essential to them, the need to meet the necessitation condition does require it.

¹⁵ Since the cluster is metaphysically sufficient for the property-instance, and since the property-instance metaphysically requires the 'something else', the cluster must also be metaphysically sufficient for the 'something else'. And yet the cluster is meant to be distinct from the 'something else'. So the objection being discussed must hold that there can be metaphysically necessary connections between distinct existences. I don't know whether this commitment is a problem.

¹⁶ It's worth reiterating the incompatibility – and not mere difference – between ShoePhys* and realization physicalism. Realization physicalism can't allow any world in which an object possesses *only* mental properties, since,

even in a non-physicalist world, an object with mental properties must also possess lower-order realizer properties of *some* kind, even if they're non-physical. By contrast, ShoePhys* *can* allow a world in which an object possesses only mental properties, since in order to possess mental properties the object need only possess a cluster of causal powers of the right types.

¹⁷ Thanks to Jessica Wilson for the suggestion here criticized.

¹⁸ Hawthorne considers a version of the view he criticizes that avoids his objection (Hawthorne, 2001, p. 375). This alternate version says, in effect, that what properties are instantiated *globally* supervenes upon what causal powers objects possess. But because global supervenience allows possible worlds containing two objects with the same causal powers but different properties, it isn't strong enough for the purposes of ShoePhys*, which requires that any object that possesses so-and-so causal power-tokens *must* possess such-and-such property, and hence that any two possible objects (whether worldmates or not) which have the same causal powers have the same properties. Thus ShoePhys* requires the claim that what properties are instantiated *strongly* supervenes upon what causal powers objects possess.

¹⁹ Shoemaker has reminded me, in private correspondence, that he regards functionalist views of the sort that realization physicalism exemplifies as facing the grave objection that they rob non-basic properties of causal relevance. This objection is serious, but I have argued at length that it can be turned (see Melnyk, 2003, Ch. 4).

²⁰ An ancestor of this paper was presented at a Conference on Physicalism, efficiently organized by Janice Dowell, that was held at Bowling Green State University in April 2005. I owe thanks to all the participants who commented usefully on that occasion or later, and especially to Jessica Wilson, Janice Dowell, Gene Witmer, and John Hawthorne. I am much obliged also for helpful comments from Sydney Shoemaker and John Heil.

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