# Physicalism and the Identity of Identity Theories

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**Abstract**

Type-identity theorists interpret physicalism as the claim that every property is identical to a physical property, while token-identity theorists interpret it as the claim that every particular is identical to a physical particular. The end of this paper is to undermine the distinction between the two. Drawing on recent work on the connection between generalized identities and truth-maker semantics, I demonstrate that these formulations of physicalism are logically equivalent. I then argue that each formulation has the resources to resolve problems that the other encounters.

## 1 Introduction

The world is filled with many kinds of things. There are chairs, there are people, there are protons, there are wave-functions and there are planets. There are colors, there are thoughts, there are seemings, there are games and there are social structures. Even a cursory glance at our surroundings reveals a dizzying assortment of things, and the world is populated by far more than our meager senses can observe. Nevertheless, everything is physical. There is nothing so distant in space or in time, nothing so large or so small, nothing so peculiar or so familiar, that it does not fall under the sweeping umbrella of physics. At the end of the day, there are atoms in a void and nothing more.

So says physicalism, anyway. But here a philosophical puzzle arises. If there are chairs, people and the like, how could there be nothing more than atoms in a void? After all, no chair is an atom. Perhaps it is tempting to suggest that this straightforwardly falsifies physicalism. But if the presence of chairs subverts the letter of physicalism, it does not affect its motivation. Disembodied minds, if such things exist, are the kinds of things which ought to undermine physicalism—chairs are not. So, how ought we to understand what physicalism amounts to? Quite generally, how must the world relate to physics in order for physicalism to be true?

This is the *interpretive question* of physicalism. Over the years, philosophers have advanced many potential answers.[1] Some couch their theories in terms of supervenience (e.g.,

[1] There is even a debate over the extent to which there is an interpretive question (see Crane (1990)). I will not do justice to this challenge, but endeavor to address the aspect most relevant to my claim.

Lewis (1986), Kim (1993)), others employ the notion of ground—a relation of metaphysical dependence (e.g., Rosen (2010), Schaffer (2017)), while still others prefer descriptions in terms of causal powers (e.g., Shoemaker (1994), Wilson (1999)). One alternative, which has largely fallen out of favor, is that physicalism ought to be understood in terms of identity. Physicalism concerns that which is identical to the physical.

As standardly conceived, there are two varieties of identity theory. Type-identity theorists take physicalism to be the claim that every property (or, perhaps, every type or kind) is identical to a physical property (or type or kind).[2] For example, the property of *being water* might be identical to the property of *being the chemical compound* $H_2O$, and the property of *being in pain* might be identical to the property of *possessing firing C-fibers*. Token-identity theorists, in contrast, interpret physicalism as the claim that every particular (or, perhaps, every instance or token) is identical to a physical particular (or instance or token).[3] For example, it might be that the event of the defenestration at Prague is identical to a physical event.

I deny any distinction between type- and token-identity theories. I claim that the two interpretations are one and the same. Recent developments on generalized identities—which can be interpreted as identity conditions for properties, propositions and relations—provide the theoretical resources needed to precisify type-identity theory. These developments entail that the formulations are equivalent. This equivalence resolves canonical problems for identity theory. I do not argue that identity theory is preferable to all other formulations of physicalism. However, the dissolution of its obstacles renders it a leading contender.

I will precede as follows. In section two, I briefly review the history of type- and token-identity theory, as well as the standard challenges these positions face. In section three, I discuss current developments on generalized identities and truth-maker semantics. I predominantly rely upon (Elgin (forthcoming)), in which I argue that sentences of the form 'To be $F$ is to be $G$' are true just in case the finely grained states of affairs which make something $F$ are the state of affairs which make it $G$. In section four, I provide formulations of type- and token-identity theory, and demonstrate that they are logically equivalent, before arguing that each resolves problems facing the other. In section five, I discuss potential modifications and refinements that concern the modal scope of physicalism, before concluding in section six.

## 2 Identity Theories and Their Discontents

Why did identity theory hold such appeal? An example may illustrate. Consider an instance of fire. Fire occurs when a substance rapidly oxidizes. The properties typically associated

[2]For the canonical defense of type-identity theory, see Smart (1959). For the purposes of this paper, I will disregard the distinction between properties, types and kinds. I do not believe that my claim turns on which of these we select.

[3]For the canonical defense of token-identity theory, see Davidson (1970). As with properties, types and kinds, I ignore any distinction between particulars, instances and tokens.

with fire—in particular, the abundance of heat and light—result from this physical process. But what, from a philosophical perspective, is the relation between *this* fire and *that* occurrence of a chemical process? It is natural to suggest that the fire does not merely supervene upon that reaction, nor does it merely depend upon the reaction, but it *simply is* that reaction. The fire is identical to the carrying out of that physical process. Identity theorists model all macroscopic phenomena similarly; they simply are physical occurrings.

Identity theory respects the parsimony implicit in physicalism. The claim that everything is identical to the physical amounts to the denial of the non-physical. The conviction that the physical is all that exists promises a simple and unified conception of reality. And if we were to posit just one kind of thing, the physical seems a promising candidate. After all, the macroscopic objects we observe are all, presumably, composed of purely physical parts.

Coupled with ontological parsimony was a complementary notion of reduction. When identity theory held its strongest sway, some argued that metaphysical reductions are identities.[4] The contention that phenomenon $a$ reduces to phenomenon $b$ amounts to the claim that $a$ and $b$ are identical. And so, in claiming that everything is identical to the physical, physicalists allowed for everything to reduce to the physical.[5]

Another motivation arose from the oddity of 'nomological danglers.'[6] Unlike the laws of the special sciences (if such things exist), the laws of physics appear to hold without exception. But how could the laws of physics apply to the non-physical? If the mind were not identical to a physical material (for example), in what sense could the laws of physics be said to apply to it? In claiming that everything is physical, identity theory accommodates the universal comprehension of the laws of physics.

Despite its initial appeal and stalwart motivation, identity theory fell from favor. This fall took different forms for different versions of identity theory. Multiple realizability precipitated the fall of type-identity theory, while the unity of phenomenal experience threatened token-identity theory. Let us take these problems in turn.

Multiple realizability concerns the ability of properties to be realized by diverse physical configurations.[7] Perhaps the property of *being a heart* is defined in terms of the function hearts perform (say, the function of pumping blood throughout a body), rather than a particular kind of matter. Carbon in one configuration may constitute a heart in many cases, but an artificial heart composed of metal and plastic counts as well. And perhaps the property of *being in pain* is associated with firing C–fibers in humans, but it seems possible

[4] For example, see Moore (1952); Carnap (1947). This view remains viable; see Correia (2017*a*).

[5] One of the most promising scientific reductions has been the reduction of thermodynamics to statistical mechanics. The flow of heat is both identical to and reducible to statistical variations of particle movement. Indeed, some philosophers remain optimistic for reductions not only to physics in general, but to statistical mechanics in particular (e.g., Albert (2003)).

[6] See Smart (1959). However, for a contemporary philosopher who embraces the possibility of nomological danglers, see Cartwright (1999).

[7] As with the interpretation of physicalism, the interpretation of the multiple realizability objection remains contentious. See Gillett (2003); Polger (2004) for some recent discussions on the issue.

for the same phenomenology to be realized by different neurological structures in other creatures. If the properties of *being a heart* or *being in pain* are not identical to particular physical configurations, then not all properties are identical to physical properties. Type-identity theorists thus seem committed to the claim that physicalism is false. But surely these are not the kinds of things which ought to undermine physicalism. The presence of hearts and pains ought to pose no greater threat to the physicalist than the presence of chairs. So, the multiple realizability objection maintains, type-identity theory is a poor interpretation of physicalism.

As astute philosophers doubtless realize, it may be possible to identify the properties of *being a heart* or *being in pain* with the disjunctions of their realizations. Perhaps the property of *being heart* is identical to the property of *being either carbon shaped thus and so, or plastic and metal shaped thus and so, etc.*. So long as each disjunct specifies a physical configuration, physicalism remains true. The problem with this response is that these identifications are explanatorily poor.[8] One learns nothing of the nature of the pain, if I may speak this way, in learning a lengthy disjunction. Because a functional definition is much more informative, it is much more plausible.

One potential response came to be seen as untenable. Early identity theorists held that identity is a contingent relation.[9] Although the property of *being in pain* is actually identical to the property of *having firing C-fibers*, it might have been identical to another neurological configuration. Type-identity theorists thus hoped to accommodate the possibility of different realizations of pain by appealing to different states that pain might have been identical to.

Even at the time, this ought to have seemed implausible. Presumably, it is epistemically possible for creatures in the actual world to experience pain without having firing C-fibers. For all that we know, creatures exist with different neurological structures who experience phenomenal pain. An appeal to different possible worlds with different identity relations is unhelpful for this case, so the appeal to contingent identity ought to have seemed suspect.

As time passed, problems multiplied. Following advancements in the philosophy of language and modal logic, philosophers largely came to believe that identity holds necessarily Kripke (1980).[10] If identities hold necessarily, and if the property of *being in pain* is identical to the property of *having firing C-fibers* in the actual world, then the property of *being in pain* is necessarily identical to the property of *having firing C-fibers*. There is no possible situation in which it is identical to anything else.

These developments not only undermined type-identity theory, but formed the basis for modal conceptions of physicalism. Many began to understand physicalism in terms of supervenience. They held that physicalism amounts to the claim that everything supervenes upon the physical; any two possible worlds that are physical duplicates of one another are

[8] See Fodor (1974) for the original discussion of this point, and Rosen (2015) for a related, more recent discussion.

[9] For an appeal to contingent identity in this context, see Smart (1959).

[10] However, for a recent defense of contingent identities, see Kocurek (2018).

duplicates simpliciter.[11] While many have strayed from purely modal interpretations in recent years, type-identity theory remains unpopular.

A less prominent objection to type-identity theory concerns its commitment to properties. In order for it not to hold vacuously, there must be properties that are identical to one another. This renders the position unavailable to nominalists, who deny that properties exist. But physicalism ought to be available to those with a preference for desert landscapes. After all, its parsimony drove its initial appeal. Minimally, physicalism ought to be compatible with nominalism, if not to entail it outright. Type-identity theory wanders dangerously close to ontological extravagance that physicalists hope to avoid.

Token-identity theory avoids these concerns. On one version, physicalism amounts to the claim that every event is identical to a physical event.[12] This does not commit the identity theorist to abstract entities like properties, so it better respects physicalism's implicit parsimony. Additionally, token-identity theory is well-equipped to accommodate multiple realizability concerns. There is no requirement that diverse realizations resemble one another, so long as all realizations are physical. The event of a human experiencing pain may be identical to the (physical) event of C-fibers firing, and the event of artificial intelligence experiencing pain may be identical to the (physical) event of its computer chips acting in a particular way.

However, token-identity theory encounters problems that the type-identity theorist avoids. There is no guarantee, on token-identity theory, that similar physical configurations realize similar mental states.[13] Although many maintain that different physical configurations realize similar phenomenal states (for the multiple realizability considerations already belabored), many also maintain that physicalism ought to guarantee that similar physical states realize similar phenomenal results. If one brain in a particular configuration realizes consciousness, then a qualitatively identical brain in a qualitatively identical configuration (and perhaps a qualitatively identical situation) also ought to realize consciousness. Token-identity theory does not ensure this result. It merely requires that each particular is identical to a physical particular; it does not guarantee that similar physical particulars realize similar mental states.

Before we proceed, it is worth noting that philosophers have universally maintained that type- and token-identity theories are distinct interpretations. Fodor, for example, claims "Token physicalism is weaker than what might be called 'type physicalism' " (Fodor, 1974, pp. 100). Similarly, Stoljar (2017) argues that type-identity theory, but not token-identity theory, entails that everything supervenes upon the physical. This entails that the views are logically distinct. This putative distinction is a principle subject of the present discussion.

Identity theory once held promise, but it was waylaid by apparently insurmountable problems. Multiple realizability and ontological extravagance threaten type-identity theory,

[11] For an insightful discussion of the way Kripke's insights affected the interpretation of physicalism, see Boyd (1980).

[12] See, again, Davidson (1970).

[13] For an early discussion of this point, see Fodor (1974).

while token-identity theory cannot account for unity physicalism ought to guarantee. So, these interpretations fell by the wayside—mere theoretical relics we did well to leave behind.

## 3 Generalized Identities and Truth-Maker Semantics

There has recently been substantial interest in a targeted reading of sentences of the form 'To be $F$ is to be $G$,' which have come to bear the label 'generalized identities,' and which are often employed to express analyses.[14] Notable examples of these sentences include:

1. To be a moral agent is to be bound by the categorical imperative.
2. To be a bachelor is to be an unmarried male.
3. To be hydrogen is to be the chemical element with a single proton and a single electron.
4. To be prime is to be a natural number that is evenly divisible only by one and itself.
5. To be a square is to be an equilateral rectangle.

On the target reading, the 'is' of generalized identities resembles the 'is' of identity in both its logical and modal profile. Sentences of this form are reflexive, transitive and symmetric and, if they are true, then they are necessarily true and it is necessary that all and only $F$s are $G$s.

Some may suspect the 'is' of generalized identities literally is the 'is' of identity. Perhaps 'To be $F$ is to be $G$' is strictly synonymous with 'To be the property of being $F$ is to be the property of being $G$.' If so, an account of generalized identities yields identity conditions for properties, propositions and relations. For the purposes of this paper, I do not object to this proposal. However, several discussions of generalized identities are uncommitted to this claim.[15] There is linguistic evidence that 'to be $F$' is not synonymous with 'to be the property of being $F$' in at least some contexts. The sentence 'I hope to be an accomplished philosopher' is perfectly true, but the sentence 'I hope to be the property of being an accomplished philosopher' is presumably false; I do not hope to be a property. More importantly for the present discussion, some desire for accounts of generalized identities to be compatible with nominalism: the denial that properties and relations exist. Such philosophers take the 'is' of generalized identities to resemble, but not to strictly be, the 'is' of identity, because they deny that the phrase 'To be $F$' denotes.

Others may dismiss a reading of 'To be $F$ is to be $G$' that is reflexive and symmetric, perhaps maintaining that if a sentence of this form is true, then $G$ is more metaphysically fundamental than $F$ is. I do not dispute that an irreflexive and asymmetric reading exists,

[14] See Dorr 2016, Correia 2017*a*, Correia 2017*b*, Rayo 2013

[15] E.g., Dorr (2016); Correia (2017*a*).

but maintain that there is also a reading that resembles an identity. On this reading, 'To be $F$ is to be $F$' is manifestly true; what else could $F$ possibly be? Interest in one reading need not diminish the import of another. Additionally, several philosophers have advanced accounts of the irreflexive and asymmetric reading in terms of the reflexive and symmetric one (e.g., Correia (2017*a*)), so the reflexive and symmetric reading ought not be abandoned prematurely.

I hope that the relevance of these developments is apparent. Type-identity theorists interpret physicalism in terms of the identity of properties. Generalized identities, which can be interpreted as identity conditions for properties, specify the conditions in which a property is identical to a physical property, so they directly bear on the topic at hand. Quite recently, Correia (2017*a*) and Elgin (forthcoming) have suggested that generalized identities ought to be accounted for by truth-maker semantics. I rely on this contention here, so let us turn our attention to this proposal.

### 3.1 Background on Truth-Maker Semantics

Truth-maker semantics identifies the meanings of sentences with finely-grained states of affairs that are exactly responsible for their truth-values. For example, the state of grass being green may verify 'Grass is green,' and the state of it raining outside may verify 'It is raining outside.' Unlike other prominent approaches, truth-maker semantics requires that verifiers be relevant to the sentences that they verify, and that they be entirely relevant; no part of them is irrelevant to the truth of such a sentence.[16] So the state of republicans controlling both the Senate and the House of Representatives does not verify '1 + 1 = 2,' although it entails that the sentences is true. It does not even verify 'Republicans control the Senate,' because a part of that state concerns the House of Representatives—not the Senate. I do not assume that sentences have a unique verifier and a unique falsifier. The sentence 'Either Frege formalized first-order logic or Gödel proved that arithmetic is incomplete' presumably has (at least) two verifiers: the state of Frege having formalized first-order logic and the state of Gödel having proven that arithmetic is incomplete.

I will spare the reader excessive formalisms, and direct those interested in the formal details to Fine (2016), Elgin (forthcoming). The following abridgement should suffice. Negation swaps a sentences verifiers for its falsifiers. So if the state of the United States being a democracy verifies 'The United States is a democracy,' then it falsifies 'The United States is not a democracy.' Verifiers of conjunctions are fusions of verifiers of their conjuncts. So, a verifier of 'Gorillas are endangered and ants are not' is the fusion of a verifier of 'Gorillas are endangered' with a verifier of 'Ants are not endangered.' Verifiers of disjunctions are verifiers of a disjunct. So, a verifier of 'Either Sarah is tall or Anne is tall' is

[16] Note that this approach commits us to the claim that states have proper parts; they are the kinds of things that are capable of mereological composition. This is an assumption I embrace. The state of a ball being both red and round, for example, might be the composite of the state of the ball being red with the state of it being round.

either a verifier of 'Sarah is tall' or a verifier of 'Anne is tall.'

Two sentences are said to be *exactly equivalent* just in case their verifiers and falsifiers are identical. Exact equivalence differs both from syntactic identity and from classical equivalence. '$A \wedge B$' is exactly equivalent to '$B \wedge A$,' and '$\neg\neg A$' is exactly equivalent to '$A$.' However, '$A$' is typically not exactly equivalent to '$A \wedge (B \vee \neg B)$,' although the sentences are classically equivalent. A verifier of the first sentence is a verifier of '$A$,' while a verifier of the second is either the fusion of a verifier of '$A$' with a verifier of '$B$,' or else the fusion of verifier of '$A$' with a falsifier of '$B$.'

This approach standardly does not restrict states to those that actually obtain, nor even to those that could possibly obtain. The state of Hillary Clinton being president is a state that does not obtain, while the state of a particular square being round is a state that could not possibly obtain. For the purposes of this paper, I foresee few uses for impossible states; we may restrict our attention to those which are possible.[17] However, I do foresee uses for non-actual states, and so I countenance states that, although possible, do not actually obtain.

Here, I rely heavily on the notion of a *physical state*—so heavily that the reader is owed a characterization of what a physical state is. I will not provide a reductive account of a physical state, but offer some clarification.[18] A physical state, as I use the term, is a kind of state as employed by truth-maker semantics. It is an aspect of the world that is capable of verifying and falsifying sentences. The state of an electron being in spin up is plausibly a physical state, and plausibly verifies 'The electron is in spin up;' the state of a disembodied Cartesian mind being conscious is not plausibly a physical state, but does plausibly verify 'There exists a conscious mind.'

I assume that physical states are closed under composition. Any composite of two or more physical states is itself a physical state. If the state of *this* electron being in spin up is a physical state, and the state of *that* electron being in spin down is a physical state, then the state of *this* electron being in spin up and *that* electron being in spin down is also a physical state.

I also assume that physical states are closed under parthood. Every part of a physical state is itself a physical state. If the state of two samples of uranium decaying is a physical state, and the state of one of these samples decaying is a part of this state, then the

[17] There are plausibly distinct notions of possibility (see Fine (2002).) As I mention in section 5, I take the most relevant notion of possibility to be *nomological possibility* The states I am concerned with are states which are physically possible.

[18] Many have advanced interpretations of physicalism without taking a stand on what it takes to be physical. Davidson (1970), for example, interprets physicalism as the claim that every event is identical to a physical event without detailing what it takes for an event to be physical. Chalmers (2001) argues that every truth is *a priori* knowable from the conjunction of the physical truths, indexical truths, phenomenal truths and a totality truth, without specifying what it takes for a truth to be a physical truth. Schaffer (2017) defends an interpretation according to which physicalism is the claim that chemical, biological and psychological entities are grounded in physical entities, without defining the notion of a physical entity. I suspect that the charge is no more pressing for me than it is for them.

state of one of these samples decaying is itself a physical state. Interestingly, this allows for (somewhat substantive) necessary and sufficient conditions on what it takes to be a physical state. A state is a physical state just in case all of its parts are physical states.[19] For mereologically simple states (i.e., those that lack proper parts), this holds vacuously; a state is a physical state just in case it is a physical state.[20] The condition gets its teeth from states with proper parts; it entails that every proper part of a physical state is itself a physical state.

It is my hope that these brief remarks and an intuitive grasp render the notion of a physical state sufficiently clear for the present discussion.

### 3.2 Truth-Making Generalized Identities

Elgin (forthcoming) argues that a sentence of the form 'To be $F$ is to be $G$' is true just in case that which makes something $F$ is that which makes it $G$: i.e., if and only if for any name $a$, '$F(a)$' is exactly equivalent to '$G(a)$.'[21] 'To be morally right is to maximize utility' holds just in case for any $a$, the verifiers (and falsifiers) of '$a$ is morally right' are identical to the verifiers (and falsifiers) of '$a$ maximizes utility,' and 'To be a bachelor is to be an unmarried male' holds just in case for any name $a$, the verifiers (and falsifiers) of '$a$ is a bachelor' are identical to the verifiers (and falsifiers) of '$a$ is an unmarried male.'

This account accommodates many of the logical and modal features of generalized identities. Because exact equivalence is an equivalence relation, sentences of the form 'To be$F$ is to be $G$' are transitive, symmetric and reflexive. And because this account requires that these sentences be exactly equivalent in all possible situations, it follows that these sentences hold necessarily. There is a great deal more to say in defense of this proposal, but I will simply assume that it is correct for the remainder of this paper.

## 4 Three Formulations of Physicalism

In light of the previous discussion of generalized identities, the following is a natural interpretation of physicalism:

> **First Formulation of Physicalism:**
> Physicalism is the claim that, for any predicate $F$ there is a physical predicate $G$ such that to be $F$ is to be $G$.

[19] Note that this requirement is logically distinct from the one mentioned in the previous paragraph. It is possible, on the second requirement, for a non-physical state to have purely physical proper parts, so long as it retains one improper part (itself) which is not a physical state. Such a state does not violate the second requirement, but does violate the first.

[20] I operate with a notion of parthood, rather than proper parthood, so every state is a part of itself.

[21] For related accounts, see Correia (2017*a*,*b*).

The first formulation strongly resembles type-identity theory. If 'to be $F$' denotes 'to be the property of being $F$,' then the first formulation simply is type-identity theory; it interprets physicalism as the claim that every property is identical to a physical property. However, if 'to be $F$' is not a denoting phrase (as suggested by Dorr (2016); Correia (2017*a*)), then the first formulation merely resembles type-identity theory without its ontological commitments. It interprets physicalism directly in terms of predicates, without reifying properties.

I suspect it seems odd that I have belabored the notion of a physical state only to interpret physicalism in terms of physical predicates. The notion of a physical predicate has a long and rich history. Most notably, Lewis (1983) argued that a predicate is a physical predicate just in case it denotes a perfectly natural property.[22] I do not commit myself to Lewis's proposal. However, I maintain that there is a connection between the notion of a physical state and the notion of a physical predicate. It is in virtue of this connection that both are worthy of the moniker 'physical.' In particular, I assume that the following principle is true:

> **Linking Principle:**
> A predicate $F$ is a physical predicate just in case, for any object $a$, all of the verifiers (and falsifiers) of '$Fa$' are physical states.

For example, the predicate 'conscious' is a physical predicate just in case every verifier and falsifier of 'John is conscious' is a physical state (and in case verifiers and falsifiers for correlate sentences with names other than 'John' are physical states). If there is a non-physical state of John being a disembodied Cartesian mind that verifies 'John is conscious,' then 'conscious' is not a physical predicate.

This principle is compatible with, but uncommitted to, Lewis's proposal. Although it is tempting to treat the linking principle as an analysis of the notion of a physical predicate (and I am not entirely averse to that idea), I only assume that it provides necessary and sufficient conditions for what it takes to be a physical predicate.

Because the first formulation so closely resembles type-identity theory, it might seem to inherit the challenges type-identity theory faced. In particular, it appears susceptible to multiple-realizability concerns. If the predicate 'heart' is defined functionally, then there may be no physical predicate $G$ such that to be a heart is to be $G$.[23] If there is no such

[22] This glosses over important details. Minimally, Lewis directly discusses the notion of a natural property, rather than a physical property. Given that his tentative examples of perfectly natural properties are charge and mass, I take it that the notion of a natural property strongly resembles the notion of a physical property.

[23] A brief aside: I take it that the first formulation clarifies what it is for a predicate to be defined functionally. A predicate $F$ is defined in functional terms just in case there is a predicate $G$ which specifies the performance of a certain function such that 'To be $F$ is to be $G$' is true. For example, if a heart is defined in functional terms, it may be that 'To be a heart is to perform the function of pumping blood throughout the body' is true.

predicate, then the presence of hearts objectionably undermines the first formulation of physicalism.

Whether or not the first formulation faces the charge of extravagance depends upon whether 'to be $F$' is a denoting phrase. If 'to be $F$' is synonymous with 'to be the property of being $F$,' then the first formulation is committed to the existence of properties. If, however, generalized identities merely resemble identity claims without their ontological commitments, then the first formulation is uncommitted to the existence of properties. The charge of extravagance can thus be avoided.

But multiple realizability may be troubling enough. Let us consider a formulation better suited for these concerns:

> **Second Formulation of Physicalism**
> Physicalism is the claim that, for any predicate $F$ and every object $a$, every verifier and falsifier of '$Fa$' is a physical state.

The second formulation is well-suited for multiple realizability. There is no requirement that the verifiers of '$Fa$' resemble one another, so long as they are all physical states. The state of Alfred possessing firing C-fibers might verify 'Alfred is in pain,' but the state of Alfred possessing another neurological structure might as well. It is unclear whether the second formulation counts as identity theory. Reference is made both to predicates (which correspond to types) and to states (which correspond to tokens). However, it is notable that the second formulation is equivalent to the first.

Suppose that the first formulation is true, and select an arbitrary predicate $F$ and an arbitrary name $a$. According to the first formulation, there exists a physical predicate $G$ such that to be $F$ is to be $G$. Because $G$ is a physical predicate, the linking principle entails that all verifiers of '$Ga$' are physical states.[24] The present account of generalized identities requires that '$Fa$' have identical verifiers to '$Ga$,' so all of the verifiers of '$Fa$' are physical states. And because both $F$ and $a$ were chosen arbitrarily, for every predicate $F$ and every object $a$, every verifier of '$Fa$' is a physical state. Therefore, the second formulation is true.

Suppose, instead, that the second formulation is true, and select an arbitrary predicate $F$. According to the second formulation, for every object $a$, '$Fa$' has purely physical verifiers. Given the linking principle, this entails that $F$ is a physical predicate. Because generalized identities possess the logical profiles of identities, it follows that to be $F$ is to be $F$. So there exists a physical predicate $G$ (in particular, $F$) such that to be $F$ is to be $G$.[25] Because the selection of $F$ was arbitrary, for any predicate $F$ there is a physical predicate $G$ such that to be $F$ is to be $G$. Therefore, the first formulation is true.

[24] For the sake of brevity, I omit mention of falsifiers, but what I say about verifiers strictly applies to falsifiers as well.

[25] The reflexivity of generalized identities serves only to guarantee that there exists some predicate or other such that 'To be $F$ is to be $G$' is true. Any predicate $G$ such that 'To be $F$ is to be $G$' is true is a physical predicate, since all verifiers of '$Ga$' are physical verifiers according to the second formulation.

The first formulation is equivalent to the second. However, as previously noted, it is unclear whether the second formulation counts as identity theory. So, let us consider a third:

**Third Formulation of Physicalism**
Physicalism is the claim that every state is identical to a physical state.

The third formulation is clearly an instance of token-identity theory, where the relevant tokens are states. Just as Davidson (1970) interpreted physicalism in terms of the identity of particular events, this interpretation is given in terms of the identity of particular states. It requires that the state of it raining be identical to a physical state and that the state of nitrogen being abundant in the Earth's atmosphere be identical to a physical state.

It is straightforward to establish that the third formulation entails the second. Given that every state is a physical state, for an arbitrary predicate $F$ and an arbitrary object $a$, all of the verifiers of '$Fa$' are physical states. After all, this set of verifiers is a subset of the set of states.

It is less straightforward to establish that the second formulation entails the third. One method is to insist that every state verifies some predicative sentence or other: to equip our language with sufficiently many predicates that every state $s$ verifies '$Fa$' for some $F$ and $a$.[26] Let us suppose that we have such a language, assume that the second formulation obtains and select an arbitrary state $s$. Because our language is so richly endowed, there exists a predicate $F$ and an object $a$ such that $s$ verifies '$Fa$.' The second formulation requires that all verifiers of '$Fa$' be physical states, so it follows that $s$ is a physical state. Because the selection of $s$ was arbitrary, every state is identical to a physical state. Therefore, the third formulation is true.

We need not adopt such a rich language in order to derive the third formulation from the second. Let us consider a predicate $F$ that applies to an object just in case the entire history of the world is precisely as it is. For an object $a$, '$Fa$' holds just in case the history of the world enfolded exactly as it did; if and only if Caesar crossed the Rubicon, the southern states seceded from the United States in 1861, Einstein discovered that $E = MC^2$, etc..[27] Such a predicate is not restricted to past events; the truth of '$Fa$' also requires that the future unfolds precisely as it will. I assume that one verifier of '$Fa$' is a state that contains

[26] This abundance is not unprecedented; a common conception of properties (which we might identify with predicates) is that they are functions from possible worlds to sets of objects—intuitively, the objects that bear that predicate in that world (see, e.g., Egan (2004)). On this view, there are as many properties as there are functions from worlds into sets of objects.

[27] This predicate is not new. It was discussed most prominently by Lewis (1983) in his account of laws of nature. Lewis, drawing on Mill (1947), argues that a sentence expresses a law of nature just in case it strikes the optimal balance of simplicity and strength, where simplicity is given by the length of the sentence and strength is given by descriptive power. A potential worry is that, on this conception, '$Fa$' is a law of nature. After all, it is maximally strong (in that it describes the entire history of the world) and is remarkably simple (in that it is two characters long). Lewis avoids this concern by employing a language that only possesses terms for perfectly natural predicates. However, my use for $F$ is differs from his.

every state as a part.[28] Suppose that the second formulation is true, and select an arbitrary name $a$. The second formulation requires that all verifiers of '$Fa$' be physical states. At least one of these states—call it state $s$—contains every state as a part. State $s$ is a physical state and, from the developments in 3.1, every part of a physical state is itself a physical state, so every state is identical to a physical state. Therefore, the third formulation is true.

The second formulation of physicalism is equivalent to the third. And, as previously noted, it is also equivalent to the first. Therefore, the first formulation of physicalism (which is reasonably interpreted as type-identity theory) is equivalent to the third formulation (which can reasonably be interpreted as token-identity theory).

This is independently significant. The distinction between type- and token-identity theories, once appropriately understood, is dissolved. It has further ramifications. The resources each formulation provides resolve problems facing the other. One problem—the charge of ontological extravagance—has already been discussed. Nominalists can (and do) account for generalized identities without reifying properties. It may be that to be a vixen is to be a fox even if there is no property of *being a vixen*. Such philosophers may embrace the first, second and third formulations, because each is agnostic about the existence of properties.

Multiple realizability is also easy enough to accommodate. Perhaps some predicates are functionally defined; perhaps to be a heart is to perform the function of pumping blood. In this case, however, physicalism merely requires that every verifier of the claim that something is a heart is a physical state. If so, then both 'heart' and 'perform the function of pumping blood' are physical predicates, and the first, second and third formulations of physicalism obtain.[29]

Perhaps the trickiest objection concerns the unity of phenomenal experience. Is there any guarantee that similar physical states yield similar phenomenal experiences? If there is any recourse, it arises from the first formulation. Let us suppose, for the sake of argument, that there is an instance of 'To be $F$ is to be $G$' where $F$ is a mental predicate and $G$ is a physical predicate.[30] For the sake of argument, let us suppose that 'To be in pain is to possess firing C-fibers' is true. This requires that the verifiers of '$a$ is in pain' are identical to the verifiers of '$a$ possesses firing C-fibers' for any name '$a$.' The states that verify 'Johnathan possesses firing C-fibers'—for example, the state of Johnathan possessing firing C-fibers—also verify 'Johnathan is in pain.' Similarly, the states that verify 'Timothy possesses firing C-fibers'—for example, the state of Timothy possessing firing C-fiber—also verify 'Timothy is in pain.' So, states concerning the firing of C-fibers are relevant to pains generally.

Identity theory thus accommodates multiple realizability, ontological minimalism and

[28] There may be issues arising from states that do not actually obtain. I discuss this in section 5 while addressing the modal scope of physicalism.

[29] Or, more accurately, are not undermined by the presence of hearts.

[30] Note that, on the current approach, this also requires $F$ to be a physical predicate; I see no objection to a predicate being both a mental and a physical predicate.

the unity of phenomenal experience. That type- and token-identity theories are identical has weighty payoffs that render it a viable interpretation. However, an unresolved issue concerns the modal scope of physicalism.

## 5 The Modal Scope of Physicalism

Recall that some discussions of truth-maker semantics allow for impossible states. There may be a state of there being two even primes or a state of an object being both entirely red and entirely blue. And so, there seems to be no constraint against a state of a disembodied Cartesian mind being conscious, even if such a state could not possibly obtain. Quite plausibly, the (impossible) state of a disembodied Cartesian mind being conscious verifies 'Something is conscious,' so the sentence has a non-physical verifier. But impossible states ought to pose no threat to physicalism; physicalism does not deny that there are impossible states of affairs in which the non-physical obtains.

The obvious solution is to restrict the verifiers that are relevant to the truth of physicalism. There are two plausible restrictions with differing modal force. The first is to restrict the account to states that actually obtain. Physicalism, the thought goes, concerns the way that the world actually is. On this interpretation, physicalism is the claim that every *actual* state is a physical state.[31] Impossible states concerning disembodied Cartesian minds are irrelevant to the truth of physicalism.

But perhaps physicalism is more demanding. Consider a possible world $w$ that is nearly identical to the actual world, except that it contains an additional ammonium atom in the rings of Saturn.[32] It would be odd if such a world contained radically different mental properties from the actual world. Why should the presence of a single ammonium atom make a considerable difference? However, this possibility is permitted by the actualist restriction—it takes no stand on what happens in nearby possible worlds.

A broader conception of physicalism accommodates this kind of case. Instead of restricting the relevant verifiers to those that actually obtain, this interpretation restricts verifiers to those that could obtain: those that are possible. On this interpretation, physicalism amounts to the claim that every possible state is a physical state.

Some maintain that there are several varieties of necessity (e.g., Fine (2002)). There may be a type of logical necessity—according to which the only impossible states are those that logically entail a contradiction—and a notion of metaphysical necessity—according to which a possible state occurs in at least one metaphysically possible world. For the present purposes, I suspect that the most useful type of necessity is *nomological necessity*. A state is nomologically possible if and only if it is compatible with the laws of physics.[33]

[31] This paraphrases the third formulation. On this restriction, the first formulation is unaltered, but exact equivalence is defined in terms of the identity of actual verifiers and falsifiers.

[32] See Kim (1993) for the first discussion of this example.

[33] For a precise definition of compatibility on the truth-maker approach, see Fine (2017).

Physicalism, then, demands that every *nomologically possible* verifier is a physical verifier. If the state of a disembodied Cartesian mind being conscious is nomologically impossible, then it is irrelevant to the truth of physicalism.

This restriction accommodates world $w$. Because the state of an additional ammonium atom existing in the rings of Saturn is nomologically possible, it is relevant to the truth of physicalism. If this world allowed for non-physical verifiers, physicalism would be false.

## 6 Conclusion

I have argued against the distinction between type-and token-identity theories, and demonstrated how this account resolves their canonical challenges. The identity interpretation of physicalism has advantages that I have failed to discuss. For example, other conceptions of physicalism rely on notions philosophers find suspect. Ground-based interpretations, for example, may be undermined by objections to grounding (e.g., Della Rocca (2014); Wilson (2014)). The notion of identity is remarkably uncontroversial. To the best of my knowledge, there are no philosophers who dispute that identity exists. However, it is my hope that the discussion I provided demonstrates that type-identity theory is identical to a version of token-identity theory, and how this resolves objections these views previously faced.

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