

The modal status of materialism

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Abstract Materialism, as traditionally conceived, has a contingent side and a necessary side. The necessity of materialism is reflected by the metaphysics of realization, while its contingency is a matter of accepting the possibility of Cartesian worlds, worlds in which our minds are roughly as Descartes describes them. In this paper we argue that the necessity and the contingency of materialism are in conflict. In particular, we claim that if mental properties are realized by physical properties in the actual world, Cartesian worlds are impossible.

Keywords Materialism · Brute necessity · Realization · Dispositions

Materialism, as traditionally conceived, has a contingent side and a necessary side. The contingent side is reflected in the claim that the mental entities in our world are “ultimately physical”. The most popular understanding of what “ultimately physical” means is that mental states (properties and events) are realized by physical states (properties and events).¹ That mental phenomena in this world are ultimately physical is not meant to imply that mental phenomena are physical in all possible worlds. In this sense, materialism is a thesis about our world alone.²

The necessary side is reflected in the metaphysics of realization. Most philosophers agree that if A realizes B, then the instantiation of A metaphysically

¹ See Melnyk (2003) for a particularly clear formulation and defense of the view.

² For influential formulations of materialism according to which it’s a contingent thesis, see Lewis (1983) and Jackson (2000).

necessitates the instantiation of B.³ In other words, realization entails metaphysical supervenience. If my being in pain is realized by my brain state, then in no possible world can there be a creature in a type-identical brain state who isn't in pain. In this sense, materialism is a thesis about all possible worlds.⁴

What is the principal alternative to materialism? Dualism, of course. But what is it to be a dualist (whether substance or property)? If materialism says that mental phenomena are physically realized in this world, then dualism, as we understand it, says that mental phenomena are basic, as basic as the fundamental phenomena of micro-physics. Let us call a world "Cartesian" if it contains entities (whether they be substances, properties, events, or states) that are clearly mental and are instantiated in a basic way. The debate between dualists and materialists is whether our world is Cartesian. Materialists insist that it is not, but normally they do not deny that other possible worlds are Cartesian. Ghosts, spirits, and disembodied minds of all sorts can exist in other possible worlds; they are just banished from our world.

So, to repeat. Materialism, in so far as it allows the possibility of Cartesian worlds, is a contingent thesis. On the other hand, in so far as what it claims about our world is a supervenience claim, it does entail consequences for all other possible worlds. On the surface, these two aspects of materialism—its contingency and its necessity—do not conflict with each other. However, it is our view that things are not as they appear on the surface. Indeed, in order to maintain the supervenience claim, materialism must abandon the pretense of contingency. If materialism is true of our world, we contend, then no other worlds are Cartesian worlds.

Why think materialism is contingent (if true at all)? Perhaps a posteriori, though there are those who would certainly deny this claim too, but why metaphysically contingent? Well, let's assume it is at least a posteriori. At least part of why it might seem contingent as well is that otherwise we would be committed to the existence of "brute" necessity. By "brute X", we mean a phenomenon that is X and there is no illuminating explanation for why it is X. Some facts about our world are, or at least might be, brute in this way. That certain fundamental physical magnitudes are what they are—say the speed of light, or the gravitational constant—might be just brute facts. If you ask why, you get the answer, "because that's how the world is".

The actual seems to us the proper place for the brute. "That's just the way it is" seems appropriate when it's contrastable with "of course it could have been otherwise". Brute nomological necessity is okay, since this is just part of the bruteness of the actual world. But brute metaphysical necessity—being told not only that this just happens to be how things are, but this happens to be how they have to be—this we really don't understand. What "just happens to be" can't be "how it has

³ What are the relata of the realization relation – are they properties, property instances, or a combination of both? We don't think much hangs on this issue, for it seems that there are natural ways of thinking about realization according to which it's a relation between properties, a relation between property instances, and as a relation between properties and property instances. This point, however, is something that we won't pursue further here. In the main text we talk of realization as a relation between properties.

⁴ See Shoemaker (1981) and Melnyk (2003) for discussions of realization and necessitation.

to be". In the end, we think metaphysical necessity has to be grounded in logic.⁵ How you tell that story is complicated; and we'll touch on it presently. But if this is so, and if there's no way to get materialism out of logic, then it seems to follow that materialism expresses a contingent fact. So Cartesian worlds would seem to be metaphysically possible.

Now, turning to the other side of the coin, why think realization must involve metaphysical necessitation? The reason is this. What exactly realization is is difficult to say, but it's clear that it's a tighter relation than mere lawful correlation. If all it meant to say that property P_1 is realized by property P_2 is that there's a law according to which whenever the latter is instantiated so is the former, then to say that mental properties are realized by physical properties wouldn't rule out property dualism. After all, the property dualist (e.g. Chalmers 1996) is quite happy to acknowledge that brain states lawfully give rise to sensation states. No, for the realization thesis to have bite it's got to be the case that in an important sense when the realizer is instantiated it doesn't merely cause the realized to be instantiated, but it *amounts to* the realized being instantiated. Now it's notoriously hard to give a precise account of what this "amounting to" amounts to, but at the very least it must entail metaphysical necessitation, or supervenience. That is, it must be the case that the realizer's instantiation metaphysically necessitates the instantiation of the realized.

Alas, the very same intuition that metaphysical necessity can't be brute, on which we based the contingency of materialism, leads to a doctrine concerning realization that seems to be inconsistent with the contingency of materialism. The doctrine in question—let's call it the "identity doctrine"—is that "realization theories", by which we mean (borrowing the term from Poland 1994) theories that explain how some property is realized, must involve an identity claim; in particular, an identity claim where one side of the identity contains a description that is logically derivable from the canonical description of the realizing property.⁶ The problem is that it seems to follow from this doctrine that if mental properties are physically realized in this world, there are no possible worlds in which they are basic.

The argument for the identity doctrine begins with the claim above that realization involves metaphysical necessitation of the realized by the realizer. How does that get us to commitment to an identity claim? Well first, remember the constraint that necessity can't be brute. What's true of our world, or a subset of possible worlds, can be a brute fact, but not what's true of all possible worlds. We said above that the way to avoid making necessity brute was to ground it in logic. That a statement of the form $P \vee \sim P$ is true in every possible world is no mystery, and doesn't deserve to be called a "brute" fact. So if all metaphysical necessitation

⁵ See Levine (2001), chapter 2 for a detailed defense of this view. Actually, it is consistent with our argument here to allow that, in addition to being grounded in logic, metaphysical necessities can also be grounded in non-logical a priori principles, if any there be. Mathematical truths might fit this category. This is a complicated issue, of course, and it doesn't really affect the argument in this paper.

⁶ Again, see Levine (2001), chapter 2 for defense of this doctrine.

can be brought to that level, explained as a consequence of logical necessity, then the threat of brute metaphysical necessitation is avoided.⁷

But how is that to be done? After all, the instantiation of the realized property doesn't normally follow logically from the instantiation of the realizing property. That's true, but only relative to their canonical descriptions. So, for example, if we claim that pain is realized by C-fiber firing, then obviously the statement "Jones is in pain" doesn't follow logically from the statement "Jones's C-fibers are firing". But this is where an identity claim comes to the rescue. If there is another description of the situation characterized by the statement "Jones is in pain"—a description that characterizes that very same situation, the instantiation in Jones of the very same property—that does logically follow from the statement "Jones's C-fibers are firing", then the fact that the one situation—Jones having her C-fibers firing—metaphysically necessitates the other situation—Jones being in pain—is no longer aptly considered a brute fact. Since under at least one description the relation between the two situations is seen to be grounded in logic, this doesn't count as an instance of brute metaphysical necessitation.

The point, then, is that if there is a description of the realized property such that, under that description, its instantiation follows logically from the instantiation of the realizing property (under its canonical description), then we're home free. So suppose that's so. Suppose, that is, that there is another description of pain that meets this condition. Call it " D_p ". Well, if D_p really does describe the very same property as the term "pain", then we are committed to the identity claim, " $\text{pain} = D_p$ ". Thus, to avoid making realization a brute relation, it is necessary to ground it in an appropriate identity claim.

One might wonder about the character of the identity claim itself though. Presumably whatever goes in for " D_p " in the identity claim above isn't going to be such as to make the claim knowable a priori. Of course some philosophers do want to ground their materialism about the mental in an a priori accessible analysis of our mental concepts, but many don't, and they too want to maintain the metaphysical necessity of the realization relation. So if the identity claim that provides the link between realized and realizing properties isn't itself based in logic, doesn't that show that the realization relation involves brute necessity after all? Haven't we just pushed the bruteness from the realization relation to the identity relation?

Yes, we have, but then that's where it belongs. Identity is, as we see it, a logical relation. It says of something that it is what it is, it is identical with itself. This isn't a situation that only obtains in this world, but of course in all possible worlds. What is not part of logic, of course, is that two distinct signs should pick out the same object. But that's alright, since that fact—that the two signs corefer—is not being claimed to be metaphysically necessary by the identity statement. This is how we can get

⁷ Why think that brute logical necessities are acceptable if brute metaphysical necessities are not? One might demand that logical necessity itself be grounded in terms of some more fundamental sort of necessity. But given that the very concept of necessity seems to be grounded in logic, this seems unreasonable. When it comes to necessity, the buck must stop somewhere, and we claim it stops with logic. To deny brute metaphysical necessity is coherent if not plausible, while to deny brute logical necessity, given the absence of any relevant more fundamental notions, seems scarcely coherent.

a posteriori necessity. It all comes down to the two modal faces presented by an informative identity claim: the situation it describes, that some object is self-identical, is necessary by logic, but the meta-linguistic fact, that the same object is picked out by these two non-synonymous expressions, is not only not a matter of logic, it's not even necessary.

One might wonder at this point, what with all this talk of avoiding brute necessity and characterizing a posteriori necessity in the way we have, whether our account bears an uncomfortable resemblance to the Chalmers-Jackson view.⁸ Well, we do admit to being in sympathy with their desire to ground necessity in logic, and insofar as their view does stem also from a desire to avoid brute necessity, to that extent our views are similar. But they go farther than we do, in a crucial way. They claim that the a posteriori identities themselves must possess an a priori foundation, which leads them to the claim that if materialism cannot be grounded in conceptual analysis it can't be true. We claim instead that when it comes to identity we don't need to appeal to conceptual analysis to avoid brute necessity, since identity itself is a logical relation in the relevant sense. The a posteriori character is grounded in the fully contingent fact that the signs flanking the identity sign happen to pick out the same object.

What we've established so far is only that realization claims must rest on certain identity claims. It's still left open that mental properties might be such as to be realized properties in this world but basic in other possible worlds. The problem emerges when we see what sort of description must go in for " D_p " in the identity claim. A constraint on that description is that it be derivable from the relevant physiological description, together with relevant physical laws. At present, the only sort of description we know of that could meet this constraint is a functional description, the sort of topic-neutral description Smart (1959) made famous and was taken over by functionalists. In such a description the only non-logical terms are those for stimuli, behavior, and the causal relation. Functional descriptions specify causal roles, and their realizers are the role fillers. It's not hard to see how in principle one could derive a claim that a certain role is filled from a sufficiently rich description of the alleged filler together with the relevant laws governing the filler's behavior.⁹

⁸ See Chalmers (1996) and Chalmers and Jackson (2001).

⁹ We have argued that realization involves metaphysical necessitation, but not brute metaphysical necessitation. Does our insistence that there is no brute metaphysical necessity lead to problems in other areas of philosophy? Consider, for example, the issue of composition in metaphysics. Suppose that (i) objects A, B, and C compose some object D in the actual world. Many claim, though Cameron (2007) is a notable exception, that composition is a metaphysically necessary relation in the sense that (ii): if (i), then, for any metaphysically possible world w in which A, B, and C exist and are arranged as they are in the actual world, they compose D in w . Markosian (1998) claims that facts like (i) are brute, and he seems to endorse (ii), qua metaphysically necessary truth. Hence, it seems that he is committed to the claim that composition involves brute metaphysical necessity, for, if (ii) were a logical truth, the truth of (i) wouldn't be brute. If this is indeed Markosian's position, then we can say that our admonition against brute metaphysical necessity rules it out. What are we to think about composition, then? We are inclined to treat composition much like we treat realization above: composition rests on identity claims. The idea, very roughly, is that the property, say, *being a table*, is identical to the property *having some parts or other arranged in such-and-such way*. In this case, you can derive the claim that the "table role" is filled from a sufficiently rich description of the arrangements of certain objects. In this sense, composition, qua metaphysically necessary relation, is underwritten by logic.

However, if mental properties are identical to causal role properties, then it's hard to see how they could be basic in any possible world. So if we identify materialism in the philosophy of mind with the doctrine that mental properties are not basic properties, it turns out that materialism, if true, is necessarily true. Hence the intuition we started off with, that materialism is a contingent thesis, that the mind is material in our world but not necessarily in every possible world, has been shown to be inconsistent with at least one way of characterizing the thesis.¹⁰

It seems to us that there are several ways one might go in order to save the contingency thesis about materialism and still maintain the account of realization above. We will discuss six. First, one might, for example, deny that only a description of a causal role can fit the bill for substitution for “ D_p ” in the identity claim. Perhaps a different sort of description will do, one that doesn't seem to rule out the possibility of being basic for the property so described. Perhaps, but we doubt it. Remember, the requirement is that the instantiation of the mental property under this description has to be shown to be logically derivable from the instantiation of its realizer under its canonical description. What sort of description other than a “role-description” is going to meet that constraint? We certainly can't think of anything. Putting this issue to the side, let's consider more promising arguments that materialism is contingent despite the fact that mental properties are role properties.

A second possible move, and perhaps the most obvious one, is to say that it would count as a violation of materialism not just if mental properties turned out to be basic, but also if they were realized in non-physical properties. That's the point of the standard “it-could-be-ectoplasm” story. So let's distinguish between Cartesian worlds (as characterized earlier) and worlds in which mental properties are realized by non-physical, ectoplasmic properties, what we will call “ectoplasm worlds”. Assuming that ectoplasm worlds are possible, the question is whether ectoplasm worlds are worlds in which materialism is false.

We don't think so, and here's why. A longstanding issue in the philosophy of mind is how to specify the sense of “physical” at issue with materialism.¹¹ There is no corresponding problem, however, for specifying mentality; mental properties are either conscious properties or intentional properties. Given that we all have a good grip on what it is to be mental in the sense relevant to the mind-body problem, we formulate materialism without a positive conception of the physical: only non-mental properties are instantiated in a basic way; all mental properties are instantiated by being realized by the instantiation of other non-mental properties.¹²

¹⁰ What about those, e.g. Kim (1992, 1998, pp. 94–95) and Lewis (1980), who claim that mental properties are identical to the role fillers for the causal role properties we have in mind above? In particular, does our argument show that materialism as they understand it is a necessary thesis? Yes it does. First, if we are talking about the mental properties themselves, then, of course, if they are identical to physical role fillers, they are necessarily physical. Second, if we're talking about the mental concepts, the non-rigid descriptions by which, according to them, we pick out mental properties, then these apply to even alien properties in other possible worlds only by virtue of higher-order descriptions that are satisfied in a world in a non-basic way. In other words, pretty much the same considerations apply to the Kim/Lewis view as apply to the type-functionalism.

¹¹ See, for example, Smart (1978), Chomsky (1988), Poland (1994), and Melnyk (2003).

¹² This is the formulation found in Levine (2001).

On this formulation of materialism, ectoplasm worlds are non-materialist only if ectoplasm is mental. But is it mental? If ectoplasm is mental, it has to have mental properties, so now the question is whether these properties are basic in ectoplasm worlds. If they are, then we have a case of consciousness and intentionality being realized in a basic fashion in some worlds (ectoplasm worlds) but in a non-basic fashion in other worlds (the actual world), which we argued above is not possible. If mental properties are realized instead in more basic ectoplasmic, non-mental properties, then, though ectoplasm worlds aren't "physical" worlds in the sense of sharing a physics with our world, they aren't non-materialist worlds either because they don't conflict with the formulation of materialism set out above. We maintain that, in the end, the debate in philosophy of mind isn't about the nature of the realizers, so long as they themselves are clearly not mental.

We argued above that the possibility of ectoplasm worlds doesn't render materialism contingent. Are there other sorts of possible worlds that would do the job? Jonathan Schaffer (2003) argues that (i) materialism is false if the actual world has no fundamental level of reality; and (ii) infinite descent is an epistemic possibility and ultimately an empirical question. If he is right and materialism is true (and thus there is an actual fundamental level), then materialism is contingently true because it's false in worlds with no fundamental level. This third potential route to the contingency of materialism doesn't depend on accepting that mental properties can be instantiated in a basic fashion, so perhaps the possibility of worlds with no fundamental level rather than ectoplasm worlds renders materialism contingent. We don't think, however, that this strategy will work, for, though we're sympathetic with claim (ii) from above, we don't think Schaffer has successfully established (i).

First we should more carefully state Schaffer's proposal: he claims that what we might call "robust" materialism in particular is false if there is infinite descent. His argument proceeds thus. According to Schaffer, materialism requires that there is a "physical base" from which all else, both physical and mental, is derivative. Supposing that there is infinite descent, he poses the following dilemma: the physical base is located either at an infinite number of levels below a certain cut-off or a finite number of levels, and both options lead to unacceptable consequences for materialism. For the first horn, suppose that the entities on levels $L + 1$ and higher are derivative with respect to the entities on L and lower, so we decide that the entities occupying L and lower constitute the physical base. Schaffer argues that in this case the entities occupying levels L and higher must be derivative with respect to the entities occupying levels $L - 1$ and lower, so it's arbitrary whether we choose as the physical base the entities occupying L and lower or those occupying $L - 1$ and lower. Schaffer therefore concludes that there is no principled way of drawing the distinction between what is primary (certain physical entities) and what is derivative (the mental entities and other physical entities) if there is no fundamental level. If this is right, then materialism, Schaffer suggests, is "toothless" (but perhaps not false) in the face of infinite descent.

Robust materialism, then, locates the physical base at a finite number of levels, so let us now turn to the dilemma's second horn. Schaffer claims that any version of materialism according to which the physical base consists of entities occupying a finite number of levels is simply false in the face of infinite descent. For suppose

that the physical base is located at levels L through $L - 3$, so the occupants of these levels are primary and all else is derivative. According to Schaffer, the problem here is that, though the occupants of levels $L + 1$ and higher may be derivative with respect to entities that constitute the physical base, occupants of levels $L - 4$ and lower aren't. Hence it's simply false to say that from the physical base all other entities are derivative, so robust materialism is itself false in the face of infinite descent.

Are we to conclude that possible worlds with no fundamental level are non-materialist worlds? We don't think so; we maintain that Schaffer has set up a false dilemma, for an adequate formulation of materialism needn't appeal to a physical base from which all else is derivative. Recall the characterization of materialism from above: only non-mental properties are instantiated in a basic way; all mental properties are instantiated by being realized by the instantiation of other non-mental properties. We maintain that an adequate formulation of materialism need specify only that mental properties always be realized non-mentally. If we must speak in terms of levels, we can say the following. There is some level L of the actual world such that no objects on L or any lower level instantiate mental properties, and the next level up, $L + 1$, is such that certain objects on that level instantiate mental properties. With L so characterized, a sufficiency claim for materialism is as follows: among worlds that are indiscernible with respect to their levels from L on down, no two differ mentally without differing physically. We conclude, then, that Schaffer has failed to show that materialism is false (or "toothless") in worlds with no fundamental level, so we don't have a good reason yet to think that the possibility of such worlds renders materialism contingent.¹³

So much for the idea that infinite descent and materialism are incompatible. But perhaps there is another way of showing that the possibility of infinite descent is relevant to the contingency of materialism. Here, then, is a fourth proposal to save the contingency of materialism. Suppose that what we will call "limitless mental realization worlds" are possible, worlds in which (i) mental properties are causal role properties; and (ii) their realizers are mental properties. Consider a mental property M_1 instantiated in such a world. By (i), M_1 is realized by some property M_2 , and, by (ii), M_2 is mental. By (i), M_2 is realized by some property M_3 , and, by (ii), M_3 is mental. By (i), M_3 is realized by some property M_4 , and so on *ad infinitum*. It's true that no mental properties are instantiated in a basic way in limitless mental realization worlds, but it's false that these worlds are such that all mental properties are realized by non-mental properties. Hence, one may conclude that materialism is false in limitless mental realization worlds, so if materialism is true, it's contingently true.¹⁴

One might object that it's unclear what makes each M_i in a limitless mental realization world mental, as opposed to being merely non-physical. If it turns out that all we're entitled to say about each M_i is that it's merely non-physical, perhaps

¹³ After crafting this response to Schaffer's argument, we realized that Montero (2006) makes essentially the same point.

¹⁴ Montero (2006) considers something like limitless mental realization worlds and claims that materialism is false in such worlds.

we needn't think that it's really mental, so in this case the possibility of limitless mental realization worlds wouldn't render materialism contingent. In response to this concern, let's suppose that each M_i has a phenomenal character; that is, each M_i is such that its instantiation by a subject essentially involves there being something it's like for the subject to have M_i . Hence, each M_i is mental in virtue of its phenomenal character.

Assuming that limitless mental realization worlds are possible, do they, as opposed to ectoplasm worlds or worlds with (merely) no fundamental level of reality, render materialism contingent? Before we consider this question, let's take a step back and reconsider the matter of whether causal role properties need be non-basic. It is worth seeing if one can make sense out of the idea that they can be instantiated in a basic way, for in this case we wouldn't need to appeal to metaphysical extravagances like limitless mental realization worlds in our effort to secure the contingency of materialism. Here we have a fifth possible route to the contingency of materialism.

There is an ongoing debate in metaphysics concerning the nature of dispositional properties.¹⁵ Following Prior, Pargetter, and Jackson (1982), let's assume that dispositions are causal role properties.¹⁶ Thus, the dispositional property *fragility*, for example, is the property of having some property or other that plays the causal role of fragility. (Properties that can play the relevant causal role include *having irregular atomic structure*, *having weak intermolecular bonding*, and so on.) One question about dispositional properties concerns the distinctness of dispositional properties and their causal categorical bases: if a dispositional property D has a causal categorical base C, need C be distinct from D? Another question is whether dispositional properties need have causal categorical bases in the first place, i.e. whether "bare dispositions" are possible. If bare dispositions are indeed possible, then dispositions, qua causal role properties, can be instantiated in a basic way, so it stands to reason that mental properties, qua causal role properties, can be instantiated in a basic way as well.

Suppose for the sake of argument that bare dispositions are possible and thus causal role properties can be instantiated in a basic way. Let's call worlds in which mental properties, qua causal role properties, are instantiated in a basic fashion "bare mental worlds". We maintain that the possibility of bare mental worlds, however, is a bit of a pyrrhic victory for the thesis that materialism is contingent. What we think people have in mind when claiming that materialism is contingent is that Descartes might have been right. That is, though Descartes was wrong about our minds, there are possible worlds in which minds are pretty much like he said ours are in the actual world. Central to the Cartesian conception of mentality is that thought just inheres in the mind, that it is a categorical property of the mind in the sense that its instantiation isn't a matter of the mind constituting a causal system that meets certain specifications. We claim that it's this conception of mentality that still

¹⁵ The literature on dispositions is quite vast. Mellor 1974 and Prior et al. 1982 are two seminal works.

¹⁶ As is no surprise, this conception of dispositions isn't universally accepted. Armstrong (Armstrong et al. 1996), for example, rejects the claim that dispositions are causal role properties, distinct from their causal categorical bases qua role fillers. He argues instead that dispositions are identical to their causal categorical bases.

motivates dualists—even property dualists who oppose substance dualism—to claim that mental properties are basic. In light of this, let's refine our conception of Cartesian worlds: in Cartesian worlds mental properties are not only basic but categorical as well. If we are right that the possibility of Cartesian worlds so understood is required for the contingency of materialism in the sense that we care about, the claim that bare mental worlds are possible seems to be of no help, for, *prima facie*, mental properties qua causal role properties are non-categorical. Hence, the fifth route to the contingency of materialism fails.

Now we can return to limitless mental realization worlds, part of the fourth proposal we considered above. Not only are mental properties instantiated in a non-basic way in such worlds, but their instantiation is a matter of the mind constituting a causal system that meets certain specifications there as well. Hence, limitless mental realization worlds violate two conditions for being Cartesian worlds, resembling Cartesian worlds even less than bare mental worlds do. Therefore, the possibility of such worlds doesn't deliver us the contingency of materialism in the desired sense either.

It seems, then, that neither the possibility of ectoplasm worlds, limitless mental realization worlds, nor bare mental worlds renders materialism contingent in the desired sense. The contingency of materialism, we have argued, demands the possibility of Cartesian worlds, and nothing else will do. At this point we can think of a sixth and final move one might find worth pursuing: one might claim that any mental property instantiated in the actual world is non-categorical and instantiated in a non-basic fashion, but there are "alien" mental properties—mental properties that are never instantiated in the actual world—that are basic and categorical. Call worlds in which categorical, basic, alien mental properties are instantiated "Cartesian alien worlds". If Cartesian alien worlds are possible, it looks like materialism is contingent in the relevant sense.

Are we to conclude that materialism is contingent? One might object that when we say that materialism is contingent, we mean that the mental properties instantiated *in the actual world* could be instantiated in a basic way in certain merely possible worlds, not that there is a sort of categorical mental property never instantiated in the actual world that is instantiated in a basic way in certain merely possible worlds. We are willing, however, to concede that if Cartesian alien worlds are possible, there are possible worlds in which materialism is false in the desired sense. We claim instead that if materialism is true, then Cartesian alien worlds are impossible. For what are the alien mental properties instantiated in such worlds supposed to be like? Note that mental properties stand in the determinable-determinate relation; the mental property *having a conscious experience*, for example, is a determinable, *being in pain* is a determinate of this property, *having a throbbing pain* is a determinate of both of these properties, and so on. On the assumption that materialism is true of the actual world, one might claim that all the actual determinates of *having a conscious experience* are non-categorical and non-basic, but there are categorical and basic alien mental properties that are determinates of *having a conscious experience* in other possible worlds.

The problem with the sixth proposal, we take it, is fairly obvious: what about *having a conscious experience*—is it categorical or not? Assuming that materialism

is true of the actual world, it's non-categorical. If it's non-categorical, then presumably it's *essentially* non-categorical, so it's non-categorical in Cartesian alien worlds as well. But if *having a conscious experience* is non-categorical in these worlds, then all its determinates are non-categorical there as well. Hence, the alien mental properties instantiated in Cartesian alien worlds that are supposed to be categorical are really non-categorical. The same considerations apply to intentional properties, so if materialism is true, Cartesian alien worlds are impossible. We therefore conclude that, instead of making materialism contingent, the possibility of Cartesian alien worlds would render materialism false.

In this paper we have argued that materialism isn't contingent in the sense relevant to the debate between the materialist and the dualist, provided certain plausible assumptions. Here are the primary assumptions: (i) metaphysical necessity is grounded in logical necessity; (ii) materialism is properly formulated as a realization claim and, given our firm grip on what it is to be mental, a positive conception of the physical isn't required; (iii) an adequate formulation of materialism needn't appeal to a physical base from which all else is derivative; (iv) categorical properties on the one hand and dispositional and causal role properties on the other are type distinct; and (v) whether a property is categorical (non-categorical) is an essential feature of that property.

Is our conclusion hard to live with? Perhaps not. The motivation cited at the start of this paper for maintaining the contingency of materialism was that, since it's not supposed to be an a priori thesis, and since necessities can't be brute, it makes sense to take materialism to be a contingent thesis. But after our discussion of the nature of a posteriori necessity, this motivation no longer retains its hold on us. As we said above, the only way to avoid making a necessity brute, while maintaining nevertheless that it's a posteriori, is to base it on an identity, since identity doesn't count as brute in the pejorative sense. Well, the necessity of materialism, as it emerges from this discussion, is precisely a matter of accepting the need for an identity claim: the identity between the mental property in question and a role property. If this is the basis for the necessity of materialism, then it doesn't count as a brute necessity, and hence it doesn't violate the overarching principle that necessities can't turn out to be brute. Thus, in the end, we have what we want, we suppose. Still, though we aren't so grabbed by the intuition that mentality is basic and categorical to be convinced that materialism is false, we did credit it enough to think that Cartesian worlds are possible. We now know better.

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