

# **The Physical: Empirical, not Metaphysical<sup>1</sup>**

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Introduction:

Intuitively, physicalism is the thesis that there's nothing 'over and above' the physical. There are two questions that must be answered if we are to go beyond this intuitive formulation. First, what is it for nothing to be over and above the physical? There have been several recent and promising attempts to answer this question.<sup>2</sup> What we lack is a careful answer to the second question, namely, what's involved in nothing's being over and above the physical?<sup>3</sup> Answering this second question requires an account of what makes an entity, property, or relation a physical one. Here I hope to outline just such a plausible account, one that, I'll argue, figures in a formulation of physicalism more plausible than rival accounts.

The trick here is to say what 'the physical' in 'nothing's over and above physical' comes to in such a way that it avoids what has come to be known as 'Hempel's dilemma'.<sup>4</sup> Briefly, that dilemma begins with the supposition that there are two strategies for defining the physical, one that takes the physical to be the posits of current physics, the other which takes it to be the posits of ideal physics. The dilemma arises because if physicalism is the thesis that there's nothing over and above the posits of current physics, then physicalism is very likely false, but if it is the thesis that there's nothing over and above the posits of ideal physics, then physicalism lacks determinate content. A satisfactory formulation of physicalism must avoid both horns of this dilemma. More broadly, I'll argue that it must involve, at minimum, defining physicalism such that:

- a) It isn't obviously false (or trivially true). ("Obviously false" covers the first horn of Hempel's dilemma.)
- b) It's contingent and a posteriori.
- c) Its explanatory aspirations are metaphysical, not nomic.
- d) It possesses 'sufficiently determinate' content. (This is the second horn of Hempel's dilemma.)
- e) The content of the notion of the physical must retain sufficient overlap with our pretheoretical notion as it figures in our intuitive formulation of physicalism.

My strategy here is to begin in section I with a more detailed discussion of what satisfying these constraints involves. Then, in section II, I distinguish different strategies for defining "the physical" in physicalism so as to meet these constraints and argue against all such strategies save the one defended here. That position is an unfamiliar implementation of a familiar strategy, one that identifies the physical with the posits of our ideal, completed physical theory.

In sections III, I outline the version of that position that I'll defend. A fully fleshed-out version of a formulation in terms ideal physics must go on to identify what makes a physical theory physical. I'll argue that the best method for fleshing out such a view begins by tying being a physical theory to being a theory with the hallmarks of scientific theories and then identifies physical theories among the scientific ones by their characteristic subject matter, roughly, the world's relatively fundamental elements.<sup>5</sup> The result is a formulation of physicalism according to which there's nothing over and above the posits of our ideal and complete scientific theory of the world's relatively fundamental elements. This formulation has the advantage of building into the thesis of physicalism the very features that make it so plausible, namely, that its ontological commitments are tied to the posits of theories that are confirmed in accordance with our best methods for justifying our beliefs about the natural world.

That's one of the present view's great advantages. For some, one of its disadvantages will be a consequence of that view that is already apparent from this early formulation. There's nothing in the very idea of a posit of our complete and ideal scientific theory of our world's most fundamental elements that rules out that some mental properties are among those posits. That means that, on the present view, it is not a priori that no mental property is among the basic physical ones. For some, this consequence will mean that the present view is bought at too high a cost.<sup>6</sup>

In section IV, I defend this formulation of physicalism against several objections, including this one, and in section V, I assess the extent to which that formulation satisfies the constraints outlined in section I. There's a short answer to the objection concerning the epistemic possibility of basic physical properties that are mental that I'll mention up front. The target of the present account and of its rivals is an explanation of what it is for a property, for example, to be a physical one. To say, as the objection does, that there's nothing that could count as it's turning out that some mental property is among the basic physical ones is to give a substantive, a priori answer to the question 'what does it take for a property to be a basic, physical one?' Far from being obvious, such an account requires defense with an identification of the components of our concepts of the mental and the basic physical that generates the alleged a priori incompatibility. (It also requires defense of the claim that there are interesting, shared, a priori truths and so to rebut Stalnaker's arguments that there aren't.<sup>7</sup>) The present account, in contrast, holds that if no actual mental property is among the basic physical ones, as seems overwhelmingly likely, that's a matter to be settled a posteriori. Without substantive argumentation settling in favor of the claim that the incompatibility is a priori, the present objection begs

the question against the present account, which holds that it is not. (That's the short answer. A more careful response is given in section IV.)

Before beginning, there are two final warnings. First, what's defended here is the sketch of an account of the physical. There are details left out that would be good to have more to say about than I do. (For example, it would be good to have more to say about what makes an element fundamental than one than I do, or more generally to have more to say about the subject matter distinctive of physical theories.) But, I'll argue, the sketch of the account is filled in here in sufficient detail to make its advantages over the alternatives clear. Second, the target here is an account of 'the physical'. So, I'm officially agnostic about what the 'nothing over and above' relation turns out to be. However, throughout the paper I treat 'is or is constituted by'<sup>8</sup> as a favored placeholder.

### **Section I: Some Constraints on a Proper Formulation of the Thesis of Physicalism**

An account of the physical and the resulting formulation of physicalism should be such that it meets the following five constraints:

1. The Genuine Question Constraint: However one formulates physicalism, it should not come out trivially true or clearly false. Whatever that thesis amounts to, there seems to be a genuine question as to whether it's true.
2. The Contingency and A posteriority Constraint: A formulation of the thesis must make physicalism come out contingent and a posteriori. First, physicalism is a contingent truth, if it is a truth. This means that physicalism could have been false, i.e. there are counterfactual worlds in which physicalism is false, for example, counterfactual worlds in which there are miracle-performing angels.<sup>9</sup> Moreover, if physicalism is true, our knowledge of its truth is a posteriori. This is to say that there

are ways the world could turn out to be such that physicalism is false. For example, if there are miracle-performing angels, then physicalism is false. So there are worlds considered as actual in which physicalism is false.<sup>10</sup> For short, call this ‘the a posteriority constraint’.<sup>11</sup>

3. The Content Constraint: A formulation should give the thesis sufficiently determinate content.<sup>12</sup> Given that a formulation should have a way of making it plausible that physicalism on that formulation satisfies the a posteriority constraint, possessing ‘sufficiently’ determinate content requires at least minimally that we can identify some ways the world could turn out or could have turned out such that physicalism on that formulation is false. This amounts to being able to identify what would count as falsifying physicalism both counterfactually and actually.

But also, given the role of explanatory reductions in the debates over physicalism’s truth, it’s at least desirable that a formulation of that thesis has the sort of content that would allow us to say something about what an explanatory reduction<sup>13</sup> has to be like in order to be a distinctively physicalist reduction. To see this, recall how some of these debates go. If physicalism is true, then it should be clear how it is that every actual property is nothing over and above the physical ones. Since dualists despair of an explanation of how it is that some instantiated properties, e.g. the phenomenal ones, are physical, they believe physicalism is false. Vindicating physicalism about the phenomenal then requires at minimum an explanation of what an explanatory reduction of the contested properties to some physical ones would be like. For such an explanation to be genuinely vindicating, however, it had better be clear why the described reduction would count as a physicalist one. The satisfaction of this second

part of the content constraint would guarantee that the needed account of what makes a reduction a physicalist one falls out of the formulation of physicalism itself.

4. The Explanatory Constraint: The explanatory aspirations of physicalism are metaphysical, not nomic. The metaphysical explanation of one set of truths by another is an explanation that holds that the former are made true by what makes the latter true.<sup>14</sup> Metaphysical explanations in this sense contrast with nomic ones. A nomic explanation explains why certain truths are true by citing their causes. The reason for requiring metaphysical explanation is that a formulation that allows that the physical merely nomically explains everything would not get the extension of 'physicalist theory' right. It is perfectly open to a dualist, for example, to hold that there are nomic correlations between the physical and the non-physical (such a view would be a form of emergentist dualism).<sup>15</sup> In general, there's no reason to think that just because an effect's cause is a physical one, that effect is physical as well. This condition on an adequate formulation of the thesis of physicalism is connected to the a posteriority constraint. The failure of the physical to metaphysically explain everything would be one way for physicalism to turn out to be false.<sup>16</sup> So the thesis of physicalism includes the thesis that the physical facts explain in virtue of what the non-physical truths are what they are.
5. The Conceptual Continuity Constraint: When physicalists claim that there is nothing over and above the physical, they do not intend for 'the physical' to be understood in an entirely new, stipulated sense, but to bear significant continuity with our pretheoretical notion. One way of understanding what is at issue between different accounts of the physical, e.g. between Wilson's account and the present

account, is over how best to understand what is central in that pretheoretical notion for the purposes of formulating the thesis of physicalism.

There are, of course, much-discussed disagreements about the best method for discovering the content of our pretheoretical notions.<sup>17</sup> Here is not the place to try to resolve those disagreements. Instead, I'll merely describe the method I favor and hope that its attractions are relatively clear. (For fuller defenses of that method, see Dowell, manuscripts a and b.) On the method I favor, consideration of our intuitions about hypothetical ways the world might turn out to be provides defeasible evidence for and against accounts of the content of the concepts in play in those intuitions. To illustrate: Suppose we found we have a widely-shared intuition that if the well-confirmed physical theory of our world were to turn out to posit something that lacked mass, that would be its turning out that being physical does not require having mass. On the view I favor, that armchair intuition would provide defeasible evidence that our concept of the physical has two features. The first is that our concept is such that being physical does not require having mass. The second is that the content of our concept is tied to what our well-confirmed physical theory tells us there is.

When it does turn out that our well-confirmed physics does posit forces and particles lacking mass and we continue to count such forces and particles as physical, we're given empirical confirmation of our armchair hypothesis about the content of our concept of the physical, namely, that indeed, being physical does not require having mass. (So on the method I favor, the confirmation of an armchair hypothesis about the content of our concepts is an a posteriori matter.) This case, and, as I'll

argue below, others like it, support the central claim defended here, that our concept of the physical is tied to the posits of our best physical theory.

## **Section II: Strategies for Understanding the Physical**

There are a variety of strategies for explaining the features of the content of our pretheoretical concept of the physical that are relevant for formulating the thesis of physicalism. A helpful way of thinking about this variety distinguishes between strategies that are direct and those that are indirect. A direct strategy gives an explanation of what it is for a property, entity, etc. to be a physical one. In contrast, an indirect strategy begins by explaining the physical in general in terms of physical x, for some x and then explains what it is for something to be a physical x without using the notion of the physical.<sup>18</sup> One part of the overall method deployed here decides between the various strategies by measuring them against our intuitions about what we would say were certain scenarios to turn out to be the actual one. These intuitions allow us to develop our best hypothesis about the content of our concept of the physical. Ideal confirmation of that hypothesis requires more knowledge of what the actual world is like than we at present have and, in the consideration of certain scenarios, could have, given our cognitive limitations. But careful consideration of our intuitions about the scenarios considered provides some of the best evidence for deciding between the rival conceptual hypotheses under consideration in this section.

Below I distinguish between three different types of indirect strategy for giving an account of the content of our concept of the physical. But consider first direct strategies. A direct strategy aims to explain our notion of the physical by directly giving an account of what an item (e.g. property) must be like in order to count as physical.<sup>19</sup> We might

consider this strategy by considering each on a list of its particular implementations, but there is good reason to think independently of assessing the merits of particular implementations that no particular implementation is likely to be successful.

To see this, first consider a particular proposal. Following the old mechanistic picture, we might have said that for an entity to be physical it must be impenetrable and its interactions determinate, among other things.<sup>20</sup> Suppose one formulated the thesis of physicalism by relying on such an understanding. Then we would say that everything that exists is or is constituted by what is impenetrable and interacts deterministically. What to say, then, when modern physics contradicts this thesis? Certainly, we must conclude that physicalism, on this formulation, is false. Significantly, however, we do not describe this as a scenario in which physics discovered that there are non-physical kinds. Rather, we think of this scenario as showing us something about what being physical comes to, namely, that it does not require, e.g., deterministic interactions.

More generally, for any set of features  $F_1 \dots F_n$  in terms of which one proposes to directly define the physical, one can always imagine a scenario in which it turns out that physics discovers some property or kind that lacks any of the features  $F_1 \dots F_n$ . Such scenarios, though, aren't ones in which physics falsifies physicalism, but in which physics discovers some new physical property or kind. Even if some direct definition were to get the actual extension of 'the physical' right, what consideration of these scenarios shows is that such a definition would not identify what makes that extension the extension of 'the physical'. The role of physics in this argument suggests that to do that one needs to add that that extension is co-extensive with the set of kinds, properties, etc. that makes our completed physics of the actual world come out true. Our intuitions about

cases in which physics falsifies some proposed direct definition of ‘the physical’ suggest that the explanation for this co-extensiveness is that our very notion of the physical is tied to our notion of being the sort of thing posited by physics, as the above example illustrates.

So direct strategies do not seem able to capture what underlies our notion of the physical, namely, its tie to physical theory. Two indirect strategies are also unpromising. The first is to formulate physicalism in terms of what Daniel Stoljar calls the ‘object-conception’ of physical properties. According to that conception, physical properties are those that characterize the intrinsic nature of our paradigmatically physical objects.<sup>21</sup> For this understanding to be complete, it requires a supplementary account of ‘paradigmatically physical object’ that does not itself rely on the notion of the physical. Suppose, as Stoljar proposes, an adequate supplementation may consist in simply listing the relevant objects. Let the members of that list be kinds of objects  $O_1 \dots O_n$ . The resulting formulation of physicalism says that the physical properties are those that characterize the intrinsic nature of objects of kind  $O_1 \dots O_n$  and those are the only properties to be found in the actual world.

One problem with this account of the physical is that it makes an a posteriori truth into an a priori one, namely, that all and only physical properties are instantiated in the objects of kinds  $O_1 \dots O_n$ . To see this, consider two scenarios. On the first scenario, we discover that objects of kind  $O_1$  have miraculous powers. On the present view, since whatever properties those objects have are physical, this would not be its turning out that physicalism is false, this would be its turning out that having miraculous powers is a physical property. But having such powers seems to be a non-physical property if

anything is. So to define ‘physical property’ as whatever intrinsic properties our paradigms of physical objects possess does not get the extension of ‘physical property’ right, unless, of course, it turns out that all and only those properties are physical, but then we can’t use this idea to capture what that would be like.

On the second scenario, physics tells us that there are some properties that aren’t to be found on the list of intrinsic properties of objects of kind  $O_1 \dots O_n$ . Perhaps we included only medium-sized physical objects among our paradigms and thereby left off dark matter. (Dark matter passes through, but does not help make up such objects.) Does the existence of the property of being dark matter show that not every property is physical? Surely not. Being dark matter is a physical property if anything is. If physics discovers properties other than those that characterize the objects on our list, that shows not that there are some non-physical properties, but that we’ve left some physical properties off the list. In general, if physics discovers some property that is not a property of our paradigmatically physical objects, that’s not physics discovering that physicalism is false. That’s physics discovering the existence of a new physical property.

It might be objected here that being dark matter is ‘sufficiently like’ the properties that would be captured by pointing to the properties of our paradigms such that it would still count as physical on the object-conception.<sup>22</sup> But in what respects is it ‘sufficiently alike’? We can’t say ‘sufficiently alike in being physical’ since ‘being physical’ is what we’re trying to explain. If we say ‘sufficiently alike in being posited by our ideal physical theory’, then this indirect strategy isn’t really a strategy that defines the notion of a physical property by appeal to the notion of a physical object and defines those, but rather an indirect strategy that understands ‘physical property’ in terms of their role in

physical explanations. Finally, if we say ‘sufficiently alike’ in having those features in virtue of which the intrinsic properties of such objects are physical, then the strategy is in fact not an indirect, but a direct one and the above objection against direct strategies again applies.

According to a second indirect strategy, physical properties, kinds, etc. are those properties and kinds posited by our current physical theory.<sup>23</sup> Unlike the indirect strategy just discussed, this strategy for identifying the physical fails for a very simple reason: defining the physical and so physicalism in terms of what our current physics says makes physicalism very likely false. Physicalism defined in terms of current physics would say that there’s nothing over and above the posits of current physics. One need only induct over the history of physics to see that our current physics must be both far from complete (and so that its posits don’t include all physical properties, kinds, etc.) and not entirely true (and so that among its posits are non-actual properties and non-existent kinds). Imagine now future physics’ discovery of some new kind K. Is K physical or not? On the present account, the answer is “no”. So the discovery of K is physics’ discovery of the falsity of physicalism. Consideration of this case shows two things. First, it makes the point mentioned above: that this formulation of physicalism makes physicalism very likely false, and so such a formulation fails to satisfy the Genuine Question Constraint. Since, as discussed in section I, there seems to be a genuine question as to whether physicalism is true, this violation of the genuine question constraint warrants the rejection of this formulation. But, second, that in the consideration of this proposal and the above two proposals, our intuitions about what counts as physical follows what future physics posits strongly suggests that our conception of the physical is tied to not just what physics

posits, but what ideal physics posits. That's because our intuitions about what counts as physical is tied to what future physics posits only when we imagine that future physics as ideally well-confirmed and complete.

These intuitions, in turn, show that of the most plausible hypothesis about the content of our concept of the physical ties it to the posits of ideal physics. On the present account, confirmation of that hypothesis awaits the further development of our physical theories and so this armchair hypothesis requires empirical confirmation, not a priori reasoning, for its full defense. But absent such empirical confirmation of one of these conceptual hypotheses over the others, we must settle for our best hypothesis. Our consideration of intuitions in actual and hypothetical cases about what physics posits shows us that our best hypothesis about the content of our concept of the physical ties being physical to being the posit of our best confirmed physical theory.

### **Section III: Defining the Physical in Terms of the Hallmarks of Physical Theories**

The present strategy for formulating physicalism while satisfying the five constraints comes in three stages. At the first stage, physical properties, kinds, etc. are identified as those posited by our complete, ideal physical theory. The initial objection against this strategy is that so identifying physical properties deprives the resulting formulation of physicalism of sufficiently determinate content and so that formulation fails to satisfy the content constraint.<sup>24</sup> On the present understanding, satisfying the content constraint requires identifying some ways the world could have been and ways the world could turn out to be such that physicalism is false. So satisfying that constraint requires identifying what would count as falsifying physicalism either actually or

counterfactually. On the initial objection to ideal physics accounts of the physical, since we don't now know what the completed physics will posit, we also don't know what won't be among those posits. Since we don't know what won't be among those posits, we're unable to identify what would count as falsifying physicalism either actually or counterfactually.

On a standard way of going beyond the first stage of a formulation in terms of ideal physics, that objection sticks. On this standard view, one completes the partial account by further defining 'complete physical theory' as the theory that will be ultimately developed by those who work in those academic departments called, in English, "physics departments". (Note the importance of the use-mention distinction in allowing this view to count as an explanation of the notion of the physical.) Using this explanation, the thesis of physicalism then becomes the thesis that everything is or is constituted by whatever is posited by the theory ultimately developed in what we call 'physics departments'.

Such a formulation clearly fails the content constraint. For who knows what future people we'll call 'physicists' will study? Given that we have no idea what will be a posit of that theory, we also have no idea what won't. And given that we have no idea what won't be a posit of the theory ultimately developed by physicists, we're unable to identify what would count as falsifying physicalism on the resulting formulation.

To sharpen the objection, suppose that future physicists, perhaps in a series of tragic lab accidents, will go off their collective rockers and take to channeling the dead. This possible scenario highlights just how unconstrained the notion of 'whatever future people we'll call 'physicists' will study' really is. Thus, consideration of this scenario illustrates

just how indeterminate the indeterminacy of the content of the present formulation really is.

It also suggests that this formulation does not really capture what we think, intuitively at least, the notion of our physical really comes to. For on the explanation of the physical presently under consideration, if it turns out that future physicists will develop their off-their-rocker theory by conducting séances, then physical properties are just those posited by that theory. Physicalism would then hold that everything that exists is or is constituted by such posits. But this explanation doesn't get the extension of 'physical property' right, nor does this formulation capture the idea behind our intuitive formulation of physicalism.

The account defended here avoids these difficulties by, at the second stage, not defining "ideal physical theory" in terms of whatever theory future physicists will ultimately develop, but rather in terms of a theory that has the hallmarks of a scientific theory and has the subject matter distinctive of physics.<sup>25</sup> At this stage we first define 'scientific theory' as any theory that has certain features, including at least the following four hallmarks of a scientific theory. (I suppose that someone might fuss here about whether these are really hallmarks of scientific theories. But I think that for someone without a philosophical ax to grind, these should really be pretty uncontroversial.)

1. The inclusion of a set of explanatory hypotheses from which empirically testable implications can be derived. (The explanations these hypotheses provide may be either metaphysical or nomic.)

An example of such a metaphysical explanation is the thesis that heat just is mean molecular motion. An example of a nomic explanation is the law of gravity.

2. Confirmation by the obtaining of a number and variety of the test-implications of its explanatory hypotheses.

The thesis about heat implies a tracking claim, namely, the claim that there is heat at location  $l_1$  and time  $t_1$  iff there is mean molecular motion at  $l_1$  and  $t_1$ . And it follows from the law of gravity that massive objects will be attracted to one another with a degree of force that is proportional to the mass of each object and inversely proportional to the distance between them. Given each of these implications, one can test each hypothesis in the usual way, i.e. by the observation of instances of the general implication, (that is to say, instances that conform to the tracking claim and predicted force, respectively.)

3. The provision of a unified explanation of a variety of empirical generalizations.

The theory as a whole provides a unified explanation of the empirical generalizations that are among its testable implications. Again, the tracking claim and generalization about the degree of attraction between massive objects are examples of generalizations that must be explained in a unified way.

4. Additional empirical support by its fit with what is antecedently known and independently observable.<sup>26</sup>

A theory with #4 fits with and hence receives independent support from other well-confirmed theories and observations.

Then we define ‘physical theory’ as a scientific theory of the world’s most fundamental elements. Finally, we define “the complete and ideal physical theory” as the complete and ideal scientific theory of the world’s most fundamental elements.

(‘Complete’ here characterizes the scope of the theory. A physical theory is complete just in case every property, etc. that can be integrated into its scope has been so integrated. ‘Ideal’ here characterizes the theory’s grounds. A theory is ideal when it is fully well-confirmed.)

Before getting to the formulation of physicalism that results from this account of the physical, it's worth noting a few of the latter's features. Its constraints on counting as a basic physical property are pretty strong. To count as basic and physical, a property must be well-integrated into the most complete and unified explanation possible for the relatively most basic occupants of space-time. To be so integrated, its behavior must be highly regular. So it is not enough, on the present account, that a property's instantiations are merely compatible with events explained by the ideal and complete physical theory. It must be well-integrated into its overall pattern of explanation.

At the third stage, physicalism itself is formulated in terms of this notion of the basically physical. What the resulting formulation says is that everything is or is constituted by the posits of the ideal scientific theory of the world's relatively fundamental elements.

A central advantage of this formulation is that it ties the content of physicalism to the very features that make it so plausible by tying ontological commitment in the first instance to the posits of a theory confirmed in accordance with our best methods for justifying our empirical beliefs.

#### **Section IV: Assessing Science-based Physicalism:**

##### **Objections and Replies**

##### **Objection 1: The Triviality Objection**

This account of the physical includes too much; it doesn't get the extension of 'the physical' right. After all, what would count as falsifying its companion formulation of physicalism? Couldn't just about anything be a fundamental element accounted for by a well-confirmed scientific theory, e.g. miracle-performing angels? But angels aren't

physical. If there are angels, then physicalism is false. But it wouldn't be false on this account. So this account doesn't get the extension of 'physical property' right by treating the property of being an angel as a physical property. And this failure to get the extension right means that physicalism in the present sense wouldn't be falsified in cases in which it clearly is, violating at least the spirit of a posteriority constraint and failing to satisfy the content constraint by making the formulation's content trivial.<sup>27</sup>

### **Reply to the Triviality Objection:**

While there are versions of the ideal physics formulation of physicalism that do render its content trivial, the present view isn't one of them. To see this, notice first that if we think about what really makes us think that the existence of angels falsifies physicalism, we'll realize that it is because we think that it's highly unlikely that our ideal physical theory (in the present sense) will take the property of being an angel or being a miracle, as a posit. And that's at least in part because our notions of an angel and of a miracle are such that their nature is incompatible with the kind of prediction and unified explanation that's available for the posits of physical theories. A miracle-performing angel is an entity whose acts are by definition incapable in principle of being fit into a pattern of explanation characteristic of scientific theories. So if angels were to figure in our ideal physical theory (in the reserved sense above), it would have to be in some mundane sense of 'angel'. They would have to be angels stripped of their miraculous powers and governed by the same laws everything else is.

Perhaps the very idea of a mundane angel is incoherent. There are two possibilities here. Either the very idea of an angel is the idea of an entity with miraculous powers or there is something to the idea of an angel that remains after its miraculous powers have

been stripped away. If the former is true, then there is nothing that counts as an ideal physical theory having an angel as a posit. If the latter is true, then it's unclear why we should say that the discovery of mundane angels would be it's turning out that physicalism is false. In order to be the sort of entity compatible with the science-based account of the physical, mundane angels would have to be subject to the same laws and integrated into the same unified pattern of explanation as everything else. But it's unclear why we shouldn't be happy to call such things physical, unless we're confusing mundane angels with miraculous ones, but then we should correct our confusion. If they are physical, then mundane angels are compatible with the truth of physicalism both intuitively and on the present account. Moreover, miraculous ones aren't physical on the present account and so angels fit into that account in just the way they should.

The important point is that on the present account anything whose existence and behavior can neither itself be explained and predicted nor figure in explanations and predictions is incapable of being integrated into the complete and ideal physical theory in the present sense and so is non-physical and its existence falsifies physicalism. Given this, the content of physicalism in the present, science-based sense is both determinate and falsifiable and so that content is not trivial and does not make the extension of 'physical property' overly generous.<sup>28</sup> This falsifiability, moreover, makes physicalism come out a posteriori on the present account, just as the a posteriority constraint requires.

## **Objection 2: The No Fundamental Mentality Objection (or Downward**

### **Incorporation Part I)**

In section I it was noted that a dualist could hold that there are nomic connections between the physical and the non-physical. But if we tie being physical to ideal physical

theory, won't all nomic connections be encompassed within that theory? And won't they all then count as connections between the physical? There's nothing in this view that would prevent physics from incorporating any fundamental property that figures in a law into its scope. In particular, there's nothing in principle that rules out that our ideal and complete physical theory will incorporate mental properties within its scope. Since any fundamental property, including fundamental, mental properties, can be incorporated into the scope of the basically physical in this way, the present account fails to preserve the contrast between physicalism, on the one hand, and emergentism, epiphenomenalism, and substance dualism, on the other.<sup>29</sup> Any scenario in which it turns out that there are fundamentally mental properties is a scenario in which physicalism is false. So it is a constraint on the adequacy of any characterization of the physical that no fundamentally physical property could be mental. The present account fails to meet this constraint.

**Reply to the No Fundamental Mentality Objection:**

First, recall that physicalism is a thesis with metaphysically explanatory aspirations. The aim here has been to identify a primary sense of 'physical' in which to understand the thesis that the physical metaphysically explains everything. What's metaphysically explained by the physical in that primary sense is secondarily physical. There are two possible scenarios to consider here that are important to keep distinct. On one scenario, there is some set of properties, e.g. the phenomenal ones, that are not metaphysically explained by anything else more fundamental. Nor, in that scenario, do those properties help to metaphysically explain anything else less fundamental.<sup>30</sup> In this scenario, physicalism's distinctively metaphysical explanation is absent—such properties neither metaphysically explain nor are metaphysically explained by anything else. So, on the

present formulation, such a scenario would be one in which physicalism is false. (Such a scenario would be one in which either emergentism, epiphenomenalism, or substance dualism turns out to be true, depending upon what else is true.)

The second, very different possible scenario here is one in which it turns out that some set of properties one might expect a standard physicalist theory to hold are to be metaphysically explained by what's primarily physical, e.g. phenomenal properties, are among the posits of ideal physics and are themselves metaphysically explanatory. That view does come out as physicalist on the present formulation. As noted above, some will hold that this consequence of the present view constitutes a reductio. Let's try to see what the crux of the issue is here and what the reasonable options are.

The crux of the issue, it seems to me, is whether or not we want to say that it is a priori that no mental property is a basic, physical one. The alternative, that it is a posteriori that none are, requires that we identify a way the world could turn out to be such that some mental property is a basic, physical one. One might contest<sup>31</sup> this account of what is required to defend the in principle incompatibility of fundamental physicality and mentality. So it's worth saying a few words in its defense.

First, a claim c is held a priori in the sense used here just in case there is no way the world could turn out to be such that c is false. To be held a posteriori requires holding that there is some way, however extremely unlikely, the world could turn out to be such that c is false. Suppose one were to hold, with objector #2, that no characterization of the physical that allows for the compatibility of fundamental physicality and mentality in any described scenario could be an adequate. Following Jessica Wilson, call this the 'no fundamental mentality' or NFM constraint.<sup>32</sup> To impose the constraint is to hold that

there is no way the world could turn out to be such that both physicalism is true and there is a fundamentally mental property. But to hold that is just to hold that there is no way the world could turn out to be such that a fundamentally physical property is also mental.

These notions can be clarified and an important distinction drawn using Wilson's example of an acid. Wilson tells us that at one point in the history of science, chemists accepted

(A) All acids contain oxygen.

But was this treated by chemists as an a priori or an a posteriori truth about acids? The test would be whether there was a way the world could turn out to be that chemists were willing to count as it's turning out that something both failed to contain oxygen, yet counted as an acid. Suppose (also following Wilson's account of the history) that there was a point in time in which chemists held that there couldn't be an acid that failed to contain oxygen.

What to say, then, with the discovery of what came to be called 'hydrochloric acid', a substance now recognized as an acid and which fails to contain oxygen? We could say that "acid" changed its meaning slightly so as to include in its extension certain oxygenless substances such as hydrochloric acid. But another possibility is that the original chemists were wrong in thinking that they held A a priori. It turned out that there was a way the world could turn out to be that was by their lights such that there were oxygenless acids; indeed, the actual world is one such way. The correct way to describe this scenario is as one in which what chemists thought was impossible, that something should both be an acid and fail to contain oxygen, is possible.

The important distinction that the acid example illustrates, then, is just this distinction between believing that one holds a claim a priori (or a posteriori) and holding it a priori (or a posteriori). A diagnosis of the intuition behind the NFM constraint is that it treats the incompatibility between fundamental physicality and mentality as a priori, when it is in fact a posteriori.

So the price of holding that the incompatibility of fundamental physicality and mentality is a posteriori is holding that there is a way the world could turn out to be such that they aren't incompatible. For this to be a reasonable alternative to holding that the incompatibility is a priori, one should identify a scenario plausibly described as one in which some mental property is a basic physical one. On the present account, it is a posteriori that no mental property is a basic physical property, so it is required to identify a scenario plausibly describable as one in which it turns out that some mental property is both basic and physical. The second of the scenarios mentioned above, in which the ideal and complete physics integrates fundamental mental properties into its unified pattern of explanation, just is that scenario. To reject the present view on these grounds, then, requires an argument showing that there is some unobvious a priori incompatibility in our concepts of the mental and the basically physical. (Note that one might here be pessimistic about whether or not any claim is a priori in just this sense. Since it's a feature of the present ideal physics account that the incompatibility is a posteriori, such pessimism is fully compatible with its truth. However, such pessimism is not compatible with the imposition of the NFM constraint.)

But without an argument establishing the a priori incompatibility of the fundamentally physical and the mental, it is not an objection to the present account that

mental properties could turn out to be among the basic, physical ones. That's just the price of saying that it's a posteriori that they're not.

### **Objection 3: Melnyk's Objection (or Downward Incorporation II)**

There's a third scenario in which emergentism comes out true that the present account will incorrectly count as physicalist. Suppose one holds that being a cell is a property that emerges from a certain complex configuration of fundamentally physical particulars. Suppose further that on this view, being a cell is itself a fundamental property that metaphysically explains the pattern of instantiation of still higher level properties (such as being an organism). This view exhibits the sort of metaphysical explanation of the non-fundamental by the fundamental characteristic of physicalism on the present formulation. So the ideal physics formulation defended here turns this emergentist view into a physicalist one.

### **Reply to Melnyk:**

Whether this intuitively emergentist view about cells comes out as physicalist on the present account depends upon whether being a cell is a property that might be incorporated into our ideal, well-integrated scientific theory of the relatively fundamental. The chances of this, however, are effectively zero. We can all agree that being a cell is a property had by all and only cells. But once we agree to this, it's clear why the above view could not be physicalist on the present account. It could not because we don't need to await the arrival of ideal physics to know already that any property that can only be had by entities with the relatively high degree of complexity exhibited by a cell is not going to be part of the highly integrated pattern of explanation characteristic of our science of the relatively fundamental. There just aren't going to be laws and relations, to

take two cases, between cells and quarks or cells and any other relatively fundamental particle of the level of complexity we can now expect of the particles ideal physics will posit. So if even if being a cell turns out to be a fundamental property, we know enough to know that it won't be a physical one, at least not according to the present account. Thus, this view comes out as emergentist on the present account.

Similar considerations also rule out that the properties of being in certain mental states, namely, those associated with propositional attitudes, such as wanting and believing, could turn out to be fundamental physical properties on this account. Recall that the present constraints on counting as basic physical property are pretty strong. To count as basic and physical, a property must be well-integrated into the most complete and unified explanation possible for the relatively most basic occupants of space-time. To be so integrated, its behavior must be highly regular. So it is not enough, on the present account, that a property's instantiations are merely compatible with events explained by the ideal and complete physical theory. It must be well-integrated into its overall pattern of explanation. We already know that having attitudes such as wantings and believings are properties of highly complex organisms whose behavior is irregular (perhaps disappointingly so). So we already know enough to know that such properties, while perhaps physical, won't come out as fundamental and physical on the present account.

An added bonus: Considerations such as these also rule out that the cases Wilson must worry about to avoid the charge of unsystematicity also plague the present account.<sup>33</sup> If the NFM constraint is required to avoid compatibility with emergentism, won't we also need to add a 'no fundamental morality' and 'no fundamental aesthetic

properties' constraint? What would make fundamental moral and aesthetic properties non-physical on the present account is their inability to figure in the highly-integrated pattern of explanation of the relatively fundamental characteristic of well-confirmed physical theories.

#### **Objection 4: The Objection from Historical Contrasts**

To allow that some mental property could turn out to be among the basic physical ones is to accept an account of physicalism that is no ancestor to the historical materialists. The materialists held that the mental is constituted out of matter, which they regarded as fundamentally non-mental. Any adequate formulation of the thesis of physicalism must make clear that it is recognizably an ancestor of that view. To allow that some mental property might turn out to be physical is to give up too much that was central to historical materialism.<sup>34</sup>

#### **Reply to the Objection from Historical Contrasts:**

As Crane and Mellor say,

Materialism was a metaphysical doctrine: it attempted to limit physics a priori by requiring matter to be solid, inert, impenetrable and conserved, and to interact deterministically and only on contact. But as it subsequently developed, physics has shown this conception of matter to be wrong in almost every respect.

What to say about this state of affairs? One option is to simply give up on materialism and its explanatory ambitions. Another is to say that there was something to the explanatory ambitions of materialism worth preserving; we just need a better understanding of the material with which to do the explaining. That physicalists have taken the latter route, revising their notion of the nature of the material world in light of the discoveries of physics, shows us something about the physicalist conception of the

physical. It shows that that conception is tied to what physics tells us there is. That we're inclined to give up the materialist conception of matter without giving up on physicalism shows us that it would be wrong to think of the materialist conception of matter as providing a substantive a priori account of our notion of the physical. This shows rather that the materialist conception is best understood as an a posteriori hypothesis about what physical stuff is like.

Interestingly, Crane and Mellor don't mention non-mentality as a feature of matter, according to the materialists. But suppose it is. It needs to be shown that the materialists thought of non-mentality as part of an a priori account of matter, as opposed to an a posteriori hypothesis about what matter is like. If they thought the latter, then there is no difference on this point between the historical materialists and physicalists on the present account. So continuity between the historical materialists and physicalism in the present sense is preserved.

Moreover, that the features of matter we're willing to give up are tied to what physics tells us there is shows that it is part of our idea of the physical that it is whatever the true physics tells us there is. Here we have no mere hypothesis about the content of our concept of the physical, we have some empirical confirmation of that hypothesis in the form of our actual reactions to the discoveries of physics.

#### **Objection 5: Wilson's Objection from the Mind-Body Problem**

Formulating the mind-body problem as it has exercised so many generations of philosophers requires a characterization of body, or the physical, such that it remains obscure how mentality could come about as a result of physical goings on. Such a characterization of the physical requires the imposition of the NRM constraint.<sup>35</sup>

### **Reply to the Objection from the Mind-Body Problem:**

The mind-body problem, Wilson rightly notes, concerns “how to make sense of the relationship between mind and body, given that these seem so different, on the one hand, and yet are so obviously intimately ontologically (and causally) related, on the other.”<sup>36</sup> Is there a way to state this problem without imposing the NFM constraint? Sure there is. Descartes’ substance dualism was motivated in part by the observation that mental and corporeal substances seem *prima facie* to have incompatible properties, for example, on Descartes’ characterization, the former is indivisible, while the latter is divisible.<sup>37</sup> The issue is: how to fit mental properties into a world made up only of fundamentally physical properties, entities, etc. and complexes made up only of such? If one imposes the NFM constraint, one will say that there is only one way for mental properties to fit into a world in which physicalism is true, namely, by bearing the favored ‘nothing over and above’ relation to properties that are fundamentally physical and non-mental. If one doesn’t impose that constraint, there will be two ways for mental properties to fit in a physicalist world, namely, the just mentioned way and by being fundamentally physical. How mental properties could be nothing over and above the physical is still just as puzzling, especially if we think of the puzzle as arising on Descartes’ assumptions about what characterizes the mental.

### **Objection 6: No Uninstantiated Physical Properties**

The notion of ‘physical property’ is not generous enough. It shrinks the notion of ‘physical property’ down to the class of the instantiated ones. But what about phlogiston? Surely it’s a physical property even though it’s not a posit of our ideal physical theory of the actual world. (Let’s suppose.) A property needn’t be instantiated

to be physical.<sup>38</sup> The aim here is to give an account of what makes a property or kind a physical one and there's nothing in the very notion of a physical property that limits them to the properties instantiated in the actual world.

**Reply to the No Uninstantiated Physical Properties Objection:**

We should remember that we're here interested in the notion of a physical property as it figures in the best formulation of physicalism. Intuitively, physicalism says that all of the actual properties (and kinds, etc.) are physical. It is a contingent thesis about the actual world (and perhaps about those worlds physically identical to our own). Given this, it's proper that the notion of the physical as it figures in a formulation of physicalism is tied to those properties actually instantiated. This isn't to deny that there are other, merely possible, physical properties. It's just that possible physical properties aren't among those that physicalism is formulated in terms of, it being a thesis about the actual world and all.

Having said that, we might distinguish between two ways of formulating physicalism along the lines proposed here. Let  $W_a$ =the actual world and  $W_i$ =some possible world,

$P_a$ ) Physicalism is true at  $W_a$  iff everything at  $W_a$  is either a posit or is constituted out of the posits of the ideal physical theory of  $W_a$ 's relatively most fundamental level.

$P_i$ ) Physicalism is true at  $W_i$  iff everything at  $W_i$  is either a posit or is constituted out of the posits of the ideal physical theory of  $W_i$ 's relatively most fundamental level.

Of course,  $P_a$  is an instance of  $P_i$ , taking  $W_i=W_a$ . It seems to me that the debate about the truth of physicalism is a debate about its truth at  $W_a$ , so  $P_a$  is here the most relevant formulation. But we can acknowledge that there is some  $W_i$  in which physicalism is a

physical property in the sense suggested by  $P_i$ , i.e. in the sense of either being a posit or being constituted out of the posits of the ideal physics of  $P_i$ . Indeed, I'd argue that insofar as we seem to want to hold that there are uninstantiated physical properties, it's because we think that in the there's some world  $W_i$  that's not  $W_a$  in which there are properties not instantiated at  $W_a$  that are physical in the  $P_i$  sense, i.e. by being a posit of the ideal physical theory of  $W_i$ . (Of course there is a even broader class of worlds with uninstantiated-in- $W_a$  physical properties in which physicalism is false, but those properties also count as physical at that world in the present sense. The worlds in which physicalism is true are merely a subset of the worlds with such properties.)

#### **Objection 7: Objection from the Rejection of Scientific Realism**

Doesn't this view presuppose the truth of scientific realism? What then about van Fraassen's arguments that show that we needn't interpret our best confirmed physical theory as positing some one determinate set of properties? If those arguments are correct, then we can't understand physical properties as those that are the posits of ideal physics, since there is no such single set of posits.

#### **Reply to the Rejection of Scientific Realism:**

a) Any understanding of 'physical property' that relies on physics is going to interpret physical theories realistically.<sup>39</sup> So this objection doesn't pose a special problem for the present view in particular. b) In any case, the present view is does not presuppose the truth of scientific realism. That's because a realist interpretation of physical theories is here used as a tool for adequately formulating the thesis of physicalism; it's not taken as a philosophical position in itself. On the present formulation, physicalism includes an ontological commitment to whatever would make the Ramsey sentence<sup>40</sup> of ideal physics

come out true. This means that physicalism in the present sense presupposes a realist interpretation of ideal physics. It then adds to realism a ‘that’s all’ clause—it’s that stuff and nothing more.<sup>41</sup> The present view is that that’s the thesis we should accept if we’re to be physicalists. Van Fraassen’s arguments most fundamentally target the question of what we have good reason to believe, in particular, whether we have good reason to believe that there are such entities, let alone only such entities. This translates into the present context as the question as to whether physicalism is true and that’s a separate matter.

### **Assessment**

Does the present science-based explanation of the physical allow for a formulation of physicalism that escapes Hempel’s dilemma? Recall that satisfaction of the genuine question constraint would guarantee that a formulation avoids the first horn of Hempel’s dilemma, while satisfaction of the content constraint guarantees that it avoids the second horn. This means that any formulation that satisfies all of the present constraints ipso facto avoids Hempel’s dilemma. So, the real question is: Does the present view satisfy all of our constraints?

Recall that the present view says:

P<sub>a</sub>) Physicalism is true at W<sub>a</sub> iff everything at W<sub>a</sub> is either a posit or is constituted out of the posits of our ideal scientific theory of the world’s relatively most fundamental elements

where being a scientific theory is tied to being a theory with the hallmarks of scientific theories.

1. The Genuine Question Constraint: P<sub>a</sub> makes physicalism not obviously false, the way the ‘actual physics’ version does.<sup>42</sup> It’s an open question whether everything

- at  $W_a$  is or is constituted by the posits of our ideal scientific theory of  $W_a$ 's relatively most fundamental elements. Moreover, by ruling out the existence of some properties, physicalism in the science-based sense isn't trivially true.
2. The Contingency and A Posteriority Constraint: This view says what it would be for physicalism to turn out to be false, and so makes physicalism an a posteriori truth, if it is a truth. Again, as noted in reply 1 above, if there turn out to be miraculous angels, for example, then physicalism is false. The discovery that the actual world doesn't contain entities with miraculous powers and, more generally, that there are no properties not capturable in the net of our best scientific theory of the world's relatively most fundamental elements is the empirical discovery of physicalism's truth. Moreover, physicalism comes out as contingent on this view. Physicalism is false in counterfactual worlds that contain at least one entity, property, etc. that is not metaphysically explainable in terms of the posits of the ideal physical theory of the actual world. So counterfactual worlds containing miracle-performing angels are worlds in which physicalism is false.
  3. The Content Constraint: Meeting the content constraint requires that a formulation possess 'sufficiently' determinate content. On the present way of fleshing out what this constraint amounts to, a formulation possesses 'sufficiently' determinate content if (i) we can identify some ways the world could turn out and could have turned out such that physicalism is false and (ii) we can say something about what an explanatory reduction has to be like in order to be a distinctively physicalist reduction. That the present formulation satisfies the a posteriority constraint guarantees that it satisfies (i) of the content constraint. (i) really just amounts to

the requirement that we make transparent how it is that a formulation is both contingent and a posteriori. Thus, that this part of the content constraint is satisfied by the present account follows from its satisfaction of the second constraint.

As for the second part of the content constraint, the present formulation allows one to say something about what an explanatory reduction has to be like in order to be compatible with the truth of physicalism. An explanatory reduction is physicalist just in case its reduction base contains only posits of the ideally well-confirmed physical theory of the actual world. Admittedly, in one sense this is not to say as much about what the reduction base of an explanatory reduction must be like to be a physicalist one since we don't now know exactly what that ideal theory will posit. But it does give 'physical' some determinate content since some entities and properties are clearly incompatible with  $P_a$ , e.g. miraculous angels in the above example. So  $P_a$  does rule out some entities as falling within the extension of "the physical" and thus gives "physicalism" more content than made apparent by discussions of Hempel's dilemma.

4. The Explanatory Constraint: The '...is...or is constituted out of... ' clause of  $P_a$  builds the metaphysically explanatory pretensions characteristic of physicalism into that formulation.
5. The Conceptual Continuity Constraint: The method used here for selecting, among the proposed hypotheses, the one that most plausibly captures the content of our concept of the physical as it figures in the thesis of physicalism relies upon the discovery of our intuitions about how to describe a variety of actual and

hypothetical ways the world might turn out (or did turn out) to be. Consideration of the variety of scenarios discussed in section II, as well as in the objections and replies, strongly suggests that our concept is closely tied what our ideal and complete physical theory tells us there is. The present account is developed with precisely this central feature of our concept in mind.

### **Conclusion:**

The debates about physicalism's truth suffer from the lack of a clear formulation as to what, exactly, the thesis of physicalism is. The most glaring gap in the literature on the proper formulation of that thesis is in identifying a plausible answer to the question: 'what is it for a property, kind, or entity to be a physical one?' This paper began by identifying five constraints any answer to that question must meet in order to be plausible. The view defended here begins by identifying the physical properties as those posited by our ideal physical theory. Then it explains what makes a theory a physical one in terms of four of the hallmarks of scientific theories<sup>43</sup> and the subject matter characteristic of physical theories.

Physicalism then comes out as the thesis that everything at  $W_a$  is or is constituted by the posits of our ideal physical theory (in that sense) of  $W_a$ . The defense of this formulation here consists in its ability to satisfy all of the constraints on a plausible formulation and its building into the formulation what makes physicalism so plausible, by tying physicalism's ontological commitments to our best methods for justifying our beliefs about the natural world.

The primary challenge to such ideal-physics characterizations of the physical comes from the intuition that if there are fundamental mental properties, then physicalism is

false, together with the claim that nothing rules out in principle that ideal physics will posit fundamental mental properties. The reply here comes in two parts. The first part is a deflationary diagnosis of the intuition's source. What gives rise to our intuition that fundamental physical properties couldn't be mental is just that it would be incredible that our ideal and complete physics should posit them. But incredible is not the same as epistemically impossible. For a claim to be held a posteriori in the sense used here, there must be some way the world could turn out to be such that that claim turns out to be false. So for the incompatibility of the fundamentally physical and the mental to be a posteriori in this sense, there must be some way the world could turn out to be such that the two are in fact compatible. And if there is any way the world might turn out to be such that the two are compatible, it is surely if it turns out that ideal and complete physics takes mental properties as posits.

One could hold, as Wilson does, that there is no way the world could turn out to be such that the two are compatible and so that an adequate formulation of physicalism requires a "no fundamental mentality" clause. But that is to hold that the incompatibility is a priori in the present sense and so requires some reason to think that it is indeed a priori. Identifying a way the world could turn out to be such that, incredibly, the two are indeed compatible is just the price of saying that it's a posteriori that they're not. And for those skeptical of a priori truths or the a priority of this truth in particular, that's a price worth paying.

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<sup>2</sup> See, for example, Horgan [1993], Jackson [1998], Wilson [2005], Witmer [2001], Melnyk [2003], and Melnyk, this volume.

<sup>3</sup> For this helpful way of distinguishing these issues, see Stoljar [2001a].

<sup>4</sup> Melnyk [1997]. Some seem to read Hempel’s dilemma as a dilemma about whether we have good reason to believe that physicalism is true (as Melnyk does), whereas I read the dilemma as one about the very content of the thesis, in particular, the content of the notion of the physical it relies upon. See especially p.624.

<sup>5</sup> For a nice discussion of this account of the subject matter of physics, see Wilson, this volume.

<sup>6</sup> See, for example, Wilson, this volume, Levine [2001], Spurgett and Papineau [1999], Montero [1999], and Crook and Gillett [2001].

<sup>7</sup> See Stalnaker [2003].

<sup>8</sup> I’m thinking of constitution much in the way that Kim thinks of realization in his [1997].

<sup>9</sup> Some might wonder about what the existence of miracle-performing angels comes to and so are uncertain about whether their existence would make physicalism false either actually or counterfactually. I’ll have more to say about the case of miracle-performing angels below that should make clear how their existence would falsify physicalism.

<sup>10</sup> Although these possible worlds formulations of what it is for a truth to be contingent and what it is for it to be a posteriori involve existential quantification, they are nonetheless to be read so as to be neutral about the metaphysical status of such worlds. Here I follow Frank Jackson. See his [1998] pp.10-11.

<sup>11</sup> Jeffrey Poland also accepts this constraint. See his [1994] pp.225-6.

<sup>12</sup> Poland also accepts a content constraint. See his [1994] p. 123.

<sup>13</sup> An explanatory reduction is a reduction in which what it is to be or to be an instance of the kind or property, etc. picked out by the expression on left hand side of the connective “...is or is constituted by...” is explained by its being or being constituted by what’s picked out on the right hand side. An example is the putative reduction: pain is C-fibers firing. In this way, explanatory reductions show how some set of non-basic truths (here the pain truths) are made true by what makes some set of basic truths true (here the truths about the firing of C-fibers).

<sup>14</sup> By “a truth” here I mean a true sentence. The difference, then, between basic and non-basic truths when they share a truth-maker is a difference in vocabulary. Basic truths are truths expressed in the basic vocabulary (plus connectives) alone.

<sup>15</sup> For a further discussion the metaphysically explanatory pretensions of physicalism, see Witmer [2001] pp. 57-58 & 70-71.

<sup>16</sup> Here the idea is that constitution or identity would do as they would support genuinely metaphysical explanations of what the higher-level properties would consist in.

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- <sup>17</sup> See Melnyk [2001] Jackson [1998], and Chalmers and Jackson [2001].
- <sup>18</sup> Dividing up strategies into those that are direct and indirect may be somewhat artificial. It should primarily be thought of as a useful way of surveying the available options.
- <sup>19</sup> For one such view, see Moore [1993].
- <sup>20</sup> For a brief discussion of a mechanistic understanding of the physical, see Crane and Mellor, [1990]. Poland also considers a direct proposal such as this (though he calls it an “a priori” proposal) in his [1994] p. 330.
- <sup>21</sup> Daniel Stoljar, [2001b]. For another expression of this view by one of its advocates, see Jackson [1998] p. 7.
- <sup>22</sup> This strategy is like a second Jackson [1998] proposal that takes physical properties to be those that are “sufficiently like” those posited by current physics. (p.7)
- <sup>23</sup> Melnyk [1997]. Although the considerations here constitute an objection to appealing to current physics to explain the physical, they do not pose a straightforward problem for Melnyk’s position, given that he is answering the different question “why physicalism?”. See also footnote 4.
- <sup>24</sup> See, for example, Crook and Gillett’s [2001] complaint against Poland’s [1994] formulation. The way Crook and Gillett develop this objection gives it a clear tie to what I’m calling “the content constraint”. On their view, tying the physical to the posits of future physics deprives physicalism of content in the sense of failing to identify what would count as falsifying it. See Crook and Gillett [2001] p. 345.
- <sup>25</sup> For an alternative account of this second stage, see Poland [1994]. In his [1994], Poland characterizes physics as concerned with giving a complete account of all occupants of space-time. So long as it is possible for there to be properties or objects that fail to be occupants of space-time, such an account will be able to satisfy the Genuine Question, A Posteriority, and Content Constraints. But it won’t satisfy the Conceptual Continuity Constraint. If it turns out that there are occupants of space-time that possess miraculous powers, physicalism in our intuitive sense will be false. But it won’t on Poland’s [1994] account.
- <sup>26</sup> All four of these features are standardly treated as hallmarks of scientific theories in the literature in the philosophy of science. See, for example, Boyd [1983] and [1985]. See also Hempel [1965] and [1966]. There may be additional hallmarks I’m overlooking. This is to be a plausible sketch of an account. Additions can be made to its core. That this is an adequate core of an empirical account is all I’m defending.
- <sup>27</sup> This objection echoes an objection David Chalmers makes against a position he calls “type-F physicalism”. For his discussion of that view and his objection against it, see his [2002]: 257-8. It also echoes Seth Crook and Carl Gillett’s [2001] objection against Poland’s [1994] account of the content of physicalism, an account that also gives ideal physics a defining role.
- <sup>28</sup> So, in response to Chalmers’ objection to the type-F view we should ask: Why do we think its turning out that quarks are conscious is its turning out that physicalism is false? The answer, I think, is that because we think it incredible that our ideal physical theory should say so. But if our ideal theory did, I don’t see on what grounds we should deny that the properties in virtue of which quarks are conscious are physical properties.
- <sup>29</sup> This is a version of the downward incorporation objection discussed by both Crook and Gillett [2001] and Poland [1994]. Andrew Melnyk also raised an objection of this sort in discussion and Jessica Wilson discusses such an objection in section 2.4.3 “Theoretical Associations: The Proposed Solutions to the Mind-Body Problem” of her paper, “On Characterizing the Physical”, this volume.
- <sup>30</sup> This is just David Chalmers’ [1996] view.
- <sup>31</sup> See, for example, Wilson, this volume, section 2.3.
- <sup>32</sup> Wilson, this volume.
- <sup>33</sup> See her paper, this volume, section 2.1.
- <sup>34</sup> Jessica Wilson and Barbara Montero have both raised this objection in conversation. For Wilson’s discussion of this objection, see her section 2.4.1 in her paper in this volume.
- <sup>35</sup> See Wilson, this volume, section 2.3.2.
- <sup>36</sup> This quote is from Wilson, this volume, section 2.3.2.
- <sup>37</sup> Descartes [1979] p.53.
- <sup>38</sup> This objection was first posed to me by Philip Pettit in conversation.
- <sup>39</sup> E.g. Melnyk [1997], Poland [1997], and Wilson, this volume.
- <sup>40</sup> For a discussion of the use of Ramsey sentences to define terms in terms of their role in a theory, see Lewis [1970].

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<sup>41</sup> This part of the present formulation follows Frank Jackson. See his [1998].

<sup>42</sup> Melnyk [1997].

<sup>43</sup> Again, there may be more hallmarks, but scientific theories have at least these four.