



Vertical versus horizontal: What is really at issue in the exclusion problem?

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Abstract

I outline two ways of reading what is at issue in the exclusion problem faced by non-reductive physicalism, the “vertical” versus “horizontal”, and argue that the vertical reading is to be preferred to the horizontal. I discuss the implications: that those who have pursued solutions to the horizontal reading of the problem have taken a wrong turn.

Keywords Exclusion · Overdetermination · Non-reductive physicalism · Mental causation

1 Prelude: a brief overview of my argument

The exclusion problem faced by non-reductive physicalism (henceforth: non-reductionism) is that given non-reduction and physicalism, implausible systematic overdetermination of many physical effects by mental and physical causes seems entailed. Hence, mental and physical causes appear to “compete” such that one must “exclude” the other.

I contend that there are two general strategies that non-reductionists employ to respond to the exclusion problem: the vertical strategy and the horizontal strategy. The terms “vertical” and “horizontal” refer to components of the standard, basic non-reductive model of mental-physical causation, an example of which is given in Fig. 1.

Specifically, “vertical” refers to: *physical cause, supervenience relation, mental cause*; and “horizontal” refers to: *physical cause, causation relation, physical effect, or mental cause, causation relation, physical effect*.

The vertical strategy is employed by those who think that the solution to the exclusion problem lies in examining the vertical parts of the non-reductive model. The standard move made by vertical strategists is to propose that a further

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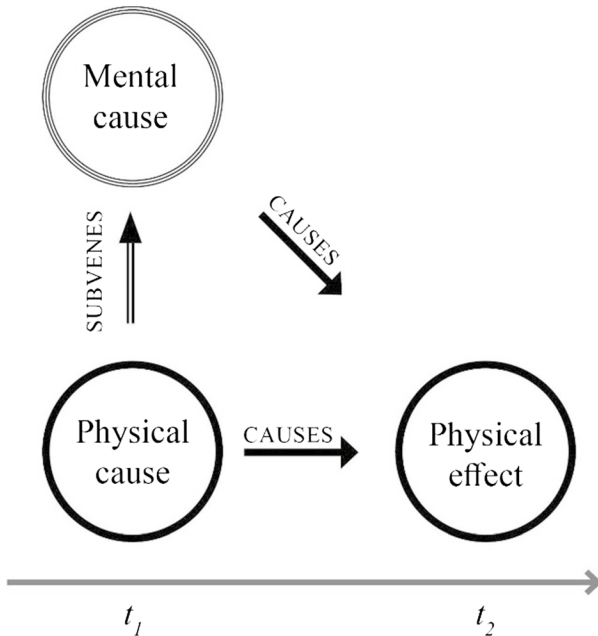


Fig. 1 Non-reductive mental-physical causation

mental-physical relation, R , holds, explains supervenience's holding, and ensures a relationship between mental and physical causes which is "intimate" enough to entail no objectionable overdetermination. The success of the vertical strategy depends on whether the claim that R actually holds is sufficiently plausible.

The horizontal strategy is employed by those who think that the solution to the exclusion problem lies in examining the horizontal parts of the non-reductive model. The standard move made by horizontal strategists is to propose a theory of causation which entails no objectionable overdetermination. The success of the horizontal strategy depends on whether the theory of causation is sufficiently plausible.

Identifying these two strategies reveals two ways of reading what is at issue in the exclusion problem: (1) the plausibility of taking the relevant "vertical" R to hold; (2) the plausibility of the relevant "horizontal" theory of causation.

This way of understanding the exclusion debate invites a question: which reading, if any, is preferable? I think the vertical reading is preferable because the horizontal strategy is neither sufficient nor necessary for solving the exclusion problem, and this shows that what is really at issue in the exclusion problem is what the vertical strategy is aimed at.

The horizontal strategy is not sufficient for solving the exclusion problem because it fails to address properly the original intuitive worry on which the exclusion problem is based: that there is an analogy between firing squad cases and the non-reductive model. The horizontal strategy is not necessary because the vertical strategy alone is sufficient (assuming the exclusion problem can be solved at all)—so long as

an “intimate” enough relation is taken to hold between mental and physical events, then no objectionable overdetermination follows, no theory of causation required.

Thus, what is really at issue in the exclusion problem is what the vertical strategy is aimed at, hence the vertical reading is preferable.

Note: throughout I assume the version of non-reductionism which posits both property and event non-identity, as well as that events are the causal relata. These assumptions are for ease of exposition alone. My conclusions hold, *mutatis mutandis*, given the version of non-reductionism according to which only mental and physical properties are not identical, and for those who prefer to treat other entities, such as properties or states of affairs, as the relata of causation, or the relata relevant to the particular kind of causal competition at issue in the exclusion problem.

I will now present the above argument in more detail, by answering the following three questions. First: why think there are two ways of reading the exclusion problem? Second: why think the vertical reading is preferable to the horizontal? Third: how might horizontal strategists respond?

2 Why think there are two ways of reading the exclusion problem?

Answer: (1) the non-reductive model invites it; (2) examining the literature reveals it; (3) independent arguments entail it. Consider (1) through (3) in turn.

To see why the non-reductive model invites the vertical/horizontal distinction, look again at Fig. 1. Note: the *causation* and *supervenience* relations form two central parts of that model. When examining whether a model faces a particular problem, it is natural to examine its central parts. Hence, the non-reductive model invites a distinction between the vertical and the horizontal; between, that is, the *physical cause, supervenience relation, mental cause* part, and the *physical cause, causation relation, physical effect, or mental cause, causation relation, physical effect*, part.

To see why examining the literature reveals the vertical/horizontal distinction, first note that there is a distinguishable exclusion-debate tradition of examining the vertical aspects of the non-reductive model, although the tradition has not been explicitly identified in this way before. The standard move of “vertical strategists” is to try to explain the holding of mental-physical supervenience such that objectionable overdetermination is avoided.¹ The first vertical strategist was Yablo who appealed to the determinate/determinable relation as that which explains the holding of mental-physical supervenience such that objectionable overdetermination is avoided.² As Yablo states: if the mental stands in the determinate/determinable relation to the physical then this is sufficient to make “nonsense of the causal

¹ Some try to accommodate overdetermination but argue that it is innocuous (e.g. Yablo 1992, 1997). Some try to reserve “overdetermination” for overdetermination of the problematic kind, and show that, given some explanation of the holding of supervenience, non-reductionism does not entail overdetermination of the problematic sort (e.g. Bennett 2003, 2008). When I talk of those who rule out “objectionable overdetermination”, I include both groups.

² It is possible to miss the explanatory element of Yablo’s position; one significant indicator of it is in 1992: pp. 256–257n29.

competition idea” (1997: p. 256). The claim that “if the mental stands in the determinate/determinable relation to the physical then there is no objectionable (mental-physical) overdetermination” is relatively uncontroversial. What is much more controversial is the plausibility of claiming that the mental stands in the determinate/determinable relation to the physical (significant contributors to the debate include: MacDonald and MacDonald 1995³; Ehring 1996; Worley 1997; McGrath 1998; Wilson 1999, 2009, 2011; Shoemaker 2001; Pereboom 2002, 2011, 2016; 2007, 2013; Bontly 2005; Funkhouser 2006, 2014; Paul 2007; Walter 2007; Whittle 2007; Ney 2007; Haug 2010).⁴ And for those who followed Yablo in either appealing to the determinate/determinable relation (or other relations which were supposed to perform the same dialectical function, such as the set/subset or constitution relations), a similar state of affairs pertains: what remains most controversial is the plausibility of claiming that the relevant relations actually hold (see, for example, Noordhof’s 2013 critique of those who appeal to the set/subset relation, or Pereboom’s 2016 summary of critiques of his own appeal to constitution).

This demonstrates that there is a tradition in the literature of those who pursue the vertical strategy: examining whether there are vertical relations which would entail no objectionable overdetermination, and which, it is sufficiently plausible to claim, actually hold between the mental and the physical.

Second, note that there is a distinguishable exclusion-debate tradition of examining the horizontal aspects of the non-reductive model, although the tradition has not been explicitly identified in this way before. The standard move of “horizontal strategists” is to propose a causal theory such that, even granting the non-identity of mental and physical causes, there is no objectionable overdetermination. There is not a single publication which has influenced the horizontal strategy in the way that Yablo’s 1992 paper has influenced the vertical strategy.⁵ Nevertheless, there

³ Although MacDonald and MacDonald (1986) were the first to discuss the determinate/determinable relation in the context of mental causation, they did so in response to Davidson’s anomalous monism, rather than non-reductionism (Davidson fails to qualify as a physicalist as he held that the mental only weakly supervenes on the physical, which is insufficient for physicalism; see his 1993: p. 4n4). Here I focus solely on the exclusion problem faced by non-reductionism. Gibb (2006) has a useful discussion of how the problem of mental causation as faced by Davidson rested on very particular features of his view which non-reductive physicalism standardly construed does not share. For those who insist on treating Davidson as a non-reductive physicalist, they may view the McDonald’s as the originators of the vertical strategy as nothing central to my argument will hang upon it.

⁴ By my definition of “vertical strategist”, namely someone who tries to solve the exclusion problem by examining the vertical aspects of the standard, basic non-reductive model (see Fig. 1), whether someone counts as a vertical strategist will depend on what “examining” is taken to mean. I think a key condition is whether any purported examination of the vertical entails significant claims about the vertical mental-physical relation over and above that which is already assumed by the standard, basic non-reductive model. If so, then an examination may qualify as a vertical strategy, if not, then it won’t so qualify. A useful test-case of this is Kim’s 1984 in which he does in some sense “examine” the vertical (in so far as he reflects upon it) but does not really go beyond the standard, basic non-reductive model and so does not qualify as a vertical strategy by my account (I am grateful to an anonymous reviewer for pressing me on this point).

⁵ Note that although some take Yablo to hold a proportionality theory of causation, he is quite explicit that he was not offering an account of the nature of causation (1992: p. 227, p. 227n60), and that the determinate/determinable relation alone is sufficient to “make nonsense of the causal competition idea” (1997: p. 256), as well as that it is a “truism that determinates do not contend with their determinables

is a range of contributors who have focused their efforts on assessing what light causal theorizing might shed on the exclusion problem (e.g. Horgan 1997; Crisp and Warfield 2001; Sider 2003; Funkhouser 2002; Gibbons 2006; Campbell 2007; Kim 2007; Loewer 2007; Maslen et al. 2009; List and Menzies 2009; Shapiro 2010; Zhong 2011, 2014; Tiehen 2011; Christensen and Kallestrup 2012; Hitchcock 2012; Papineau 2013; Menzies 2013; Woodward 2015; McDonnell 2017; Baysan 2018). The debate involves defenses or critiques of analyses of causation, or more generally engaging with reflections on causation which aren't strictly analyses of it.

For example, Zhong has recently argued that a proportionality account of causation should be accepted, and that there would be no overdetermination on a non-reductive model if so (2014).⁶ The details of his, or any of the other accounts need not concern us at this juncture (I outline Zhong's view below). Instead, simply note that the success of the horizontal strategy rests on whether the relevant theory of causation is sufficiently plausible (for example, McDonnell 2017 has criticized Zhong's proposal on those very grounds). A theory of causation can be offered which might appear to solve every single problem of mental causation there has been in the history of philosophy. But if so, what really then matters is whether the relevant theory of causation should be accepted. Hence, the existence of this debate demonstrates one way of reading what is at issue in the exclusion problem: that if non-reductionism can offer a sufficiently plausible theory of causation such that objectionable overdetermination is avoided, then the problem is solved.

This demonstrates that there is a tradition in the literature of those who pursue the horizontal strategy: examining whether there are horizontal—i.e. causal—relations which entail no objectionable overdetermination, and which (it seems sufficiently plausible to claim) actually hold.

To see why independent arguments entail the vertical/horizontal distinction, first note that it appears possible to appeal to vertical relations which, if they held, would

Footnote 5 (continued)

for causal influence" (1992: p. 259). With his reflections on proportionality, Yablo is best read as trying to offer a diagnosis of the intuitive appearance of objectionable overdetermination given non-reduction and physicalism. Hence my categorizing of Yablo as a vertical strategist. Indeed, it might generate a puzzle about Yablo's view and could require one to interpret him as making a basic mistake if one were to insist that he is both a horizontal and a vertical strategist. As the above quotes demonstrate, he explicitly states that positing the vertical determinate-determinable relation is sufficient to do away with worries about causal competition. If so, then why would Yablo think that the problem would remain unsolved without also making strong claims about the horizontal aspects of the non-reductive model? That's the puzzle. Also, if one grants that Yablo thinks that the vertical strategy is sufficient for solving the exclusion problem and also contends that Yablo thinks that the horizontal strategy is necessary for solving the problem, then one would appear to be interpreting Yablo as making a basic mistake. The only way to avoid these issues and maintain that Yablo was in some sense a horizontal strategist would be to insist that he held that both the vertical and horizontal strategies were sufficient but neither necessary. Again, I do not believe that the textual evidence best supports this, but as it does not affect my argument I am happy to let the chips fall where they may on this point. So long as the vertical/horizontal distinction is accepted as applying to contributions to the exclusion debate or relevant parts thereof, then this stage of my argument has achieved all that it needs to (I am grateful to an anonymous reviewer for pressing me on this point).

⁶ Zhong does not describe his view as a proportionality account of causation, but that is what it is (see McDonnell 2017 for a critique of proportionality theories of causation which discusses Zhong).

entail that there is no objectionable overdetermination, but which obviously don't hold between the mental and the physical. For example, *is a higher biological taxa than* seems as likely to entail no objectionable overdetermination as the determinate/determinable relation, yet clearly doesn't hold between the mental and the physical. Two points are key here: (I) it is relatively easy to appeal to vertical relations which, alone, would be sufficient to solve the exclusion problem if they held; (II) the issue is whether it is sufficiently plausible that such relations actually hold.

This justifies identifying one half of the vertical/horizontal distinction that I have drawn, and once one half is established, the other half effectively comes for free—for me, at least. This is because I argue that the vertical reading of the problem is to be preferred to the horizontal. If someone were to assert that the vertical reading is the only reading, then my conclusion that it is the best reading follows trivially. But if you wish to accept, as I think you should, that the vertical reading is not the only reading, then there must be another, with the horizontal reading being the only other game in town.⁷

Hence why there are two ways of reading what's at issue in the exclusion problem: (1) the non-reductive model invites it; (2) examining the literature reveals it; (3) independent arguments entail it.⁸

Of course, the waters are muddier than the distinction that I have drawn here might be taken to imply: many contributors approach the exclusion problem with a mixture of horizontal and vertical strategies (although they still tend to lean more one way than the other). In such cases, the vertical/horizontal distinction can be applied to identify the relevant components of those mixed approaches, and my argument that the vertical strategy is to be preferred to the horizontal can be taken to apply to those components.⁹ Moreover, as we shall see below, it is part of my argument that the waters have been *too* muddy: because the vertical and horizontal readings of the exclusion problem have not been clearly distinguished, wrong turns have been made.¹⁰

⁷ I discuss mixed approaches below.

⁸ Hence, I am not claiming that the vertical/horizontal distinction is based on an ambiguity in one of the theses that are standardly used to set up the problem. Rather, that the vertical/horizontal distinction is based on: (1) the fact that the non-reductive model has two key parts (the supervenience and causation relations) which invite the distinction; (2) looking at the literature as a whole demonstrates that the distinction can be usefully used to categorise the different contributions; and (3) independent arguments which demonstrate that it seems at least possible to solve the exclusion problem by examining either the horizontal or vertical aspects (I am grateful to an anonymous reviewer for pressing me to clarify this point).

⁹ To justify: either it will be clear which parts of a given contribution to the debate are vertical and which horizontal, or it won't. If it is clear, then my claim that my argument can be applied to the relevant vertical/horizontal components stands. If it is not clear, then so much the worse for that opaque view. Consider: if it is not clear which parts of the view are horizontal and which vertical, then it must not be clear which parts of the view relate to the explaining of the holding of supervenience and which to causation. That is a significant failure of perspicuity. Fortunately for all sides in this debate, none of the contributors I cite have so failed.

¹⁰ Does this talk of two "readings" of the exclusion problem entail that there are really *two problems*? (I am grateful to an anonymous reviewer for pressing me on this point). The short answer is no: when I say there are two readings of the exclusion problem I am using "the exclusion problem" as a demonstrative to pick out whatever has been referred to by that label in the literature that I cite. That leaves it open

I will close this section by making a few remarks about how the vertical/horizontal distinction fits with what has been the most popular general distinction for carving up the exclusion debate: compatibilism/incompatibilism (introduced in Horgan 1997).¹¹ The distinction has been drawn in different ways over the years (compare, for instance, Horgan 1997 to Bennett 2003). Here is one useful way to draw it. Consider the following four claims: *causal efficacy*: mental events have physical effects; *non-reduction*: mental properties and events are not identical to physical properties and events; *causal closure*: every physical effect has a physical cause; *no overdetermination*: physical effects are not objectionably overdetermined. One is a compatibilist if one holds that the four claims are compatible, an incompatibilist if not. Typically, it is believed that non-reductionists must accept *causal efficacy*, *causal closure*, and *non-reduction*, as they are basic components of non-reductionism. And, as I have framed it, *no overdetermination* does not appear easy to deny—objectionable overdetermination is, after all, objectionable. Thus the challenge: non-reductionists must accept the first three claims as they are part of the view, and seemingly must also accept the fourth. Hence, if one wishes to defend non-reductionism, then, in the sense employed here, one must defend compatibilism. It follows that as both the vertical and horizontal strategies are attempts to defend non-reductionism, both strategies are varieties of compatibilism. The former tries to show that examining the vertical aspects of the non-reductive model demonstrates compatibilism’s truth, the latter tries to show that examining the horizontal aspects of the non-reductive model demonstrates compatibilism’s truth.

Nevertheless, I think there is a potentially useful sense of “horizontal” and “vertical” which includes incompatibilists. Namely, that one could agree that either the vertical or horizontal reading is the correct way to understand the exclusion problem, but that the exclusion problem can’t be solved, and thus that the four claims are incompatible. Thus, one might distinguish four broad groupings: (1) compatibilist

Footnote 10 (continued)

whether there are really two exclusion problems or not (although note the claim I make about what I call “hardline horizontalism” in Sect. 4 below). One might still ask: but are there *really* two exclusion problems or not? I think to answer this question one must do the metaphysics of philosophical problems, which is not a goal of this paper. Indeed, in this paper I remain neutral on whether there are really two exclusion problems or just two ways of understanding one problem so that my conclusion regarding the vertical reading being preferable to the horizontal does not rest on a strong claim about the metaphysics of philosophical problems. Nevertheless, here are some thoughts: one could take either a coarse or fine-grained approach to answering the question of whether there are two exclusion problems. Coarse-grained: one problem can contain more than one point at issue so long as the points at issue are sufficiently similar (by whatever metric one’s preferred metaphysics of problems specifies); fine-grained: problems are to be identified with individual points of issue (where the latter are individuated, say, at the propositional level with some relatively exacting degree of specificity required). If you prefer a more fine-grained view, then my talk of two ‘readings’ of the exclusion problem can be taken to suggest two *problems*, if you prefer a more coarse-grained view, then my talk of two “readings” can be taken to suggest simply two ways of approaching one problem. Nothing I say here will hang on whether the coarse or fine-grained view is correct, or whether, as also seems possible, one can harmlessly switch between a fine or more coarse-grained approach depending on one’s pragmatic concerns.

¹¹ A further, and in my view underappreciated framework for understanding the causal exclusion debate and related disputes can be found in Leuenberger 2010.

verticalism; (2) compatibilist horizontalism; (3) incompatibilist verticalism; (4) incompatibilist horizontalism. However, for ease of exposition, I put the incompatibilist groups to one side. Thus, all my uses of the terms “vertical strategy”, “horizontal strategy”, and cognates, should be understood in the compatibilist sense.

3 Why think the vertical reading is preferable to the horizontal?

Answer: (a) the horizontal strategy is not sufficient for solving the exclusion problem because it fails to properly address the intuition on which the problem is based; (b) the horizontal strategy is not necessary for solving the exclusion problem because the vertical strategy alone is sufficient. Given (a) and (b), this demonstrates that what is really at issue in the exclusion problem is what the vertical strategy is aimed at, hence the vertical reading is preferable.

Consider (a) and (b) in turn.

3.1 (a) Why the horizontal strategy is not sufficient

To see why the horizontal strategy is not sufficient for solving the exclusion problem first note the intuition on which the exclusion problem is based: that the existence of systematic firing-squad type overdetermination is highly implausible and there is an analogy between the non-reductive model of mental-physical causation and systematic firing-squad type overdetermination. Call this the “firing-squad intuition”. The literature is full of appeals to this intuition in both the defenses and critiques of non-reductionism. Recent, prominent examples include: Bennett 2003: pp. 474–475, 2008: p. 3; Kroedel 2008: pp. 128–129, 2013: p. 11; Kim 2011: pp. 215–216; Carey 2011: pp. 253–254; Zhong 2011: p. 132, p. 132n4; Pereboom 2011: p. 129; Gibb 2013: p. 3; Robinson and Piccinini 2015: p. 377. Here are two representative instances from that list:

the rationale behind [...] the exclusion problem is that cases where behavioral events have simultaneous mental and physical causes would be similar to prototypical cases of overdetermination such as deaths by firing squads (2013: p. 11; for similar comments, see Kroedel 2008: pp. 128–129).

[non-reductionists cannot claim] that systematic overdetermination of the everyday firing squad sort is perfectly fine (Bennett 2008: 3; for similar comments, see Bennett 2003: pp. 474–475).

I don’t make any far-reaching claims here about exactly how much weight the firing-squad intuition should be given. But my arguments are framed on the assumption that the intuition has sufficient weight to warrant the existence of the exclusion debate. All published participants in the debate seem to accept this assumption: even those who have argued that the firing-squad intuition should be rejected can reasonably be credited with holding that the intuition has enough weight to require publication-standard arguments in order to be rejected.

I do make the claim that the exclusion debate operates under the assumption that any solution to the exclusion problem must properly address the firing-squad intuition. What does properly addressing the intuition require? Answer: that non-reductionists need to break the firing squad/non-reductive causation analogy (their opponents need to show that such analogy-breaking efforts fail). The question then is: can the horizontal strategy break the analogy? My contention is that, in virtue of the general nature of the strategy, it cannot.

In order to establish this contention, I will do two things. First, I will make clear what breaking the analogy requires. Second, I will show why the horizontal strategy cannot meet those analogy-breaking requirements.

To see what breaking the analogy requires, consider two key parts of the analogy.

On the one hand, there is the implausibility of positing systematic firing squad overdetermination. A specific version of the posit will be helpful: suppose that every time there is a killing by shooting there *must* be another shooting such that both shootings are sufficient for the death of the person killed.¹² Any model of shooter killings which incorporated this supposition would be *prima facie* implausible. Let's call such a model the "two-shootings model".

On the other hand, there is the purported similarity between the two-shootings model and the model of non-reductive mental-physical causation. A key question: which features of the two-shootings model must have corresponding features in the non-reductive model in order for the analogy to work against non-reductionism? Answer: those features which make the two-shootings model implausible.

Thus, to break the analogy, it must be shown that the non-reductive model does not possess features which correspond to the implausible features of the two-shootings model. This shows us how to assess any analogy-breaking strategy: we can try out the strategy to see if it succeeds in making the two-shootings model any more plausible. If the horizontal strategy cannot "remove" the implausible features of the

¹² For the avoidance of doubt: here the "must" denotes a necessary connection between the two shootings. This point might require stressing: for questions might arise about exactly how the analogy between firing-squads and the non-reductive model is supposed to work. For example, one might object that: "any non-reductive model that posits supervenience relations between mental and physical causes just doesn't have the feature of *coincidence* that is implausible on the two shootings model, hence the analogy is bound to fail." To which the response is: the two-shootings model is not just a typical firing-squad model—it's intended as a (non-perfect yet relevantly) analogous case which at least gets the exclusion problem off the ground. But if the firing-squad intuition is supposed to be that the non-reductive model is analogous to typical firing-squads *including the coincidence* between the shootings that you get in typical firing squad cases, then the exclusion problem can't even get off the ground: as the non-reductive model is very obviously not relevantly analogous with typical firing squads (in virtue of the supervenience relation). Moreover, it might seem somewhat uncharitable to the literature to hold that all those who have taken the firing-squad intuition to be at least sufficient to get the exclusion problem off the ground have been assuming that the non-reductive model is analogous with typical firing squads in that there's coincidence in both cases. A more charitable view of the literature is that this error is not being made. Indeed, this is why contributors frequently talk of *systematic* firing-squad type overdetermination, where "systematic" means something like "in all cases" and the scope of "all" ranges over the relevant mental-physical causation cases across possible worlds, and hence entails a necessary connection between the supposed mental-physical competitor causes.

two-shootings model, then this will demonstrate that it cannot remove the corresponding implausible features of the non-reductive model.

I will now show that the horizontal strategy fails, in virtue of the general nature of the strategy, to make the two-shootings model more plausible to any significant degree.

I will use a recent example of the horizontal strategy in action, Zhong's appeal to a proportionality account of causation (2014), to illustrate my argument (Zhong's view is very similar to List and Menzies 2009; see McDonnell 2017 for a discussion of the similarities). Zhong argues in favor of a "dual condition" requirement that any cause must meet:

C is the cause of E iff: if C is present then E is present; and: if C is absent then E is absent.¹³

Once this requirement is applied, it follows that supervening causes can never compete because there just can't ever be supervening, distinct causes of the same effect. Causal competition might seem to require at least two causes as competitors, and on Zhong's dual condition account there can only ever be one cause in the relevant cases. Consider: grant that an event, E_1 , causes an effect, E_2 . On Zhong's view, this entails that if E_1 is present then E_2 is present, and if E_1 is absent then E_2 is absent. In essence: E_1 is both necessary and sufficient for E_2 (assuming a fixed context). Hence, if E_1 is the cause, any other event which supervenes on, or subvenes E_1 , is ruled out as a cause by Zhong's dual condition, proportionality analysis.

It is widely believed that this kind of result offers a solution to the exclusion problem: even horizontal strategists' objectors typically agree that if the theory of causation offered is true, then this horizontal type of response would constitute a solution. For example, the first major objector to Zhong to make it into print explicitly concedes this point: McDonnell 2017. But we can see why this point should not be conceded if we apply Zhong's view to the two-shootings model, so that it follows that one of the shootings is the cause, the other is merely a sufficient event.¹⁴ Does this make the two-shootings model significantly less implausible? Of course not: supposing that every time there is a shooting there *must* be another shooting such that both shootings were sufficient for the death is still highly implausible, even if it's true that only one of the shootings can properly be labelled with "the cause" and the other with "sufficient event". And we would continue to have good grounds for rejecting the two-shootings model even granting Zhong's proportionality account of causation, or any other horizontal strategy which entailed that only one of the events was the cause.¹⁵

¹³ This is simplified—I have suppressed mention of intervention; for the original see Zhong 2014: p. 344.

¹⁴ Zhong does not talk in terms of events, but my modification of his view here to fit my presentation of the dialectic is harmless.

¹⁵ What about other kinds of horizontal strategy? Given my argument below, they do not need to be discussed in detail, but here are two examples. First, some horizontal strategists have argued that both supposedly competing events can be accepted as causes (e.g. Crisp and Warfield 2001). Second, some horizontal strategists take a contextualist approach, holding that what is deemed to be the cause will vary according to context—typically contexts individuated broadly in line with scientific taxon such as *physical*, *chemical*, *biological*, and *psychological* (e.g. Maslen et al. 2009). For contextualist horizontal strate-

I think there is an important lesson to draw from this example of horizontal strategy failure: that the implausibility of the two-shootings model does not stem from its horizontal features. If so, then it can only stem from its vertical features. And this seems right, the intuitive worry appears to be: what about the world (rather: worlds) could make it the case that every time there was one shooting there *must* be another which is sufficient for the same effect? Any satisfying defense of the two-shootings model which answers this question should take the form: there is something special about the relationship between the two shootings which explains this. In other words, any defense of the two-shootings model should examine the model's vertical features.

Thus, whether it is Zhong's particular horizontal strategy or any other, we can see that it cannot make the two-shootings model significantly less implausible because the model's implausibility stems from its vertical features. And, as we have seen, in order to break the firing squad/non-reductive causation analogy, it must be shown that the non-reductive model does not possess features which correspond to the implausible features of the two-shootings model. But we have just seen that applying the horizontal strategy cannot do that: it has no significant effect on the implausible, vertical features of the two-shootings model, and thus cannot be used to demonstrate that the non-reductive model does not possess corresponding features.¹⁶

In summary, for the horizontal strategy to be sufficient for solving the exclusion problem, it must properly address the firing-squad intuition. In order to properly address the firing-squad intuition, the strategy must be able to break the firing squad/non-reductive causation analogy. But the firing squad/non-reductive causation analogy rests on supposing that there are corresponding vertical features, not horizontal, so the horizontal strategy cannot break the analogy. Consequently, the horizontal strategy is not sufficient for solving the exclusion problem.

3.2 (b) Why the horizontal strategy is not necessary

To see why the horizontal strategy is not necessary for solving the exclusion problem we need only see that the vertical strategy is sufficient, assuming the exclusion problem can be solved at all, because it properly addresses the firing-squad intuition. Consider again the two-shootings model. Now apply a vertical strategy to it: grant that the shootings stand in the determinate/determinable relation to one another. This makes significant headway against the implausibility of the model: we are no longer faced with a mysterious pattern of systematically aligned shootings. Instead, we have an explanation of the relationship between the two shootings that makes sense of their systematic alignment and vitiates any appearance of competition and threat

Footnote 15 (continued)

gists, the move is more complicated than Zhong's, but dialectically similar, namely: to claim that for any context in which one event is the cause, the other is not.

¹⁶ In this section, I differ from Bennett's well-known understanding (2003: pp. 474–480) of what breaking the analogy requires. I keep the focus firmly on the vertical features of the analogy, Bennett proposes a more mixed vertical/horizontal account.

of exclusion. It is as if, when presenting the two-shootings model to an incredulous audience, a proponent of the model had said, “but of course, by ‘two shootings’ I mean that, strictly speaking, there are two events such that the first is a determinable of the second. There is the shooting event, and the shooting by *a* event, but the latter is just a determinate of the former.”

This is simply another example of the force of Yablo’s original insight from whence the vertical strategy came: that it is, as he states, a “truism that determinates do not contend with their determinables for causal influence” (1992: p. 259). And, as subsequent vertical strategists have demonstrated, other relations, such as set/subset or constitution, seem to perform the same dialectical function: ensuring an “intimate” enough relation such that any two entities which stand in it to one another cannot plausibly be taken to causally compete.

Thus, if one’s intention is to break the firing squad/non-reductive mental-physical causation analogy, then the vertical strategy looks to be sufficient. If the vertical strategy is sufficient, then the horizontal strategy is not necessary.¹⁷

It is important to note that I am not claiming that the vertical strategy definitely solves the exclusion problem. Hence, when I say that the vertical strategy is sufficient for solving the exclusion problem *assuming the problem can be solved at all*, what I mean is that the following is true: if mental events stand in at least one of the relevant vertical relations to physical events, then the exclusion problem can be solved. This leaves untouched the further, significant issue of whether any of the relevant vertical relations actually hold. Here, I am silent on that further issue.

4 How might horizontal strategists respond?

I will consider two responses on behalf of horizontal strategists. First, that the vertical strategy is not sufficient because there cannot systematically be two causes of the same effect, where those causes supervene on each other, even if those causes stand in a vertical relation of the type proposed by vertical strategists. Second, and relatedly, that breaking the firing squad/non-reductive causation analogy is not what solving the exclusion problem requires.

¹⁷ One might object: “why frame the exclusion worry in terms of firing squads? Could one not simply say that on the non-reductive model there is ‘no work’ left for mental causation to do?” (I am grateful to an anonymous reviewer for inviting me to consider this objection.) My response: framing the exclusion problem in terms of firing squads is simply one way to illustrate the underlying worry, which is that it would be implausible (because unparsimonious) to have two causes in every case of a physical effect with a mental cause. What the firing-squad analogy does is frame this parsimony problem. So swapping talk of firing squads with talk of “no work left for mental causation” is a change of framing only, one still ends up in the same place facing the same questions about apparently competing causes. So my arguments about the vertical versus the horizontal have purchase either way. Unless one wishes to contend that there is “no work” left for determinables once the relevant determinates have done their bit, then one should accept that vertical solutions can be sufficient to address the worry that there is no work left for mental causation to do on a non-reductive model. So long as the supposedly competing causes are related “intimately enough”, then the “no work left for mental causation” worry can’t get off the ground any more than the worry that “mental physical causation surely can’t be like systematic firing squads”.

I believe that a significant part of what motivates horizontal strategists, particularly those horizontal strategists whose contributions to the debate are quite strongly horizontal, is a firm suspicion of any kind of systematic overdetermination involving causes which stand in a supervenience relation to each other. Sometimes this motivation is implicit, but not always. Zhong, for example, states that there are “no clear cases” where A supervenes on B, and A and B overdetermine an effect (2014: p. 352), before going on to offer his proportionality causal theory which rules out (given other assumptions) that there can be such cases. Similarly, Gibbons contends that “determinates compete with determinables, parts compete with wholes, what is realized competes with its realizer, and functional properties compete with the properties that play the roles” (2006: p. 82). Even more strongly, Merricks is prepared to deny that inanimate macroscopic objects exist rather than be forced (as he believes he would otherwise be) to accept any objectionable overdetermination (2001). And, it is perhaps optimistic to hope that the vertical strategy will provide immediate satisfaction to those that have motivations along the lines of Zhong, Gibbons, and Merrick.

So what should we make of this kind of motivation? Call the view that we should not accept any kind of systematic overdetermination involving causes which stand in a supervenience relationship to each other: “hardline horizontalism”. If horizontal strategists respond to my argument by insisting that the exclusion problem cannot be solved by the vertical strategy alone because it must also be shown that hardline horizontalism is consistent with non-reductionism, then I think that their understanding of the exclusion problem differs significantly from the understanding of it as the problem of breaking the firing squad/non-reductive causation analogy. Differs so significantly, indeed, that there are really two problems: (1) the problem of breaking the firing squad/non-reductive causation analogy; (2) the problem of demonstrating non-reductionism’s consistency with hardline horizontalism. At the very least, the arguments I have presented above should be persuasive for those who view the exclusion problem in terms of (1).¹⁸

Moreover, it is not obvious why we should accept either that hardline horizontalism is true, or that its purported inconsistency with non-reductionism presents a serious threat to the latter view. Zhong suggests that there are no “clear cases” where A supervenes on B, and A and B overdetermine an effect. But Zhong says nothing about why we should not accept the kind of cases that vertical strategists appeal to in order to motivate the claim that the vertical relations they posit ensure sufficient intimacy between mental and physical events to rule out causal competition. Yablo’s

¹⁸ To be clear: on my view hardline horizontalists, horizontal strategists more generally, and vertical strategists are all compatibilists in the sense that I elucidated at the end of Sect. 2. This is because what they disagree on is what is at issue in the exclusion problem: the vertical versus the horizontal reading (or the hardline versus the softline horizontal reading in the case of hardline horizontalists versus other horizontalists), and thus what the best solution to the exclusion problem is. What they don’t disagree on is that there is a solution, and thus that *causal efficacy*, *nonreduction*, *causal closure*, and *no overdetermination* are all compatible. Hence, they’re all compatibilists. There is a potentially useful sense of the terms “vertical” and “horizontal” (and thus “hardline horizontal”) which can include incompatibilists, but as I have noted above at the end of Sect. 2, I am putting that use of the terms to one side.

Sophie the pigeon case provides the definitive example: a pigeon trained to peck at all and only red triangles which sees a scarlet triangle and pecks. What causes Sophie's pecking, the event of the triangle being scarlet, or the event of it being red? If we accept, as I think we should, Yablo's claim that it is a truism that determinates do not causally compete with determinables, then this is an example where A (the red event) supervenes on B (the scarlet event), and where A and B are both sufficient events for—i.e. overdetermine—an effect (the pecking). To my eye, that is a clear case, and I think the burden is on those who want to argue that it is not. Add in the similar cases which employ other relations vertical strategists have proposed, such as set/subset or constitution, and I think the burden faced by hardline horizontalists becomes very significant.

The most obvious way for hardline horizontalists to try and meet that burden is to appeal to a particular causal theory which entails that hardline horizontalism is true, and present arguments in support of that causal theory. But I cannot pretend that I am overwhelmed by the motivation for that approach: if one's intuition is that it cannot possibly be the case that determinates and the relevant determinables could unobjectionably overdetermine effects, then fair enough. I await the outcome of the debates about the plausibility of causal theories which entail that. But what we can see already is that this is a much weaker worry for non-reductionism than the worry that the model of non-reductive causation might be analogous with firing squads. Thus, the possibility that hardline horizontalism is inconsistent with non-reductionism is a threat of far less significance for the latter view than the exclusion problem standardly construed.

Finally, horizontal strategists might argue that it is wrong to understand the point at issue in the exclusion problem as being the breaking of the firing squad/non-reductive causation analogy. But given the nature of philosophical problems, it's not immediately obvious how one might resolve that disagreement. The quick route out of the dispute, I think, is just to recognize, as we have done here, that there are two problems: (1) the problem of breaking the firing squad/non-reductive causation analogy; (2) the problem of demonstrating that non-reductionism is consistent with hardline horizontalism. And, I am content if my arguments can persuade those concerned about the former; for the latter, I am content to let the chips fall where they may.¹⁹

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¹⁹ Recall, my interest here has not been to defend non-reductionism or any other view about the mental-physical relationship. Rather my interest has been to clarify the exclusion problem, and everything I have said has been aimed at achieving that, rather than taking a stance on whether the problem may be solved.

References

- Baysan, U. (2018). Epiphenomenal properties. *Australasian Journal of Philosophy*, 96(3), 419–431.
- Bennett, K. (2003). Why the exclusion problem seems intractable and how, just maybe, to tract it. *Noûs*, 37(3), 471–497.
- Bennett, K. (2008). Exclusion again. In J. Hohwy & J. Kallestrup (Eds.), *Being reduced: New essays on reduction, explanation, and causation* (pp. 280–304). Oxford: Oxford University Press.
- Bontly, T. D. (2005). Proportionality, causation, and exclusion. *Philosophia*, 32(1–4), 331–348.
- Campbell, J. (2007). *An interventionist approach to causation in psychology psychology. Causal learning: Philosophy, and computation* (pp. 58–66). Oxford: Oxford University Press.
- Carey, B. (2011). Overdetermination and the exclusion problem. *Australasian Journal of Philosophy*, 89(2), 251–262.
- Christensen, J., & Kallestrup, J. (2012). Counterfactuals and downward causation: A reply to Zhong. *Analysis*, 72(3), 513–517.
- Crisp, T. M., & Warfield, T. A. (2001). Kim's master argument. *Noûs*, 35(2), 304–316.
- Davidson, D. (1993). Thinking Causes. In J. Heil & A. Mele (Eds.), *Mental causation* (pp. 3–17). Oxford: Clarendon Press.
- Ehring, D. (1996). Mental causation, determinables and property instances. *Noûs*, 30(4), 461–480.
- Funkhouser, E. (2002). Three varieties of causal overdetermination. *Pacific Philosophical Quarterly*, 83(4), 335–351.
- Funkhouser, E. (2006). The determinable-determinate relation. *Noûs*, 40(3), 548–569.
- Funkhouser, E. (2014). *The logical structure of kinds*. Oxford: Oxford University Press.
- Gibb, S. (2006). Why Davidson is not a property epiphenomenalist. *International Journal of Philosophical Studies*, 14(3), 407–422.
- Gibb, S. C. (2013). Introduction. In S. Gibb & R. Ingthorsson (Eds.), *Mental causation and ontology*. Oxford: Oxford University Press.
- Gibbons, J. (2006). Mental causation without downward causation. *The Philosophical Review*, 115(1), 79–103.
- Haug, M. C. (2010). Realization, determination, and mechanisms. *Philosophical Studies*, 150(3), 313–330.
- Hitchcock, C. (2012). Theories of causation and the causal exclusion argument. *Journal of Consciousness Studies*, 19(5–6), 5–6.
- Horgan, T. E. (1997). Kim on mental causation and causal exclusion. *Philosophical Perspectives*, 11(s11), 165–184.
- Kim, J. (1984). Epiphenomenal and supervenient causation. *Midwest Studies in Philosophy*, 9(1), 257–270.
- Kim, J. (2007). Causation and mental causation. In B. P. McLaughlin & J. D. Cohen (Eds.), *Contemporary debates in philosophy of mind* (pp. 227–242). Hoboken: Blackwell.
- Kim, J. (2011). *Philosophy of mind* (3rd ed.). Boulder: Westview Press.
- Kroedel, T. (2008). Mental causation as multiple causation. *Philosophical Studies*, 139(1), 125–143.
- Kroedel, T. (2013). Dualist mental causation and the exclusion problem. *Noûs*, 47(3), 453–466.
- Leuenberger, S. (2010). Exclusion and physicalism: Comments on O'Connor and Churchill. In C. Macdonald & G. Macdonald (Eds.), *Emergence in Mind*. Oxford University Press.
- List, C., & Menzies, P. (2009). Nonreductive physicalism and the limits of the exclusion principle. *Journal of Philosophy*, 106(9), 475–502.
- Loewer, B. (2007). Mental causation, or something near enough. In B. P. McLaughlin & J. D. Cohen (Eds.), *Contemporary debates in philosophy of mind* (pp. 243–265). Hoboken: Blackwell.
- Macdonald, C., & Macdonald, G. F. (1986). Mental causes and explanation of action. *Philosophical Quarterly*, 36(April), 145–158.
- Macdonald, C., & Macdonald, G. F. (1995). Introduction: Supervenient causation. In C. Macdonald & G. Macdonald (Eds.), *Philosophy of psychology*. Hoboken: Blackwell.
- Maslen, C., Horgan, T., & Daly, H. (2009). Mental Causation. In H. Beebe, C. Hitchcock, & P. Menzies (Eds.), *The oxford handbook of causation* (pp. 523–553). Oxford: Oxford University Press.
- McDonnell, N. (2017). Causal exclusion and the limits of proportionality. *Philosophical Studies*, 176, 1–16.
- McGrath, M. (1998). Proportionality and mental causation: A fit? *Noûs*, 32(S12), 167–176.

- Menzies, P. (2013). Mental causation in the physical world. In S. C. Gibb & R. Ingthorsson (Eds.), *Mental causation and ontology*. Oxford: Oxford University Press.
- Merricks, T. (2001). *Objects and persons*. Oxford University Press.
- Ney, A. (2007). Can an appeal to constitution solve the exclusion problem? *Pacific Philosophical Quarterly*, 88(4), 486–506.
- Noordhof, P. (2013). Mental causation: Ontology and patterns of variation. In S. C. Gibb & R. Ingthorsson (Eds.), *Mental causation and ontology*. Oxford: Oxford University Press.
- Papineau, D. (2013). Causation is macroscopic but not irreducible. In S. C. Gibb & R. Ingthorsson (Eds.), *Mental causation and ontology* (pp. 126–152). Oxford: Oxford University Press.
- Paul, L. A. (2007). 13 constitutive overdetermination. In J. K. Campbell, M. O'Rourke, & H. S. Silverstein (Eds.), *Causation and explanation* (pp. 4–265). Cambridge: MIT Press.
- Pereboom, D. (2002). Robust nonreductive materialism. *Journal of Philosophy*, 99(10), 499–531.
- Pereboom, D. (2011). *Consciousness and the prospects of physicalism*. Oxford: Oxford University Press.
- Pereboom, D. (2016). Anti-reductionism, anti-rationalism, and the material constitution of the mental. In K. Aziwa & C. Gillett (Eds.), *Scientific composition and metaphysical ground*. Basingstoke: Palgrave Macmillan.
- Robinson, Z., Maley, C. J., & Piccinini, G. (2015). Is consciousness a spandrel? *Journal of the American Philosophical Association*, 1(2), 365–383.
- Shapiro, L. (2010). Lessons from causal exclusion. *Philosophy and Phenomenological Research*, 81(3), 594–604.
- Shoemaker, S. (2001). Realization and mental causation. In C. Gillett & B. M. Loewer (Eds.), *Physicalism and its discontents* (pp. 23–33). Cambridge: Cambridge University Press.
- Shoemaker, S. (2007). *Physical realization*. Oxford: Oxford University Press.
- Shoemaker, S. (2013). Physical realization without preemption. In S. C. Gibb & R. Ingthorsson (Eds.), *Mental causation and ontology* (pp. 35–56). Oxford: Oxford University Press.
- Sider, T. (2003). What's so bad about overdetermination? *Philosophy and Phenomenological Research*, 67(3), 719–726.
- Tiehen, J. T. (2011). Disproportional mental causation. *Synthese*, 182(3), 375–391.
- Walter, S. (2007). Determinables, determinates, and causal relevance. *Canadian Journal of Philosophy*, 37(2), 217–244.
- Whittle, A. (2007). The co-instantiation thesis. *Australasian Journal of Philosophy*, 85(1), 61–79.
- Wilson, J. (1999). How superduper does a physicalist supervenience need to be? *The Philosophical Quarterly*, 49(194), 33–52.
- Wilson, J. M. (2009). Determination, realization and mental causation. *Philosophical Studies*, 145(1), 149–169.
- Wilson, J. M. (2011). Non-reductive realization and the powers-based subset strategy. *The Monist (Issue on Powers)*, 94(1), 121–154.
- Woodward, J. (2015). Interventionism and causal exclusion. *Philosophy and Phenomenological Research*, 91(2), 303–347.
- Worley, S. (1997). Determination and mental causation. *Erkenntnis*, 46(3), 281–304.
- Yablo, S. (1992). Mental causation. *Philosophical Review*, 101(2), 245–280.
- Yablo, S. (1997). Wide causation. *Philosophical Perspectives*, 11(11), 251–281.
- Zhong, L. (2011). Can counterfactuals solve the exclusion problem? *Philosophy and Phenomenological Research*, 83(1), 129–147.
- Zhong, L. (2014). Sophisticated exclusion and sophisticated causation. *Journal of Philosophy*, 111(7), 341–360.

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