

In Defence of Chalmers's Positive-Fact Formulation of Physicalism

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Research Article

Keywords: Physicalism. Supervenience. Problem of extras. Blockers. Psitive facts

Posted Date: October 16th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10668219/v1>

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Additional Declarations: No competing interests reported.

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Abstract

A prominent formulation of physicalism appeals to the supervenience of all worldly phenomena on the physical. This formulation, however, faces the problem of extras. Several responses have been proposed. Jackson addresses the problem by appealing to the notion of a minimal world, whereas Chalmers develops an alternative account in terms of positive facts. Luenenburger appeals to the notion of blockers to argue that Jackson's formulation of physicalism is superior to Chalmers's. In this paper, however, I defend Chalmers's account. I argue that Luenenburger's objection rests on a questionable assumption, namely, that physicalism is blocker-friendly. Chalmers's account has also been challenged on two further grounds: first, that the problem of extras is not a genuine problem, and second, that his proposal is internally incoherent. I argue against both criticisms and conclude that formulating physicalism in terms of positive facts provides a simple and defensible account of physicalism.

Keywords Physicalism . Supervenience . Problem of extras . Blockers . Positive facts

1 Introduction

Disputes concerning physicalism can be divided into two broad categories. The first concerns whether physicalism is true, whereas the second, and perhaps more fundamental, concerns how

physicalism should be understood and formulated. This paper falls within the latter category.¹ A standard supervenience-based formulation of physicalism may be stated as follows:²

(1) Physicalism is true of the actual world (hereafter, α) *iff* every fact in α supervenes on the physical facts of α .³

Many philosophers have argued that this formulation is too demanding because it is vulnerable to the objection from *extras*.⁴ The objection is that the formulation commits physicalism not only to the claim that entities such as Cartesian souls do not exist in α , but also to the stronger claim that

¹ Following Howell (2013, p. 10), debates over the formulation of physicalism fall into three categories: the base problem, concerning what counts as physical; the domain problem, concerning the scope of the physicalist thesis; and the relation problem, concerning the relation that must obtain between physical and nonphysical phenomena in a physicalist world. For discussions of the base problem, see Hempel (1980), Markosian (2000), Montero (2009), Ney (2008), Stoljar (2001, 2024), and van Fraassen (2002, pp. 49–61). For discussions of the domain problem, see Montero (2017), Rabin (forthcoming), and Schneider (2017). For discussions of the relation problem, see Crane (1991), Horgan (1993), O’Conaill (2018), Tiehen (2018), and Wilson (2005).

² By supervenience, I mean global supervenience, according to which B-properties supervene on A-properties *iff* any two possible worlds that are indiscernible with respect to A-properties are also indiscernible with respect to B-properties. Kim (1987) argues that global supervenience is insufficient to capture our conception of physicalism and that other varieties, such as local or strong supervenience, are needed. For further discussion of different varieties of supervenience, see McLaughlin and Bennett (2023). For simplicity, I focus on global supervenience here; however, nothing of substantive importance depends on this choice, and the same qualifications apply to other forms of supervenience. Finally, although supervenience has sometimes been used to express nomological covariation, I use the term here to refer to metaphysical covariation.

³ Throughout this paper, “physical facts” refers to qualitative physical facts.

⁴ See, e.g., Blumson and Tang (2015), Chalmers (1996), Hawthorne (2002), Horgan (1982), Jackson (1994b), Leuenberger (2008), Lewis (1983), Rabin (forthcoming), and Witmer (1999). This problem is also sometimes referred to as the “epiphenomenal ectoplasm problem” (Stoljar, 2010).

their existence is physically impossible. To see why, suppose that the proposition *There are no Cartesian souls* expresses a fact about α . If physicalism is true of α , then this fact must supervene on the physical facts of α . It follows that every possible world that is physically identical to α must also be a world in which there are no Cartesian souls. The absence of Cartesian souls thus becomes physically necessary.

In response to this problem, several philosophers have proposed revised supervenience formulations of physicalism. Frank Jackson (1994a, 1994b), for example, appeals to the notion of a *minimal world*, whereas David Chalmers (1996) formulates physicalism in terms of *positive facts*. In this paper, I defend Chalmers's formulation, according to which:

(2) Physicalism is true of α *iff* every physical duplicate of α contains all positive facts of α .

Although, as I argue, Chalmers's proposal avoids the objection from extras, it has nevertheless been challenged on several fronts. Stephen Leuenberger (2008) contends that it is less satisfactory than Jackson's account because, unlike Jackson's, it is incompatible with the possibility of blockers. In my terminology, it is not blocker-friendly. Other critics have argued that the objection from extras is not a genuine problem to begin with and have further claimed that Chalmers's formulation is internally inconsistent.

In Section 2, I argue that Chalmers's formulation, no less than Jackson's, avoids the objection from extras. In Section 3, I examine the issue of blockers in two stages. I first argue that Leuenberger's criticism presupposes the controversial claim that physicalism is blocker-friendly. I then argue that John Hawthorne's (2002) blocker-based objection to Chalmers's account can also be resisted. Finally, in Section 4, I consider the two remaining objections to Chalmers's formulation and argue that neither succeeds. I conclude that the formulation of physicalism in terms of positive facts is ultimately defensible.

2 Physicalism and the Problem of Extras

Physicalism is often understood not as a necessary truth, but as a thesis concerning α .⁵ On this view, every phenomenon in α is either itself physical or dependent on the physical facts of the world. The crucial question is how this dependence should be understood. It cannot be merely nomological, since opponents of physicalism, such as dualists, may also accept that every phenomenon is related to the physical in accordance with the laws of nature.⁶ The dependence invoked by physicalism must therefore be metaphysical. One of the most influential notions used to capture such dependence is supervenience, which has led many philosophers to adopt formulations of physicalism in terms of supervenience, such as formulation (1).

Before considering the objection from extras, however, it is worth noting that many philosophers have argued that supervenience alone is insufficient to establish physicalism.⁷ The reason is that supervenience secures only metaphysical covariance between two classes of properties or facts, rather than a genuine relation of metaphysical dependence. For example, suppose that there are nonphysical necessary entities that do not depend in any way on the physical. Their existence would not violate a supervenience condition, since necessary entities would exist in every possible world and would therefore covary with the physical facts. Nevertheless, the existence of such entities would be incompatible with physicalism.⁸

⁵ Levine and Trogdon (2009) argue that materialism is a necessary thesis rather than a thesis restricted to α . One might, however, object that their conception of materialism differs from the notion of physicalism at issue here.

⁶ For representative discussions, see Chalmers (1996), Foster (2002), and Stoljar and List (2017).

⁷ See Kim (1998, Ch. 1). Compare Bennett (2008) for an argument supporting the sufficiency of supervenience for physicalism.

⁸ For discussions of the relationship between abstract entities and the truth of physicalism, see Montero (2017), Rabin (forthcoming), and Stoljar (2024, sec. 5.3).

There are two main strategies for responding to this concern. The first is to regard the supervenience of all facts on physical facts as a necessary, but not sufficient, condition for physicalism. The second is to restrict the scope of physicalism to contingent facts.⁹ On the latter strategy, physicalism holds in α *iff* every contingent fact in α supervenes on its physical facts. In this paper, I adopt the second strategy. Hence, the formulation (1) may be modified as follows:

(1*) Physicalism is true of α *iff* every contingent fact in α supervenes on the physical facts of α (and there is no nonphysical necessary entity in α).

Formulation (1*) thus provides a more precise statement of the supervenience thesis. Nevertheless, because discussions of physicalism are primarily concerned with contingent facts, such as facts about human mentality, I set aside the issue of necessary existents and, for simplicity, use formulation (1) throughout the remainder of this paper. It should be kept in mind, however, that from this point onward, whenever I speak of the supervenience of the world's facts, I mean the world's contingent facts.

Now, to facilitate a clearer comparison of competing formulations of physicalism, it is useful to state them in a more formal manner. In particular, the supervenience formulation of physicalism can be reformulated, in a simplified form, as a necessity-based account.¹⁰ The following formulation is equivalent to (1):

⁹ Other strategies for restricting the scope of physicalism have also been proposed. For example, Crane and Mellor (1990) restrict physicalism to the empirical world. See Rabin (forthcoming) for further proposals.

¹⁰ It is important to distinguish supervenience from mere necessitation. The latter does not entail the former. For example, an object's being blue necessitates its being colored, but the property of being colored does not supervene on the property of being blue. Two objects may be alike with respect to blueness, for instance, by both failing to be blue, while differing with respect to color, as in the case of a green object and a colorless one. See McLaughlin and

(3) Physicalism is true of α *iff* the physical facts in α necessitate all facts in α .

To formalize this formulation, let P_α denote the conjunction of all physical facts in α , let F_α denote the set of all facts in α , and let S range over the members of F_α . The formulation in (3) can then be rewritten as follows:

$$(3^*) \text{Physicalism}(\alpha) \leftrightarrow \forall S (S \in F_\alpha \rightarrow \Box(P_\alpha \rightarrow S))$$

As noted above, the objection from extras poses a challenge to this formulation. If physicalism is true of α , then the fact *There are no Cartesian souls* belongs to F_α . According to (3^{*}), it follows that every possible world in which P_α obtains, that is, every world that is physically identical to α , must also be a world in which there are no Cartesian souls. This consequence, however, is stronger than physicalists need accept. Although physicalists deny the existence of Cartesian souls in α , they need not deny their existence in every possible world that is a physical duplicate of α . A number of proposals have been advanced to avoid this difficulty, the most influential being those developed by Jackson and Chalmers.¹¹ I examine these proposals in the next two sections.

2.1 Jackson's Solution to the Problem of Extras

Jackson (1994a) addresses the problem of extras by proposing the following condition:

(4) Physicalism holds in α *iff* “any world which is a *minimal* physical duplicate of our world is a duplicate *simpliciter* of our world” (p. 28).

Bennett (2023, sec. 3.2) for discussion. Supervenience, by contrast, entails the corresponding necessity claim. Accordingly, the necessity operator is used here only as a convenient formal device for representing the modal consequences of supervenience, not as a definition of supervenience itself.

¹¹ For other revisions of the simple supervenience formulation of physicalism motivated by the objection from extras, see Horgan (1982) and Lewis (1983).

To clarify the notion of a minimal physical duplicate, it is helpful to begin with the relevant definitions. A world w is a physical duplicate of α *iff* its total physical description is identical to that of α (i.e., $P_w = P_\alpha$). A world w is a duplicate *simpliciter* of α *iff* all facts obtaining in w are identical to those obtaining in α (i.e., $F_w = F_\alpha$). As the problem of extras illustrates, however, even from a physicalist perspective, physical duplication alone is not sufficient for w to qualify as a duplicate *simpliciter* of α .

Jackson introduces an additional requirement, namely, *minimality*. He (1994b) explains that “[a] minimal physical duplicate of our world is what you would get if you used the physical nature of our world (including of course its physical laws) as a recipe [...] for making a world” (p. 485). He later characterizes a *minimal physical duplicate* as a world that “(a) is exactly like our world in every physical respect [...] and (b) contains nothing else in the sense of nothing more by way of kinds or particulars than it must to satisfy (a)” (Jackson, 1998, p. 13).

Following Chalmers (2012, p. 151), I use T to denote minimality.¹² Formulation (4) can then be restated as follows:

(4*) Physicalism holds in α *iff* any world that is a physical duplicate of α and satisfies T is a duplicate *simpliciter* of α . In other words, physicalism holds in α *iff* the conjunction of all the physical facts of α , together with T , necessitates all the facts of α . That is:

$$\text{Physicalism}(\alpha) \leftrightarrow \forall S [S \in F_\alpha \rightarrow \Box((P_\alpha \wedge T) \rightarrow S)]$$

Although, as noted above, Jackson has offered some clarifications regarding minimality, the notion remains open to different interpretations. I will not engage with these interpretive issues here.

¹² Chalmers (2012, p. 151) refers to T as the “that’s-all” truth, or *stop clause*, to indicate that the world contains nothing beyond what is required to accommodate the other elements.

Nevertheless, the very fact that minimality admits of multiple readings constitutes one of the challenges facing Jackson's formulation.¹³

The above formulation allows for the possibility of worlds that are physical duplicates of α while containing Cartesian souls. It therefore avoids the problem of extras. Such worlds are not minimal physical duplicates of α , and so there is no requirement that all the facts obtaining in α , including the fact that no Cartesian souls exist, also obtain in them.¹⁴ Chalmers, however, offers a more straightforward solution to the problem of extras, to which I now turn.

2.2 Chalmers's Solution to the Problem of Extras

Chalmers (1996) offers a different and more straightforward solution to the problem of extras. Rather than appealing to minimality or T , he proposes formulation (2), arguing that “supervenience theses should apply only to positive facts and properties” (p. 40). He characterizes a *positive fact* as one that cannot be negated merely by enlarging a world. That is, if a positive fact obtains in a world w , it also obtains in every world that contains w as a proper part. By contrast, claims such as “there is no Cartesian soul” and “the mass of the universe is n kilograms” express negative facts about α , since they may fail to hold in worlds that contain α as a proper part.

To formalize formulation (2), let F_{α}^{+} denote the set of all positive facts obtaining in α . Formulation (2) can then be restated as follows:

¹³ For alternative interpretations of minimality, see Chalmers (2012, pp. 151–152), Leuenberger (2008), and Rabin (forthcoming).

¹⁴ This assumes that physicalism holds in α . So it contains a fact that Cartesian souls do not exist.

(2*) Physicalism holds in α iff, for every fact S in F_α^+ , the conjunction of all the physical facts obtaining in α necessitates S . i.e., $Physicalism(\alpha) \leftrightarrow \forall S (S \in F_\alpha^+ \rightarrow \Box(P_\alpha \rightarrow S))$

According to (2*), the physical facts of α necessitate only its positive facts. Thus, even if the fact that *no Cartesian souls exist* obtains in α , and even if physicalism is true of α , that fact need not obtain in every physical duplicate of α because it is a negative fact. This leaves open the possibility that a world be a physical duplicate of α while nevertheless containing Cartesian souls.

Although both Jackson's and Chalmers's formulations successfully address the problem of extras, they yield different results when confronted with certain other challenges. I examine one of these challenges in the following section.

3 Positive-Fact Formulation and the Challenge of Blockers

The notion of a blocker was introduced by Hawthorne (2002). To understand its role, it is helpful to distinguish between two kinds of metaphysical necessity: strong necessity and weak necessity. Strong necessity corresponds to the standard notion of metaphysical necessity. A -facts strongly necessitate C -facts just in case every possible world in which A -facts are obtained is also one in which C -facts are obtained.

Weak necessity is also a metaphysical relation, but it differs from strong necessity in an important respect. A -facts weakly necessitate C -facts just in case every possible world in which A -facts are obtained is also one in which C -facts are obtained, provided that a certain nonphysical entity B is absent. The entity B is a blocker, that is, a nonphysical entity whose presence prevents A from necessitating C . More generally, if B is taken to be the conjunction of all possible blockers of C with respect to A , then A weakly necessitates C just in case the conjunction of A and the absence of B strongly necessitates C .

Leuenberger argues that once blockers are recognized, Jackson's formulation of physicalism is preferable to Chalmers's. Hawthorne, by contrast, contends that blockers pose a different challenge for Chalmers's formulation. In the following sections, I argue that neither objection succeeds.

3.1 Leuenberger's Blocker-Based Objection to Chalmers's account

To see how Chalmers's and Jackson's accounts interact with the problem of blockers, consider a scenario in which no blockers are instantiated in α . Nevertheless, the relationship between physical and mental facts in α is one of weak necessity. That is, there is a possible world w that is a physical duplicate of α , but in which some of the mental properties instantiated in α fail to be instantiated because a blocker is realized in w . How would Chalmers's and Jackson's accounts evaluate such a scenario?

According to Jackson, physicalism would still hold in α in such a scenario. As, worlds that contain blockers are not its minimal physical duplicates, and in all of its minimal physical duplicates, where no blocker is realized, the weak necessity relation between physical and mental facts guarantees that all of α 's mental facts are obtained. Consequently, those worlds are duplicates *simpliciter* of α .

Chalmers, however, would deny that physicalism is true of α in such a scenario. The reason is that facts concerning the instantiation of mental properties would count as positive facts. On the one hand, in a physicalist world, positive facts must be necessitated by the totality of physical facts. On the other hand, in the scenario described above, some mental facts fail to obtain in some worlds that are physical duplicates of α . It follows that the physical facts of α do not necessitate those positive facts. Therefore, α would not qualify as a physicalist world.

Having considered how Jackson's and Chalmers's formulations assess the scenario at hand, we can turn to the question whether physicalism is true of α in that scenario. The answer to this question sheds light on which of the two accounts of physicalism is preferable. However, it turns on whether physicalism is a blocker-friendly thesis.¹⁵ I shall call a formulation of physicalism *blocker-friendly* if it allows physicalism to hold in a world where all mental facts are necessitated by physical facts, even though some of those mental facts remain blockable. On such a formulation, weak necessitation is sufficient for physicalism; strong necessitation is not required. If physicalism is blocker-friendly, Jackson's formulation has the advantage, since it correctly classifies α as a physical world. If not, Chalmers's formulation is to be preferred. In the next section, I argue that physicalism is not a blocker-friendly thesis.

3.1.1 Physicalism Is Not Blocker-Friendly

I now present several considerations in support of the claim that physicalism is not blocker-friendly. None of these considerations is, by itself, decisive. Each, however, provides an independent reason for rejecting blocker-friendly physicalism, and taken together they support the conclusion that physicalism is incompatible with blockers.

Causal Closure of the Physical and Mental Causation. One of the principal motivations for physicalism is that it appears to accommodate both the causal closure of the physical—the thesis that every physical effect has a sufficient physical cause—and the commonsense view that mental events can causally influence physical events. Physicalists typically reconcile these commitments by maintaining that mental properties inherit their causal powers from the physical

¹⁵ Leuenberger (2008, 2014) defends a blocker-friendly conception of physicalism. For non-blocker-friendly accounts of physicalism, see Blumson and Tang (2015), Chalmers (2013), Hawthorne (2002), O'Conaill (2018), Stoljar (2024), and Witmer (2020).

properties on which they supervene or in which they are grounded. This strategy, however, is unavailable to the blocker-friendly physicalist.

On the blocker-friendly view, what strongly necessitates the mental facts of α is the conjunction of α 's physical facts and the absence of blockers. Accordingly, the physicalist must hold either that mental properties derive their causal powers from physical properties together with the absence of blockers, or that they derive those powers from the physical properties alone.

The second option is unpromising. If mental properties derive their causal powers solely from physical properties, then the absence of blockers contributes nothing causally. But if the absence of blockers makes no causal difference, neither does their presence. This is difficult to reconcile with the claim that blockers can prevent the instantiation of mental properties. Since mental properties are causally efficacious, preventing their instantiation constitutes a causal difference that must be attributable to the presence of blockers.

The first option is no more attractive. If mental properties derive their causal powers from both physical properties and the absence of blockers, then blockers—or more precisely, their absence—must play an independent causal role. Because blockers are, by hypothesis, distinct from physical entities, this result is in tension with the causal closure of the physical.

Simplicity. A further ground for rejecting blocker-friendly physicalism comes from considerations of simplicity and parsimony, which have long been among the principal motivations for physicalism.¹⁶ Consider two worlds, v and w . In v , the physical facts weakly necessitate the mental facts, and no blocker is instantiated. In w , by contrast, the physical facts strongly necessitate the mental facts. Suppose that the two worlds contain the same physical and mental entities and

¹⁶ See Melnyk (2003) and Papineau (2002) for related discussions.

instantiate exactly the same properties. Even so, there is an intuitive sense in which w is a better candidate for a physicalist world than v .¹⁷ The following comparison helps explain why.

Using the familiar metaphor of divine creation, suppose God first sets out to create w and, on another occasion, v , together with all the mental properties instantiated in each world. To create w , God need only create its physical facts. Given strong necessitation, every other fact, including the mental facts, follows automatically. Creating v is more demanding. In addition to creating its physical facts, God must also secure their *totality* by making true the relevant "that's all" fact—that is, by ensuring that no blockers or other additional facts obtain. Only once this condition is met do the remaining facts, including the mental facts, follow.

The need to secure the absence of blockers makes v a less economical world than w . If simplicity and parsimony count in favor of physicalism, they therefore favor a conception of physicalism on which the physical facts alone strongly necessitate all other facts. In other words, they support a non-blocker-friendly conception of physicalism.

Identity Thesis. A further consideration concerns the identity thesis, according to which mental properties are identical with physical properties. Many physicalists regard some version of this thesis as the most attractive form of physicalism. Since identity is a relation of strong necessity, it leaves no room for blockers to prevent the instantiation of mental properties. A blocker-friendly conception of physicalism therefore excludes identity theory from the outset. Given the central

¹⁷ O’Conaill (2018) endorses this position, arguing that “a version of physicalism which allows for necessitation is, other things being equal, preferable to one which does not” (p. 717). He further argues that physicalism is better understood as holding that the relationship between the mental and the physical is one of essential connection.

role that identity theory has played within the physicalist tradition, this is a substantial theoretical cost.

If physicalism is not blocker-friendly, then Chalmers's account has an advantage over Jackson's in the scenario introduced at the beginning of this section. Unlike Jackson's account, it correctly predicts that the scenario is nonphysicalist. Chalmers's account, however, faces a different challenge arising from the possibility of blockers, to which I now turn.

3.2. Hawthorne's Blocker-Based Objection to Chalmers's account

Hawthorne (2002) uses the notion of blockers to challenge Chalmers's account of physicalism in a different way. To catch his objection, consider a possible world w in which every instantiated mental property is strongly necessitated by the world's physical properties and is therefore not susceptible to blocking. At the same time, there are additional mental properties that could have been instantiated in w but are not because their instantiation is prevented by blockers.

According to Hawthorne, *restricted materialism* (R.M.) with respect to the mental fails in w . That is, physicalism doesn't hold of the mental phenomena of w because, as he puts it, "certain immaterial entities would be explanatorily important to an understanding of the mental layout of the world" (p. 109). Nevertheless, he argues that Chalmers's account appears committed to the opposite conclusion, namely, that R.M. does hold of the mental in w . Why should Chalmers be committed to this result?

Recall Chalmers's characterization of physicalism: physicalism holds in α iff all of α 's positive facts are necessitated by its physical facts. Hawthorne argues that, by the same reasoning, Chalmers's account implies the following characterization of R.M. with respect to the mental:

Materialism about, say, the mind, is true just in case every world physically indiscernible from the actual world will have at least the positive mental facts that obtain at the actual world (p. 108).

The positive mental facts in w stand in a strong necessitation relation to the physical facts of w . It follows that any mental properties instantiated in w are also instantiated in every physical duplicate of w . On Hawthorne's interpretation, then, Chalmers is committed to endorsing R.M. about the mind in w . At the same time, some mental properties are not instantiated in w , even though they would have been instantiated in the absence of blockers.

To appreciate Hawthorne's objection, it is important to note that he treats blockers as nonphysical entities. Consequently, any world containing a blocker is, strictly speaking, nonphysical. His concern, however, is not whether w itself counts as a physical world, but whether R.M. holds for the mental in w . He further assumes that physicalism is not blocker-friendly. On this assumption, R.M. requires that all mental phenomena be strongly necessitated by the physical. Since, in the present scenario, some mental phenomena are only weakly necessitated by the physical, Hawthorne concludes that R.M. fails with respect to the mental in w .

This objection rests on a particular conception of what R.M. requires. Hawthorne argues that R.M. does not hold in w because an adequate explanation of its mental layout must appeal to nonphysical entities, namely blockers. According to this conception, a world's mental layout includes not only the mental properties instantiated there, but also those that fail to be instantiated. R.M. therefore holds only if both the presence and the absence of mental properties admit of a wholly physical explanation.

This requirement, however, is excessively demanding. To see why, consider a paradigmatically physicalist world, α , in which there are no blockers and every instantiated mental

phenomenon is strongly necessitated by the physical. Even in such a world, Hawthorne's criterion appears to imply that R.M. fails. The reason is that many possible mental properties are not instantiated in α , including, for example, the property of being a Cartesian soul. Yet their absence is not explained by α 's physical facts. If it were, the existence of Cartesian souls would be physically impossible, which is precisely what the problem of extras is intended to deny. Nevertheless, the fact that no Cartesian souls exist is part of α 's mental layout on Hawthorne's conception. That fact must therefore either be taken as a brute nonphysical fact or explained by appeal to further nonphysical facts. Either way, it cannot be accounted for solely in physical terms. If Hawthorne's criterion is correct, then R.M. must be rejected even for a paradigmatically physicalist world in which no blockers are present.

The problem, however, extends beyond R.M. On Hawthorne's view, it also poses a challenge for unrestricted materialism. Presumably, Hawthorne would hold that unrestricted materialism is true in α only if the world's overall structure can be explained entirely in physical terms. As in the case of R.M., however, this structure includes not only positive facts but also negative facts. This leaves us with a dilemma. Either the fact that Cartesian souls do not exist must itself be explained by the physical facts, in which case the account faces the problem of extras, or unrestricted materialism must be rejected in α because the world's structure cannot be fully explained in physical terms.

In light of these consequences, the notion of R.M. requires revision. When unrestricted materialism claims that a world's structure is determined by the physical, the relevant facts are naturally understood to be the positive facts of that world, namely, the properties that are actually instantiated. The same point should apply to R.M. What matters for determining whether R.M. holds in a world is the set of instantiated properties that constitute its positive facts, not the set of

merely possible properties that fail to be instantiated. Understood in this way, R.M. holds in w , since every instantiated mental property in w stands in a strong necessitation relation to the physical. Uninstantiated mental properties are irrelevant to this assessment. Indeed, this is precisely the verdict delivered by Chalmers's account concerning the mental properties instantiated in w .

Nevertheless, Hawthorne's conclusion about w is not without motivation. The appeal of his argument, I suggest, derives from a distinction between two kinds of uninstantiated mental properties. The first consists of mental properties that would have been instantiated if the world's physical configuration had been different, while their instantiation would still have been strongly necessitated by the relevant physical facts. The second consists of mental properties whose absence is explained by the presence of blockers and therefore does not depend on the arrangement of the world's physical facts. The absence of properties in the first category can be explained simply by the absence of the physical conditions required for their instantiation. By contrast, explaining the absence of properties in the second category requires appeal to blockers.

The formulation of R.M. that Hawthorne attributes to Chalmers concerns only the positive mental properties instantiated in w . Consequently, it lacks the resources to distinguish between the two types of uninstantiated mental properties identified above. Nevertheless, that formulation also faces the problems already discussed. To avoid these difficulties while preserving the central Chalmersian insight, I propose the following reformulation of R.M.:

Restricted Materialism (R.M.): R.M. with respect to a kind of property M holds *iff*, for every possible world v in which a property of kind M is instantiated, the fact that it is instantiated is strongly necessitated by the complete physical description of v .

On this formulation, a property of kind M may fail to be instantiated in α and yet still qualify as materialistic, provided that, whenever it is instantiated in a possible world, its instantiation is strongly necessitated by the complete physical description of that world. Conversely, if there is some possible world in which a property of kind M is instantiated but its instantiation is not strongly necessitated by the physical facts of that world, then that property fails to qualify as materialistic, regardless of whether it is instantiated in α .

If this formulation captures Chalmers's understanding of R.M., then his verdict in Hawthorne's scenario differs from the one Hawthorne attributes to him. On this account, R.M. with respect to mental properties fails in w . The reason is that there is another possible world, x , that is physically identical to w but contains no blockers. Presumably, the mental properties blocked in w are instantiated in x . However, their instantiation in x is not strongly necessitated by the physical facts of x . Those properties therefore fail to qualify as materialistic. Indeed, if their instantiation in x were strongly necessitated by the physical facts of x , then they could not be blocked in w and would have been instantiated there as well.

The preceding discussion reveals two possible interpretations of R.M. On the first interpretation, R.M. applies only to the properties instantiated in a particular world. Under this reading, R.M. holds with respect to the mental properties instantiated in w , and Chalmers's verdict is correct. On the second interpretation, R.M. ranges over all properties of a given kind, including those that are not instantiated in the world under consideration. If this broader interpretation is adopted, however, Chalmers's account must be understood in cross-world terms. The reason is that a property can be assessed for its materialistic status only in worlds where it is instantiated and therefore contributes to the world's positive facts. Only in such worlds can we evaluate the relation between its instantiation and the corresponding physical facts. On either interpretation,

Hawthorne's objection does not succeed in undermining the Chalmersian account. In the next section, I consider further objections that have been raised against Chalmers's view.

4 Further Challenges for Chalmers's Account of Physicalism

As noted earlier, both Jackson's and Chalmers's proposals were developed in response to the problem of extras. One objection to both views is that the problem of extras is not a genuine objection and therefore requires no response. A further objection, directed specifically at Chalmers's proposal, is that it is internally inconsistent. I address these two objections in turn.

4.1 The Problem of Extras Is Not Substantive

Francescotti (2014) argues that the problem of extras poses no genuine challenge to physicalism.¹⁸ If he is right, then our first formulation is sufficient to capture physicalism:

(1) Physicalism is true of α iff every fact in α supervenes on the physical facts of α .

If no modification of (1) is required, then Jackson's and Chalmers's attempts to refine the notion of physicalism are unnecessary. Francescotti's argument relies on the claim that, although physicalism is a contingent thesis, no physical duplicate of α could contain nonphysical extras. According to this view, the complete physical facts of α determine not only its positive facts but also its negative facts. At the same time, this view remains compatible with the possibility of Cartesian souls in worlds that differ physically from α . Francescotti advances several arguments in support of this position.

His first argument concerns the status of negative facts. He contends that if the physical facts of α fail to determine its negative facts, then those facts must be entirely independent of the physical domain, a consequence that should be unacceptable to the physicalist. To illustrate,

¹⁸ For a similar idea, see Witmer (2001).

suppose that $x_1, x_2, \dots, x_n$ are all the minds that exist and that each is embodied. It follows that there are no minds other than these embodied minds. If this negative fact is not determined by the physical facts, Francescotti argues, then it must be wholly independent of them. As he puts the point, “while the physical facts do make it the case that minds $x_1, x_2, \dots, x_n$ are embodied, they would not make any difference at all [...] to whether there are any minds other than the embodied ones” (p. 246).

In response to this objection, it is important to distinguish the commitments of physicalism from the explanatory powers of physics. A physicalist need not claim that every true proposition about α can be explained purely by physical facts. In other words, simply taking all the physical facts as premises is not sufficient to entail every truth about the world. For example, a physicalist would accept propositions such as “Physicalism is true,” “Jones's pain is grounded in his C-fiber firing,” and “There are no Cartesian souls.” However, the physicalist need not maintain that the truth of these propositions follows from physical premises alone. Rather, they are accepted on the basis of broader philosophical considerations that support physicalism itself.

The same point applies to Francescotti's example. The fact that “there are no minds other than the embodied ones” cannot be derived solely from physical data. To reach that conclusion, one must also assume the truth of physicalism, a thesis supported by philosophical argument rather than by physics alone. This is entirely consistent with physicalism and therefore poses no difficulty for the view. Accordingly, Francescotti's first argument fails to establish that the problem of extras is illusory.

Francescotti's second, and more substantial, objection is as follows:

[I]f the world could have had lots of ghosts and spirits while staying exactly the same physically, then it seems there would be no good reason to deny that such entities might

actually appear at any moment. [...] no amount of knowledge regarding the physical details of the world could provide any confidence that a massive emergence of ghosts and spirits will not occur at any moment (p. 246).¹⁹

Francescotti's argument can be reconstructed as follows:

1. The physical facts of α do not necessitate its negative facts, such as the fact that Cartesian souls do not exist. (Assumption for reductio)
2. If facts A do not necessitate facts B , then knowledge of facts A does not provide good reason to believe that facts B obtain.
3. Therefore, knowledge of all the world's physical facts does not provide good reason to believe that its negative facts obtain. (From 1 and 2)
4. Yet we do have good reason to believe that the world's negative facts obtain, as physicalism maintains.
5. Therefore, the initial assumption is false. It follows that the physical facts of the world do necessitate its negative facts.

This argument, however, is vulnerable at two points. The first concerns premise (2). For facts A to give us a good reason to believe facts B , it is not necessary for A to entail B . It is enough that A provides evidential support for B and renders B sufficiently probable, so that awareness of A , together with awareness of the relation between A and B , justifies our belief in B .

¹⁹ Chalmers (1996, ch. 2, fn. 16) appears to anticipate a similar objection. Witmer (2001) develops a related objection under the label *the problem of lucky materialism*, which I do not address here.

The second point returns us to what was noted in the previous section. The considerations listed in paragraph 4 as good reasons for believing physicalism arise from philosophical reflection rather than from knowledge of physical facts. As long as the world is such that believing those philosophical considerations remains reasonable, physicalism can maintain that believing in the instantiation of certain negative facts, such as the nonexistence of Cartesian souls, is itself a reasonable stance.

Some of the philosophical considerations that are claimed to justify belief in physicalism, and consequently in the obtaining of the relevant negative facts, include *ontological parsimony*, according to which one should not posit entities beyond those required to explain the world, and the *causal criterion for ontology*, which maintains that only entities that play a role in the world's causal structure exist.²⁰ Thus, even if ghosts or spirits were to appear in the future but remained entirely causally inert, these philosophical considerations would still give us good reason to believe that no such entities have appeared.

Francescotti's second objection therefore fails to undermine Chalmers's account as well. The final objection to the positive-fact account considered in this paper is advanced by Rabin (forthcoming), to which I now turn.

4.2 On the Incoherence Claim: A Response to Francescotti

Rabin's second objection to Chalmers's account can be formulated as follows. Chalmers's treatment of positive facts appears to conflict with three independently plausible claims that he himself would likely endorse. If so, his account is internally inconsistent. Recall that, according to

²⁰ For further discussion of this idea, often referred to as the *Eleatic principle*, see Armstrong (1997, sec. 3.82) and Colyvan (1998).

Chalmers, “a positive fact that obtains in a world w also obtains in every world that contains w as a proper part.” The three claims that generate the alleged tension are:

1. There could be mental phenomena that are blockable.
2. If a blocker is added to a world w , thereby generating a world w' , then w is a proper part of w' .
3. Facts such as the fact that Jones is in pain are paradigmatic examples of positive facts.

The tension between these claims and Chalmers’s account can be illustrated by considering a possible world w containing the mental fact M , namely, the fact that Jones is in pain. Suppose that M bears only a weak necessitation relation to the totality of physical facts in w , P_w , and is therefore susceptible to being blocked. Given (1), w is a possible world. Accordingly, there is another possible world w' in which a blocker B exists that prevents the relation between P_w and M from obtaining, such that M fails to obtain in w' . By (2), w is a proper part of w' .

However, this result creates a problem for Chalmers’s account. If w is a proper part of w' , then, according to Chalmers’s criterion, M should also obtain in w' if it is a positive fact in w . Yet M does not obtain in w' . Therefore, M cannot count as a positive fact. This conclusion conflicts with (3), since facts concerning ordinary mental states, such as Jones’s being in pain, appear to be paradigmatic examples of positive facts. Rabin argues that the plausibility of these three claims therefore provides a reason to reject Chalmers’s account of positive facts and, consequently, his formulation of physicalism.²¹

²¹ Stoljar (2010, p. 138) and Witmer (2020) raise similar concerns about the relationship between blockers, positive facts, and the condition of proper parthood in Chalmers’s account.

My response to this objection is to reject premise (2). The crucial issue is the nature of the proper parthood relation between possible worlds, a notion that has received comparatively little attention in the relevant literature. Proper parthood is, fundamentally, a relation between objects, and as Uzquiano (2011) notes, “the mereological relations on material objects are perfectly mirrored by the mereological relations on their exact locations” (p. 199). More generally, “ x is a proper part of y *iff* x ’s location is a proper part of y ’s location” (Gilmore et al., 2024).

However, since possible worlds do not stand in spatial relations to one another, the notions of parthood, and proper parthood in particular, cannot be understood in their ordinary spatial sense. How, then, should the relation of proper parthood between possible worlds be understood?

Suppose that each possible world is identified with a single, maximally conjunctive proposition consisting of the conjunction of every proposition true in that world. On this conception, the relation of proper parthood might be defined in several ways.

A natural first proposal is that a world w_1 is a proper part of a world w_2 *iff* the conjunctive proposition corresponding to w_2 contains every conjunct contained in the conjunctive proposition corresponding to w_1 not *vice versa*. However, this proposal fails. The propositions constituting w_1 determine not only the world’s internal content but also its boundaries. That is, the conjunctive proposition corresponding to w_1 includes negative propositions specifying what does not exist in that world. If w_2 were to contain every conjunct of w_1 , it would have to include those negative propositions as well. As a result, w_2 would have exactly the same boundaries as w_1 , making the two worlds identical rather than standing in the relation of proper parthood.

A second proposal is that a world w_1 is a proper part of a world w_2 *iff* the conjunctive proposition corresponding to w_2 contains every positive proposition true in w_1 . In effect, however, this proposal reverses Chalmers’s order of explanation. Chalmers appeals to the relation of proper

parthood to characterize positive facts, whereas this proposal characterizes the relation of proper parthood in terms of positive facts.

However, accepting this proposal amounts to rejecting premise (2) by definition. In the example introduced to reconstruct Rabin's objection, w would not qualify as a proper part of w' , because w contains a positive fact, namely, that Jones is in pain, which does not obtain in w' . Rabin might respond, however, that premise (2) enjoys independent intuitive support and therefore reject the proposed definition of proper parthood.

A third proposal is that a world w_1 is a proper part of a world w_2 *iff* the conjunctive proposition corresponding to w_2 includes every proposition in w_1 that asserts the existence of an entity or the instantiation of a natural property.²² I contend that, on this proposal as well, w would not qualify as a proper part of w' . Although w' contains all the entities that exist in w , there is a natural property that is instantiated in w but not in w' , namely, the property of being in pain, instantiated by Jones.

A final option is to treat the relation of proper parthood between possible worlds as primitive and rely on our intuitive understanding of it. To develop such an intuition, it is helpful to begin with the familiar case of proper parthood among ordinary objects. For example, your hand is a proper part of your body. Consequently, every constituent of your hand is also a constituent of your body. If one of your fingers that is a constituent of your hand, is in pain, then that very finger, together with its being in pain, is likewise a constituent of your body. Intuitively, the finger is part of the body in precisely the same condition in which it is part of the hand, as long as that the hand is a proper part of the body.

²² For more on natural properties, see Dorr (2026).

If we extend this intuition to the relation of proper parthood between possible worlds, the same conclusion follows. If Jones is in pain in w and w is a proper part of w' , then Jones must also be in pain in w' . More generally, when one world is a proper part of another, the smaller world is included in the larger world in its entirety, without any alteration to its internal features. Consequently, if the presence of a blocker in w' changes the intrinsic properties of the constituents of w , then w can no longer be a proper part of w' , because the portion of w' corresponding to w is no longer identical to w . Premise (2), on which Rabin's objection depends, should therefore be rejected.

5 Conclusion

In this paper, I have defended Chalmers's formulation of physicalism. This formulation develops a supervenience-based account of physicalism by appealing to the notion of positive facts, thereby addressing the problem of extras that arises for the original supervenience formulation of physicalism. To defend Chalmers's account, I first showed how it can avoid the problem of extras. I then examined Jackson's formulation, which is also capable of addressing this problem, and argued that Chalmers's account has two advantages over it. First, because it does not rely on the notion of minimality or the "that's all" clause, Chalmers's account is theoretically simpler. Second, unlike Jackson's account, it does not face difficulties in responding to the problem of blockers. To establish these claims, I proceeded in two stages. First, I argued that the most plausible understanding of physicalism does not require it to be blocker-friendly. Second, I showed that Hawthorne's objection to Chalmers's account, which appeals to R.M. and the possibility of blockers, does not succeed. I then considered two further objections to Chalmers's formulation and argued that both can be resisted.

In sum, I conclude that Chalmers's positive-fact formulation provides a superior account of supervenience-based physicalism. It avoids the difficulties associated with the simpler formulation, performs better than its main rival in critical cases, and withstands objections to its underlying conceptual framework.

Funding

This research was conducted with financial support from Iran Cognitive Sciences and Technologies Council.

Competing Interests

The author declares that there are no competing financial or non-financial interests.

Acknowledgments

I would like to thank Mahmoud Morvarid and Mohsen Zamani for helpful discussions and comments. I am also grateful to the audience at the Institute for Research in Fundamental Sciences (IPM) for valuable feedback on earlier versions of this paper.

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