

## Five Problems for Five-Dimensionalists

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*Abstract:* Five-dimensionalism is the view that ordinary objects don't just have spatiotemporal (four-dimensional) parts, they also have modal (fifth- dimensional) parts “stretched” across possible worlds. This paper presents five problems for this five-dimensionalist view.

*Keywords:* Extended modal realism; five-dimensionalism; counterpart modal occurentism; modal dimensionalism.

### 1. Introduction

In the past twenty years, the metaphysics literature saw the emergence of a view that combines the conceptual resources of Lewisian modal realism and four-dimensionalism (packaged with eternalism and perdurantism).<sup>1</sup> This view has been called by many names, e.g., “counterpart modal occurentism” (Varzi, 2001), “extended modal realism” (Yagisawa, 2010), and “(extended) modal dimensionalism” (Vacek, 2019). However, one name seems to have stuck, viz., “five-dimensionalism” (or 5D, for short) (Graham, 2015).

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<sup>1</sup> Such a packaged four-dimensionalist view is defended by people like Sider (2001).

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5D is the view that ordinary objects don't just have spatiotemporal (fourdimensional) parts but also modal (fifth-dimensional) parts. For friends of this 5D picture ("5Ders" as I'll call them), this means that aside from having parts extended in space and time, objects also have modal parts that are somehow "stretched" across possible worlds.<sup>2</sup> Thus, according to 5Ders, since I could have been a professional footballer (instead of being a lowly philosophy professor), I have a modal part that is enjoying the life of a professional footballer somewhere in the vastness of logical (hyper) space.

5Ders have offered several arguments in favour of their view. For example, Graham (2015) argues that the 5D view provides a "unified and elegant solution" to the puzzles of transworld identity. On the other hand, Yagisawa (2017) argues that it preserves the "absolute conception of possibility" and the truth of the S4 axiom (i.e., the axiom that tells us that whatever is possibly possible is possible). These arguments share the same (Lewis-style) cost-benefit form: "the theoretical payoff of this account is worth the high ontological cost" (Jago, 2013).

I don't intend to challenge these arguments in this paper. Rather, I aim to raise issues about the 5Ders' metaphysical picture. In particular, I present five cases that 5Ders might have problems accounting for, given their metaphysical picture. These are (arranged by level of difficulty) (i) the case of non-existing parts, (ii) the case of impossible parts, (iii) the case of necessary parts, (iv) the case of dis-unified modal parts, and (v) the case of jumping parts.<sup>3</sup> I consider and reply to possible rejoinders that 5Ders may give in response. Before getting into this, however, let's first get a conceptual handle on the metaphysical picture that 5D paints us.

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<sup>2</sup> Some 5Ders (like Yagisawa (2010)) use the term "modal *stages*," instead of "modal *parts*." Since I don't intend to make any important philosophical distinction between modal stages and modal parts, I'll use the latter term throughout this paper.

<sup>3</sup> Case (iii) has already been raised by Jago (2013), an early critic of 5D. My original contribution to this discussion is the other cases.

## 2. The Five-Dimensional Picture

We all know who Pelé is. He was one of the – if not *the* – greatest footballer(s) of all time. However, instead of being a world-famous footballer, Pelé might have been a restaurateur in Brazil. Thus, while it's true that Pelé *was* a world-famous footballer, it's also true that he could have been a restaurateur in Brazil.

In standard possible-worlds analysis, “Pelé could have been a restaurateur in Brazil” is true just in case there's a possible world where he (or his counterpart) is a restaurateur in Brazil.<sup>4</sup> This analysis is straightforward, *possibilia* are just facts in some possible world.

Matters, however, are a bit complicated in the 5D picture. For 5Ders, “Pelé could have been a restaurateur in Brazil” is true because he has two modal parts: a modal footballer part who is famous in some world (viz., our “actual” world) and another modal restaurateur-in-Brazil part in some other possible world.

The metaphysical picture that 5Ders paint extends the one that fourdimensionalists (4Ders) have painted. In the 4D picture, ordinary objects are spacetime worms, having spatiotemporal parts. The 4D view is standardly packaged as a block view of reality, in which the past, present, and future are equally real (aka an eternalist theory of time) and in which things persist by perduring or by having temporal parts (aka a perdurantist theory of persistence).<sup>5</sup> For instance, Pelé is a spacetime worm whose parts are stretched across a particular spacetime bit in our 4D world. Accordingly, he has a spatiotemporal part on the 23rd of October 1940 (his date of birth), a spatiotemporal part in 1958 (which played at the World Cup in Sweden), and a spatiotemporal part in 1997 (which served as the Brazilian Minister of Sports). All these spatiotemporal parts (and many more besides) are parts of the Pelé's spacetime worm in this world.

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<sup>4</sup> I won't delve into the Lewis-Kripke debate about transworld identity here, as it has no bearing on the points proposed in this paper. For an overview of this debate, see Mackie and Jago (2022).

<sup>5</sup> The idea of a “packaged view” here follows Chalmers's discussion in (2012, §7.11).

In the 5D picture, objects are 5D objects whose respective modal parts are spacetime worms in some 4D worlds. For example, aside from his spatiotemporal parts, Pelé also has an infinite number of (or at least finitely many) modal parts stretched across some segment of logical (hyper) space. So, Pelé doesn't only have a world-famous footballer modal part in our 4D world and a restaurateur-in-Brazil modal part in some other possible 4D world, he also has a novelist-extraordinaire-in-Paris modal part in yet another 4D world, and yet another modal part in some further 4D world, *et sic porro*.

We could think of a 5D object here as a metaphysical “starfish,” where each of its arms (or spines) represents a 4D spacetime worm. And much like how 4Ders take the whole of spacetime as an enormous 4D worm, composed of all little 4D worms, 5Ders take the whole of logical (hyper) space as a gigantic 5D starfish, composed of all little 5D starfish.

### 3. The Five Problems

The 5D picture is as bizarre as it sounds. It's ontologically committed to modal parts existing across possible worlds. As Lewisian modal realists, 5Ders also believe that these worlds are plentiful and causally isolated. Moreover, since the 5D view is just an extension of the 4D view, it follows that each 4D world is a non-empty block universe in which eternalism and perdurantism prevail. 5Ders believe that their metaphysics' weirdness is not a steep theoretical cost to pay if it can lead us to a metaphysical paradise – a paradise free of the puzzles of material constitution (Graham, 2015) and where the absolute conception of possibilities holds (Yagisawa, 2017).

However, since the promised paradise implies that 5D starfish have modal parts (arms) spread across the vastness of logical (hyper) space, it might have problems accounting for the following seemingly genuine “modal parts.”

First, consider the case of non-existent modal parts. For instance, consider the simple modal non-existence claim, “Pelé might not have existed.” This might be true either (i) because the facts of some world partially determine Pelé's (possible) non-existence – thus, “Pelé might not have existed, had some facts in a world not happened” – or (ii) because of the

nonexistence of a whole (possible) world itself – thus, “Pelé might not have existed at all, had *some* world not existed.”

Both are counterfactual claims. The former is reasonable enough. Pelé’s (possible) non-existence counterfactually depends on some facts in some world. (For instance, had his parents not met, Pelé might not have been born.) However, the latter counterfactual claim is metaphysically demanding: it requires Pelé’s (possible) non-existence to counterfactually depend on the non-existence of a whole (possible) world. More precisely, it seems to demand the existence of an empty world. Construed this way, the latter is a problem for 5Ders’ Lewisian commitment to non-empty worlds.

Second, consider the case of a 5D object having impossible modal parts. This might mean that (i) a 5D object has contradictory properties – e.g., “Pelé could have been a ten-footer under five feet” – or (ii) there’s a natural kind that a 5D object can’t possibly fall under but seemingly could – e.g., “Pelé could have been an alligator” (Plantinga, 1978) – or (iii) there’s a task that a 5D object can’t logically do but seemingly could have done – e.g., “Pelé could have squared the circle” – or, finally (iv), there’s a super-task that a 5D object could have performed – e.g., “Pelé could have beaten the tortoise in a Zeno-like race” (Black, 1951). These impossible modal parts seem “possible” in some absolute sense (Yagisawa, 2010, 2017). So, 5Ders need to account for them.

Third, consider the dual case of necessary modal parts. For instance, consider (i) simple tautologies – e.g., “Pelé could have been a restaurateur or not” – or (ii) weirder “necessary” properties – e.g., “Pelé could have been a restaurateur and  $2+2=4$ ” (Restall, 2011) – or (iii) even seemingly modal tautologies – e.g., “Pelé is necessarily or contingently a restaurateur” (Jago, 2013). Since necessities are duals of impossibilities, 5Ders must account for them as well.

Fourth, consider the case of dis-unified (or disjointed) modal parts – i.e., “finer-grained” parts that a 4D (not a 5D) object has. For instance, consider the case of divided (fission) parts – e.g., “Pelé could have *fissioned* in two different possible worlds” (Parfit, 1971) – and the even more fine-grained case of a scattered 4D object – e.g., “Pelé could have been a scattered object across worlds” (Cartwright, 1975). These cases imply that one and the same 4D spacetime worm could have been divided or scattered into different

possible worlds. Since such possibilities are genuine possibilities (hence genuine modal parts), 5Ders must also account for them.

Finally, consider the related case of “jumping” parts – e.g., “Pelé could have been a modal jumper” – where “modal jumping” implies that one and the same 4D spacetime worm jumps from one possible world to another. To make this more vivid, think of how the Flash jumps from Earth 1 to other Earths in *Crisis on Infinite Earths*.<sup>6</sup> Or think of Evelyn Quan Wang’s surreal “(multi)verse-jumping” in *Everything Everywhere All at Once*.<sup>7</sup> Or think of how Nemo recalls his alternative lives in *Mr. Nobody*.<sup>8</sup> These fictional cases evince the possibility of modal jumping. Thus, 5ders need to account for such jumping modal parts as well.

To be clear, these two latter cases amount to the same challenge for 5Ders. Because one and the same 4D object can be scattered in two or more worlds, or jump from possible world to possible world, such possibilities imply that there’s a single branching world or that the possible worlds are somehow connected. The latter contradicts the Lewisian commitment to the isolatedness of worlds. The former dispenses with the Lewisian commitment to a plurality of worlds. Neither option seems friendly to 5Ders.

#### 4. Replies to (Possible) Rejoinders

These five cases serve as a counterexample to the 5D picture. So, how should 5Ders respond?

Regarding the case of non-existent modal parts, 5Ders may argue that this case is misguided. The 5D view doesn’t need empty worlds to account for the truth of contingent non-existence claims. “Pelé could not have existed” is true simply because there are worlds in which Pelé doesn’t exist. Pelé’s (possible) non-existence simply depends on the existence of those possible worlds in which Pelé doesn’t exist. As such, Pelé doesn’t need to have non-existent modal parts to explain why he could not have existed. All that’s needed is the thought that all worlds are non-empty, but some of

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<sup>6</sup> See <https://www.imdb.com/title/tt29195117/>.

<sup>7</sup> See <https://www.imdb.com/title/tt6710474/>.

<sup>8</sup> See <https://www.imdb.com/title/tt0485947/>.

them don't contain Pelé. This is all that's needed to explain the truth of "Pelé could not have existed." Thus, empty worlds don't play an explanatory role here.<sup>9</sup>

I reply, however, that this 5D rejoinder seems self-defeating. After all, *if* 5Ders are committed to the view that *all* possibilities of something imply modal parts of that thing, then since it's possible that some contingent thing doesn't exist, there must be a non-existent modal part of that thing.

5Ders may respond that this riposte confuses the referent of a name like "Pelé." If "Pelé" refers to the sum of all the modal parts (i.e., the 5D starfish), then "Pelé could not have existed" would be true only if he has a non-existent modal part. But this is not what "Pelé" refers to in the contingent non-existence claim like "Pelé could not have existed." It only refers to the actual footballing god we all admire. To account for the truth of such a claim, all that's needed is for there to be a non-empty world (which is included in all possible non-empty worlds) in which Pelé doesn't exist.

To this response, I'll say fair enough. However, it opens 5Ders to a further riposte, for if the Pelé referred to in "Pelé could not have existed" is the 5D starfish itself, then 5Ders would have now to accept the existence of non-existent modal parts; thus, they must accept, *contra* their Lewisian commitment, empty worlds.

Regarding the case of impossible modal parts, 5Ders may say that just as we can extend modal semantics to include *impossibilia* (or impossible worlds), so can we extend 5D to include impossible parts. This is the claim of 5Ders who subscribe to the Extended Modal Realism (EMR) of Yagisawa (2010) or the Extended Modal Dimensionalism (EMD) of Vacek (2019).

One upshot of EMR and EMD is an account of Pelé's impossible parts. "If it is impossible for an object to have an impossible property G, it has an impossible world-stage [part] that has G" (Vacek, 2019, 73). This means there's an impossible world in which Pelé has contradictory properties or is an alligator. There's also an impossible world in which he squared the circle or completed a Zeno-like supertask.

I reply. A metaphysics of *possible* worlds is a hard enough philosophical pill to swallow; what more of a metaphysics of *impossible* worlds? Many

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<sup>9</sup> My thanks to the referee for raising this possible 5D rejoinder.

metaphysicians hold that Lewisian modal realism is already incredulous: extending it to *impossibilia* is even more so.

Of course, 5Ders of the EMR or EMD bent may bite the bullet here. They may argue that appealing to impossible worlds is beneficial and worth the philosophical cost. All I can say is that even if such 5Ders consume an arsenal, it doesn't make EMR and EMD philosophically parsimonious.

How about the necessary parts? 5Ders have a ready account of simple tautologies. They may say that Pelé's restaurateur modal part (in some world) already suffices to make "Pelé could have been either a restaurateur or not" true. This is well and good. But the harder bit for them will be to account for the other sorts of "necessary properties," viz., the bit about Pelé's modal property of being a restaurateur and being such that  $2+2 = 4$ , and the bit about Pelé being necessarily or contingently a restaurateur. Let's take these two bits in turn.

In standard possible world semantics, the conjunctive property of being a restaurateur and being such that  $2+2 = 4$  is true of any (possible) restaurateur like Pelé, since a world in which Pelé is a restaurateur is a world in which  $2 + 2 = 4$ . But this is weird! What does an arithmetical property (if that's even a "property" at all) have to do with being a restaurateur?

To avoid this bizarre consequence, 5Ders need to distinguish between "being a restaurateur" and "being a restaurateur and being such that  $2+2 = 4$ ." They *might* do this in terms of the notion of "relevance."

Here, 5Ders may employ the semantic resources of relevant logics, like the one proposed by Routley and Meyer (1973). In this semantics, "Pelé could have been a restaurateur and  $2 + 2 = 4$ " might be analysed in terms of a world where being a restaurateur is true of Pelé but where  $2 + 2 = 4$  is not true. This analysis makes "Pelé could have been a restaurateur and  $2 + 2 = 4$ " false. However, it implies that we're in an inconsistent world in which some arithmetical truths aren't true. Some 5Ders might accept this move since they can now distinguish the mundane property of being a restaurateur from the weird conjunctive property of being a restaurateur and being such that  $2 + 2 = 4$ . However, the philosophical cost here is that 5Ders must subscribe to a metaphysics of inconsistent worlds.

I reply, however, that this is precisely what impossible worlds are doing for EMR and EMD. So, the same parsimony objection against impossible

worlds might be raised against inconsistent worlds. A metaphysics of *possible* worlds is already a hard philosophical pill to swallow; what more of a metaphysics of *inconsistent* worlds?

However, even if we grant that a metaphysics of inconsistent (or impossible) worlds is OK, 5Ders will still find it challenging to account for Pelé's modal property of being necessarily or contingently a restaurateur.

In 5D, "Pelé could have been a restaurateur" means that he has a modal restaurateur part. But is this a necessary or contingent part of Pelé? If it's necessary, then Pelé must be a restaurateur in *all* possible worlds, including ours. But this is false since Pelé isn't a restaurateur in our world. So, Pelé's modal restaurateur part must be contingent. But if this is so, it means that Pelé could have been a restaurateur in some other world, which again means that he has a modal restaurateur part in another possible world. However, we may again ask whether this further modal part is necessary or contingent for Pelé. This now leads to an infinite regress. Thus, even if we grant 5Ders their inconsistent (impossible) worlds, the 5D view might still be incoherent (Jago, 2013).

Now, 5Ders may cry foul, arguing that the dilemma is constructed unfairly. It assumes an underlying modal semantics in which all worlds "see" one another, including itself. That is, it presumes the semantics of S5.<sup>10</sup> But S5 is designed to account for modally extended objects, not un-extended ones. So, "it is not surprising that it turns out not to work for reasoning involving modally un-extended objects" (Yagisawa, 2015). Thus, if 5Ders dispense with the S5 semantics, the dilemma won't be a problem for them since the regress won't be that vicious.

To this, I reply that if 5Ders don't commit to S5, then 5D is a weaker view. It's no longer the view that *all* possibilities of something imply modal parts of that thing. Some 5Ders might find this acceptable, but it makes the revised view *ad hoc*.

Finally, I argued that the cases of dis-unified parts and jumping modal parts imply either a single branching world (which negates the need for a plurality of worlds) or that the worlds are somehow connected (which contradicts the isolatedness of worlds). Now, 5Ders may draw a different moral and say that these cases imply iterated self-referential modal talk, which is

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<sup>10</sup> In S5, the accessibility relation of worlds is reflexive, symmetrical, and transitive.

indeed bad for a 5D modal realist. To avoid this, they might subscribe to a hierarchy of world talk (akin to Russell's theory of types).

This hierarchy world talk might look something like this.<sup>11</sup> At its ground level are true non-modal sentences, like "Pelé is a world-famous footballer." At the next level are true modal sentences about the subjects of those ground-level sentences, e.g., "Pelé could have been a restaurateur." At the third level are true modal sentences about the predicates of those ground-level sentences, "World-famous footballers could have been restaurateurs." And so on. By fiat, no same-level modal talk is permitted. This, then, bars self-referential modal talk, like "Pelé could have been a modal jumper."

I reply, however, that this kind of hierarchy world talk is again *ad hoc*. Modal jumpers (such as the Flash, Evelyn Quan Wang, or Nemo Nobody) are certainly possible. Heck! We even have movies about them. So, the modal sentence, "Pelé could have been a modal jumper" makes sense. But if this is so, then there *must* be a world in which Pelé is a modal jumper. Or, in 5D terminology, Pelé has a modal-jumping part that jumps between worlds. But now, we're back to the objection that 5Ders must address. If there are disunified or modal-jumping parts, then either there's a single branching world (which again negates the need for a plurality of worlds), or else the worlds are somehow connected (which again contradicts the isolatedness of worlds). To answer this, perhaps 5Ders might drop the commitment to Lewisian modal realism altogether. 5Ders need not be modal realists. They can instead be modal ersatzers or fictionalists. In this way, they need not be committed to the troublesome pluralism and isolatedness of worlds.<sup>12</sup>

However, if this is the 5Ders' only recourse, it doesn't help their cause since the strong analogy between 4D and 5D now fails. Being a non-modal realist 5Der is like being a non-eternalist 4Der. While these metaphysical views are consistent, the 4D and 5D analogy will not be as philosophically tight as before.

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<sup>11</sup> The same kind of hierarchy world talk might be used to account for the case of non-existent modal parts.

<sup>12</sup> Perhaps 5Ders who subscribe to impossible or inconsistent worlds may go for this option too.

Perhaps 5Ders may issue a final rejoinder. To address all these weird counterexamples, 5Ders must just bar all of them: no to all weird counterexamples, full stop. But this has an easy reply: “OK, then!” But 5Ders must also say “Goodbye” to all kinds of modal talk.

## 5. Final Thoughts

5Ders want us to go with them to a 5D paradise, where we can swim with 5D starfish and admire their fascinating modal parts. In this paper, however, I presented five reasons why such a paradise might not be a good one to go to, since the promised 5D starfish we can swim with might not even exist in the first place.

Perhaps I’m entirely wrong about the 5D picture. Perhaps 5Ders are pure Lewisians who employ the whole Lewisian metaphysical package: modal realism, the 4D view with perdurantism and eternalism, counterpart theory, universal mereology, nomological Humeanism, and so on. Thus, the five cases I presented here may not be problems for them. Perhaps. But my target 5Ders (viz., Graham, Vacek, and Yagisawa) are the only Lewisians I’m concerned with here. And some of these five cases may still problems for them.

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