Chancy Covariance and The Mind Body Problem

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Abstract

Most agree that mental properties depend in some way on physical properties. While physicalists describe this dependence in terms of deterministic synchronic relations like identity or supervenience, some dualists prefer to think of it in terms of indeterministic dynamic relations, like causation. I'm going to develop a third conception of the dependence of the mental on the physical that falls somewhere between the deterministic synchronic dependence relations of the physicalist and the indeterministic diachronic dependence relations advocated by some dualists. I'll then use this new conception of metaphysical dependence to formulate a novel approach to the mind body problem that (i) posits a necessary, metaphysically robust synchronic dependence of the mental on the physical, (ii) satisfies several of the key motivations of both non-reductive physicalism and naturalistic dualism, (iii) is consistent with both the causal efficacy of the mental and the causal closure of the physical, and (iv) is capable of reconciling determinism about the physical world with indeterminism about the mental world.

In this paper, I set out to introduce and explicate a new species of metaphysical dependence relation, before arguing that this relation paves the way for the articulation of a novel and promising approach to the mind body problem. Before introducing this new relation, it will be useful to describe a natural way of partitioning the space of possible metaphysical dependence relations. Firstly, we can divide dependence relations along the diachronic/synchronic axis, i.e. into those relations whose relata are instantiated simultaneously vs those whose relata are distributed across time. On the synchronic side, the most prominent example is supervenience, a relation that plays a central role in articulating the most influential physicalist responses to the mind body problem and the most prominent conceptions

of the metaphysics of emergence.[1] On the diachronic side, the most salient example is, of course, causation. Secondly, we can divide dependence relations along the deterministic/indeterministic axis, i.e. into those relations for which the instantition of the dependant property is always fully determined by the property on which it depends vs those relations for which the instantition of the dependant property is not fully determined by the property on which it depends. According to orthodoxy, causal relations come in both deterministic and indeterministic flavours.[2] And by its definition, the supervenience relation is completely deterministic – supervening properties are fully determined by the properties upon which they supervene. We can now combine these two partitions to obtain the finer grained four cell partition depicted below.

Synchronic/Deterministic	Synchronic/Indeterministic
Diachronic/Deterministic	Diachronic/Indeterministic

As noted above, philosophers are well acquainted with instances of the top left (supervenience), bottom left (deterministic causation) and bottom right (indeterministic causation) cells of the table. However, there are no known instances of the top right cell of the table. At first blush, this may not be too surprising. For, one might think that the very notion of an indeterministic synchronic dependence relation is inherently incoherent. We say that property B indeterministically depends on property A when the instantiation of A makes a difference to how likely B is to be instantiated without fully determining it. But that can only be the case if B is instantiated later than A (assuming that A and B are instantiated at all). If B is instantiated simultaneously with or earlier than A, then the instantiation of A can't possibly make a difference to the chance of B's instantiation since, at the moment at which it is 'decided' whether A is instantiated or not, it will likewise already be decided whether B is instantiated, which leaves no room for A to make a difference to the chance of B's instantiation. So it looks like any indeterministic dependence relation must, of necessity, be diachronic. The first basic task of this paper is to show that this reasoning is not entirely sound, since it is possible to formulate robust metaphysical dependence relations that are both synchronic

[1] Another example of a synchronic dependence relation that plays an important role in the current literature is *grounding*. In recent years, a number of authors have argued that physicalist approaches to the mind body problem are best articulated in terms of grounding relations (see e.g. Dasgupta (2014), Rosen (2010), Schaffer (2009)) rather than supervenience relations. Here, I focus mainly on supervenience based formulations of physicalism because I don't want to get involved in the subtle controversies that surround the proper understanding of grounding relations.

[2] At the very least, it is standardly accepted that causation can be coherently conceived of as either a deterministic or an indeterministic dependence relation.

and indeterministic in something like the sense defined above. As well as broadening the logical space of possible dependence relations available to metaphysicians and philosophers of mind and the special sciences, I will argue that the identification of this hitherto unrecognised class of dependence relations actually allows for the articulation of a fruitful new perspective on the mind body problem that yields novel responses to the causal exclusion problem and the apparent incompatibility of free will and physical determinism.

To foreshadow the way in which these synchronic/indeterministic dependence relations can be significant for the mind body problem, recall that the most influential extant physicalist approaches to the problem start from the premise that the mental properties of a world at any time supervene on the physical properties of the world at that time. Reductionist views go one step further by actually identifying all mental properties with the physical properties on which they supervene (see e.g. Feigl (1967), Place (1970), Smart (1959)), while non-reductionist views argue for the metaphysical autonomy of mental properties (see e.g. Fodor (1974), Horgan (1993)). While the reductionist theory famously fails to account for the multiple realisability of mental properties (see e.g. Davidson (1970), Fodor (1974), Putnam (1967)), the non-reductionist view also runs into a number of its own problems, the most notorious of which involve its apparent incompatibility with the facts of mental causation (see e.g. Kim (1998)). In response to these problems with standard physicalist accounts of the emergence of the mental from the physical, some authors (see e.g. O'Connor and Wong (2005)) have proposed an alternative view that replaces the 'static, formal' supervenience relation of non-reductive physicalism with a 'dynamic, causal' view of emergence, on which mental properties depend on physical properties via an indeterministic and diachronic causal dependence relation. They argue that this alternative conception of emergence resolves the most intractable problems of both reductive and non-reductive physicalism. But regardless of whether that is so, most will be reluctant to surrender the idea that there is *some* lawlike synchronic dependence of the world's mental properties at a fixed time on the world's physical properties at that time. Even if one accepts that this dependence is not properly characterised in terms of supervenience, one might still demand that there must be some kind of weighty synchronic metaphysical dependence of of the mental on the physical. Here, I will argue that by characterising the dependence of the mental on the physical in terms of synchronic/indeterministic dependence relations, we can simultaneously resolve the problem of mental causation and take steps towards reconciling the

possibility of free will with physical determinism, whilst also preserving the primal physicalist intuition that the world's mental properties at a given time depend (in a metaphysically robust sense) on the world's physical properties at that time.

The structure of the paper is as follows. First, I set up some necessary formalism and terminology (§2) before using it to motivate and define a synchronic and indeterministic dependence relation, which I call 'chancy covariance' (§3). After explicating the key metaphysical properties of this dependence relation, and comparing it to its diachronic and deterministic counterparts, I use the relation to formulate a novel approach to the mind body problem, which I call 'pseudo physicalism' (§4). I then go on to show that pseudo physicalism is roughly on a par with classical non-reductive physicalism with respect to some important theoretical virtues (including its ontological parsimony and its compatibility with token physicalism), before demonstrating that pseudo physicalism is able to avoid two of the most intractable problems for classical non-reductive physicalism, namely the problem of mental causation (§5) and the apparent incompatibility of free will with physical determinism in a classical physicalist worldview (§6). After *that*, I make some comparisons between pseudo physicalism and Chalmers' (2006) naturalistic dualism (§7). Finally, I conclude and identify some salient avenues for future work (§8).

1 Preliminaries

Before we're able to properly motivate and define the relation of chancy covariance, we need to set the table with a few simple technical notions. To begin, let H and L denote the sets of possible 'higher level' and 'lower level' states of the world. For example, it might be that H contains all the possible mental states (maximally fine grained specifications of which mental properties are instantiated in the world at a time), while L contains all the possible physical states (maximally fine grained specifications of which physical properties are instantiated in the world at a time). For now, I allow H and L to refer to any two state spaces that contain states that correspond to maximally fine grained specifications of which properties of a particular kind are instantiated in the world at a time.

Next, let T denote the set of times. I assume only that T is a linearly ordered set that contains an 'initial time' t_i and has a (possibly infinite) cardinality of at least 2. The stipulation that T contains

an initial time is a useful technical idealisation, and if one finds it an unpalatable assumption, one can simply think of T as the set of times for an arbitrary proper temporal subregion of the world. A history is a function $\mathbf{h} : T \rightarrow L \times H$ that assigns to each time $t \in T$ both a lower level state and a higher level state, which represent the higher and lower level states that the world instantiates at t on that history. Intuitively, a history provides a full specification of which higher and lower level properties are instantiated by the world at every moment in time.[3] I use $\mathbf{H}$ to denote the set of metaphysically possible histories, i.e. $\mathbf{H}$ contains every history $\mathbf{h}$ such that it is metaphysically possible for $\mathbf{h}$ to represent the true history of the world for the entire duration encompassed by T. I will not dwell on the conception of metaphysical modality at play here, and nothing I say in the following commits me to a particular account of that notion. The reader is free to fill in the gap with her preferred definition.[4] For current purposes, the reader can think of the histories as analogous to possible worlds, in the sense that they correspond to maximally fine grained specifications of what is true of the world across across its temporal duration. One can then define a semantics for modal talk in the usual way, i.e. a proposition is necessarily true if it is true in every history, possible if it is true in some history, and impossible if it is true in no history.

Next, I let Ch denote the probability function that assigns to each possible history $\mathbf{h} \in \mathbf{H}$ the objective chance at the initial time t_i of $\mathbf{h}$ being actually realised. In other words, $Ch(\mathbf{h})$ denotes the chance, at the beginning of the world (or the relevant temporal subregion of the world), that $\mathbf{h}$ will accurately describe exactly which properties are instantiated at all subsequent times. I assume that $Ch(\mathbf{h}) > 0$ for all (and only) $\mathbf{h} \in \mathbf{H}$ since, by stipulation, every history in $\mathbf{H}$ is metaphysically possible, and should therefore have a non-zero chance of being actual, when considered from the perspective of the initial time.

For any state $s \in H \cup L$ and any time $t \in T$, I use the notation $< s, t >$ to denote the proposition that the state s is instantiated at time t. Formally, this proposition (and every other proposition) can be thought of as the disjunction of all the histories that make it true. I write $\mathbf{h} \models < s, t >$ for the case in which $\mathbf{h}$ makes $< s, t >$ true, and more generally write $\mathbf{h} \models X$ whenever X is a proposition

[3] If one interprets T as the set of times for a temporal subregion of the world rather than the 'full' set of all times, then of course these histories will provide full specifications of which lower and higher level properties are instantiated at every moment of the relevant sub region.

[4] Section 7 discusses some of the implications of replacing metaphysical necessity with logical or natural necessity in my analysis.

that is true on the history $\mathbf{h}$. Given a higher level state $h \in H$ and a lower level state $l \in L$, I write $\mathbf{h} \models < h \wedge l, t >$ for $(\mathbf{h} \models < h, t >) \wedge (\mathbf{h} \models < l, t >)$. Finally, I call a proposition X a 'pre-t' proposition if it can be expressed as a logical function of propositions of the form $< s, t' >$ for $t' < t$, in which case X can be thought of as asserting something about the history of the world prior to t. And with this light formal machinery in hand, we are now ready to start on the path towards a definition of 'chancy covariance'.

2 Generalising Supervenience

As a first step towards defining the desired 'chancy covariance' relation, it will be instructive to consider an interesting reformulation of supervenience that is suggested by the framework introduced above. In its most generic form, the supervenience relation is typically defined in something like the following manner: 'higher level properties supervene on lower level properties if there can be no change in the higher level properties without a corresponding change in the lower properties' (see e.g. Davidson (1970), Horgan (1993), Kim (1992, 1998), Lewis (1983)). There are many ways to disambiguate, precisify and formalise this informal definition. In the current setting, an obvious formalisation suggests itself. Let H and L consist of states corresponding to all the maximally fine grained possible specifications of which higher and lower level properties are instantiated, respectively. To say that the higher level properties supervene on the lower level properties is to say that one cannot vary the higher level H state without also varying the lower level L state. Formally, this can be made precise as follows: for any lower level state $l \in L$, there do not exist any histories $\mathbf{h}, \mathbf{h}' \in \mathbf{H}$, times $t, t' \in T$ and higher level states $h, h' \in H$ such that the following conditions are both satisfied.

$$\text{(i) } \mathbf{h} \models < l \wedge h, t >$$
$$\text{(ii) } \mathbf{h}' \models < l \wedge h', t' >$$

If (i) and (ii) were both satisfied, then it would be possible for the same lower level state to give rise to two different higher level states in the sense that there would exist histories $\mathbf{h}$ and $\mathbf{h}'$ and times t, t' such that l is instantiated in $\mathbf{h}$ and $\mathbf{h}'$ at t and t', respectively, but for which different higher level states are instantiated at t and t' in those histories. There is a natural sense in which this would be

an example of the higher level H state varying while the lower level L state remains fixed. Ruling out the simultaneous satisfaction of (i) and (ii) amounts to requiring that for any lower level state $l \in L$, there should correspond a unique higher level state $h \in H$ such that for any $\mathbf{h} \in \mathbf{H}$ and any $t \in T$, $\mathbf{h} \models < l, t >$ implies $\mathbf{h} \models < h, t >$. Thus, we have the following definition:

Definition 2.1 *Say that the higher level properties* supervenes *on the lower level properties if, for any lower level state $l \in L$, there corresponds a unique higher level state $h \in H$ such that for any $\mathbf{h} \in \mathbf{H}$ and any $t \in T$, $\mathbf{h} \models < l, t >$ implies $\mathbf{h} \models < h, t >$.*[5]

The formalisation of supervenience given by Definition 2.1 is entirely equivalent to many of the most prominent formulations of the notion.[6] However, we can now give a further alternative reformulation that will subsequently allow us to obtain a genuinely novel generalisation of the relation. To see this, note that Definition 2.1 entails that, regardless of what else happens before t, once one knows that l is instantiated at t, one also knows that h must be instantiated at t. Formally, we can describe this as follows. Let X be any pre-t proposition that is metaphysically consistent with $< l, t >$ in the sense that there exists a history $\mathbf{h}$ such that $\mathbf{h} \models X \wedge < l, t >$.[7] Then, at the initial time t_i, the chance that h will be instantiated at t given that X and $< l, t >$ are true is 1. Whatever we suppose about the actual history of the world leading up to t, we know from the beginning of time that if l is instantiated at t, then h must be too. This motivates the following alternative definition of supervenience.

Definition 2.2 *Say that the higher level properties* supervene *on the lower level properties if, for any lower level state $l \in L$, there corresponds a unique higher level state $h \in H$ such that for any pre-t proposition X that is metaphysically consistent with $< l, t >$, $Ch(< h, t > | X \wedge < l, t >) = 1$.*[8]

[5] This formalisation is of course closely related to the definition of 'strong supervenience' given by Horgan (1993). One could also use the present framework to formalise the alternative notion of 'weak supervenience', but I prefer to focus on strong supervenience, since it is widely considered to be more suitable for the proper articulation of physicalist approaches to the mind body problem. Note also that the notion of 'implication' at play in Definition 2.1 can just be thought of as truth of the relevant material conditional (in this case, $(\mathbf{h} \models < l, t >) \supset (\mathbf{h} \models < h, t >)$).

[6] It is also popular to define supervenience in modal terms, as a particular form of necessary covariance. In the next section I show that, given some plausible assumptions, Definition 2.1 ensures that all actual supervenience relations are metaphysically necessary. Similarly, if one were to let $\mathbf{H}$ consist of all naturally/logically possible histories rather than metaphysically possible histories, the same arguments would show that all actual supervenience relations are naturally/logically necessary.

[7] The requirement that X be metaphysically consistent with $< l, t >$ is needed to ensure that we do not consider the conditional chance that h is instantiated at t given that a metaphysical impossibility is true (which is undefined).

[8] If one takes Ch to represent the chances at the initial moment of a proper temporal subregion of the world, rather than the chances at the true initial moment, then this definition (as well as Definitions 3.1 and 3.2) should be understood to implicitly quantify over the chances at the initial moment of every temporal subregion that has an initial moment.

To see that Definition 2.2 is equivalent to Definition 2.1, suppose first that H supervenes on L in the sense specified by Definition 2.1, and take any $l \in L$. We know that there exists a unique $h \in H$ such that for any $t \in T$ and any $\mathbf{h} \in \mathbf{H}$, $\mathbf{h} \models < l, t >$ implies $\mathbf{h} \models < h, t >$. So every possible history that satisfies $< l, t >$ also satisfies $< h, t >$ (for arbitrary fixed time t). Since only possible histories have non-zero chance, it follows that $Ch(< h, t > | < l, t >) = 1$, which in turn entails $Ch(< h, t > | X \wedge < l, t >) = 1$ for any X that is metaphysically consistent with $< l, t >$. So satisfaction of Definition 2.1 ensures satisfaction of Definition 2.2. To see the converse, assume satisfaction of Definition 2.2 and take $X = \mathbf{H}$ (i.e. X is the disjunction of all possible histories).[9] Then $1 = Ch(< h, t > | X \wedge < l, t >) = Ch(< h, t > | < l, t >)$ (for arbitrary fixed time t). Since all possible histories are assumed to have non-zero initial chance, it follows that there are no histories where $< l, t >$ is true but $< h, t >$ is false, which means that for arbitrary time t and arbitrary history $\mathbf{h} \in \mathbf{H}$, $\mathbf{h} \models < l, t >$ implies $\mathbf{h} \models < h, t >$, i.e. satisfaction of Definition 2.2 ensures satisfaction of Definition 2.1. So, under the assumption that all and only metaphysically possible histories have non-zero chance, Definitions 2.1 and 2.2 are entirely equivalent.

Now, the attentive reader may note that requiring $Ch(< h, t > | X \wedge < l, t >) = 1$ for every pre-t X that is metaphysically consistent with $< l, t >$ is actually equivalent to simply requiring $Ch(< h, t > | < l, t >) = 1$. But the slightly more complicated condition will be useful when we finally come to comparing supervenience to chancy covariance. Furthermore, the current form of Definition 2.2 nicely illustrates an important facet of the distinctive metaphysical oomph of the supervenience relation. In particular, it illustrates the fact that when H supervenes on L, the lower level state at t doesn't just fix the higher level state at t with probability 1. It does so in a way that is entirely impervious to everything else that happens prior to t. Whatever else we assume about the history of the world (whatever X we substitute into Definition 2.2), the lower level state will continue to synchronically determine the higher level state in the manner reflected in the unconditional chances that obtain at the beginning of time.

Relative to this interpretation, all subsequent argumentation applies equally well to both versions of the definitions.

[9] $\mathbf{H}$ is clearly a pre-t proposition for any non-initial t since $\mathbf{H} = < s, t' > \vee \neg < s, t' >$ for arbitrary $s \in L \cup H$ and $t' < t$.

3 Chancy Covariance

We're now finally ready to actually define the notion of 'chancy covariance' by generalising Definition 2.2 (which, as I have argued, is equivalent to most standard definitions of supervenience).

Definition 3.1 *Say that the higher level properties* chancily covary *with the lower level properties if, for any lower level state $l \in L$ and any higher level state $h \in H$, there exists a number $x \in [0,1]$ such that for any time $t \in T$ and for any pre-t proposition X that is metaphysically consistent with $< l, t >$, $Ch(< h, t > | X \wedge < l, t >) = x$.*

To understand the relation of chancy covariance to supervenience, note first that the latter directly entails the former. If H supervenes on L, then for any $l \in L$ there exists a unique $h \in H$ such that for any $t \in T$ and any pre-t X that is metaphysically consistent with $< l, t >$, $Ch(< h, t > | < l, t > \wedge X) = 1$. This in turn entails that for any other $h' \neq h$, $Ch(< h', t > | < l, t > \wedge X) = 0$. So if you take any $l \in L$ and any $h \in H$, there will be a unique x (either 1 or 0) such that for any time t and any pre-t X that is metaphysically consistent with $< l, t >$, $Ch(< h, t > | < l, t >) = x$, which shows that supervenience entails chancy covariance.

More generally, when H supervenes on L, each lower level state l assigns a fixed chance x to each higher level state h such that, regardless of what what we assume about the actual history of the world up until t (for arbitrary fixed t), the chance that h is instantiated at t, given that l is instantiated at t, is always x. Furthermore, we know that there will always be exactly one higher level state for which x is 1, and x will be 0 for every other higher level state. The situation is exactly analogous when H chancily covaries with L, except for the fact that x can now take non-extreme values. If H chancily covaries with L, then there may be a lower level state l that sets the chance of two distinct higher level states h_1 and h_2 both at $\frac{1}{2}$. But it's still true that these chances are completely fixed in the sense that, no matter what else we assume about the history of the world up until t, the chance that h_1/h_2 is instantiated at t (for arbitrary fixed t), given that l is instantiated at t, will always be $\frac{1}{2}$.

Note that in the case of chancy covariance, requiring that $Ch(< h, t > | X \wedge < l, t >) = x$ for any suitable X is importantly not equivalent to simply requiring that $Ch(< h, t > | < l, t >) = x$

for all t.[10] In fact, it's being the case that for all $t \in T$, $Ch(< h, t > | < l, t >) = x$ is not enough to ensure the kind of weighty synchronic metaphysical connection that I'm interested in. All that is guaranteed by that condition is that, from the perspective of the initial time, the chance of a higher level state being instantiated at a time given that a lower level state is instantiated at that time is invariant across times. But this leaves open the possibility that, as the world evolves, the synchronic connection between lower level and higher level states can be disrupted, so that the chances of higher level states are no longer synchronically determined by the lower level states. For example, one can imagine a situation in which $Ch(< h, t > | < l, t >) = \frac{1}{3}$ for every $t \in T$, but where there exist $t, t' \in T$ with $t' > t$ such that $Ch(< h, t' > | < l, t' > \wedge < l, t >) \neq \frac{1}{3}$. In that case, although it's true that, from the perspective of the initial time, the chance that h is instantiated at t' (or any other time) given that l is so instantiated is fixed at $\frac{1}{3}$, that chance is subject to change when we further specify facts about what lower level states are instantiated at times leading up to t'. In this case, there is no real metaphysical glue connecting the higher level state of the world at a time with the lower level state at that time. And this is exactly the kind of case that is ruled out by chancy covariance. When H chancily covaries with L, the lower level state at a time completely fixes the chances of the higher level states at that time, and it does so in a way that is entirely impervious to any other facts about the prior history of the world. This means that for each pair $< l, h > \in L \times H$, the conditional chance $Ch(< h, t > | < l, t >)$ is fully determined from the beginning of time, and remains unchanged regardless of what else we stipulate about the history of the world.[11] It's not just that l's being instantiated at t fixes the chance of h being instantiated at t at x, but rather that it does so in a way that cannot be disrupted by what goes on before t.

The preceding comments show that chancy covariance is a robust and weighty metaphysical connection. If the higher level properties chancily covary with the lower level properties, then what happens at the higher level at a time depends on what happens at the lower level at that time in a way that cannot be disrupted by any contingent details concerning the prior history of the world. In particular, the conditional chance of any higher level property being instantiated at a time t given

[10] In the special case of supervenience, these two requirements are equivalent, since $Ch(< h, t > | < l, t >) = 1$ implies $Ch(< h, t > | X \wedge < l, t >) = 1$ for all X that are metaphysically consistent with $< l, t >$, which is not the case when $x < 1$.

[11] Assuming, of course, that our stipulations are consistent with $< l, t >$ and only concern what happens at times leading up to t. In what follows, the reader can take this qualification as a standing background commitment.

that a specific lower level property is also instantiated at t is fixed from the beginning of time, and is independent of all further contingent facts that one can specify about the history of the world leading up to t.

Another important distinction between supervenience and chancy covariance is that, while it is compelling to think that, if higher level states supervenes on lower level states, then they do so necessarily, the same is not true of chancy covariance as defined above.[12] To see this, let H supervene on L and assume that a history is metaphysically possible if and only if it's metaphysically necessary that the history is metaphysically possible.[13] Since H supervenes on L, it's true that for any $l \in L$, there exists a unique $h \in H$ such that for any $\mathbf{h} \in \mathbf{H}$ and any $t \in T$, $\mathbf{h} \models < l, t >$ implies $\mathbf{h} \models < h, t >$, i.e. the following sentence is true.[14]

$$\text{(i) } (\forall l \in L)(\exists! h \in H)(\forall \mathbf{h} \in \mathbf{H})(\forall t \in T)((\mathbf{h} \models < l, t >) \supset (\mathbf{h} \models < h, t >))$$

Since each possible history is necessarily possible and each impossible history is necessarily impossible, the following sentence follows from (i).[15]

$$\text{(ii) } (\forall l \in L)(\exists! h \in H)\Box\forall(\mathbf{h} \in \mathbf{H})(\forall t \in T)((\mathbf{h} \models < l, t >) \supset (\mathbf{h} \models < h, t >))$$

Two iterations of the Barcan formulas subsequently yield[16]

$$\text{(iii) } \Box(\forall l \in L)(\exists! h \in H)\forall(\mathbf{h} \in \mathbf{H})(\forall t \in T)((\mathbf{h} \models < l, t >) \supset (\mathbf{h} \models < h, t >))$$

This shows (modulo the relevant assumptions) that all supervenience relations are necessary. If the higher level state of the world supervenes on the lower level state, it does so necessarily. Note

[12] Note that, for the purposes of this section, I am interested specifically in metaphysical modality.

[13] Some readers may take issue with this assumption, but the point I'm making here is a conditional one. *If* one accepts that the possible histories are the histories that are necessarily possible, then supervenience has an important metaphysical property that chancy covariance lacks, namely that there are no contingent supervenience relations, but there may be contingent chancy covariance relations. I go on to note that, if one demands that the nature of the dependence of the mental on the physical requires necessary rather than merely contingent dependence relations, then one can easily redefine chancy covariance to avoid this problem, i.e. I offer a solution to a problem that arises if one accepts the contested assumption. If one rejects the assumption, then the problem doesn't arise and this part of the discussion can be safely ignored.

[14] Where $\exists!$ is read 'there exists exactly one'.

[15] Here, we also implicitly rely on the fact that each history is individuated by a specification of which states are satisfied at which times, which implies that $(\mathbf{h} \models < l, t >) \supset (\mathbf{h} \models < h, t >)$ holds necessarily whenever it holds.

[16] Again, critics of the Barcan formula are welcome either to provide an alternative proof of the necessity of all supervenience relations, or to argue that there can be contingent supervenience relations, in which case they don't need to concern themselves with the current discussion.

that the same does not seem to be true of chancy covariance. Definition 3.1 allows for the possibility that the higher level state can contingently chancily covary with the lower level state. To see this, note that we have not assumed that the chances encoded in the initial chance function are necessary. Maybe the initial chances of histories are contingent. If that's true, then it's clear that H and L can contingently satisfy the conditions for chancy covariance. Again, one might think that in the case that H chancily covaries with L but only does so contingently, there is not a robust or meaningful metaphysical dependence of H upon L, since the world could have been such that the chances of higher level happenings are not synchronically determined by lower level happenings in any lawlike way. For chancy covariance to be worthy of the title 'metaphysical dependence relation', one might argue, it needs to be a necessary relation.

The most obvious way to respond to this objection is to simply stipulate that the initial chances *are* necessary. But it's far from self evident that the chances assigned to possible histories at the beginning of time couldn't have been different, and I certainly don't want my arguments to be conditional on such a contentious supposition. However, this response can be plausibly weakened by noting that, although there is no compelling reason to think that the initial chances are necessary *in general*, there are some features of the initial chances that do seem plausibly necessary. For instance, since we have already assumed that a history is possible if and only if it has non-zero initial chance, the plausible assumption that all and only possible histories are necessarily possible is equivalent to the assumption that all and only histories with non-zero initial chance necessarily have non-zero chance. So I take it to be relatively uncontroversial that there may be some properties of the initial chances that are genuinely necessary. In light of this observation, we can simply strengthen the definition of chancy covariance as follows.

Definition 3.2 *Say that the higher level properties* chancily covary *with the lower level properties if it is necessarily the case that, for for any lower level state $l \in L$ and any higher level state $h \in H$, there exists a number $x \in [0,1]$ such that for any time $t \in T$ and for any pre-t proposition X that is metaphysically consistent with $< l, t >$, $Ch(< h, t > | X \wedge < l, t >) = x$.*

According to Definition 3.2, H chancily covaries with L as long as it necessarily covaries with L in the sense specified by Definition 3.1. By construction, Definition 3.2 ensures that every chancy

covariance relation is necessary, and hence that the chancy covariance relation is modally robust in exactly the sense that supervenience is. Importantly, Definition 3.2 defines chancy covariance in terms of necessary properties of the initial chances, unlike Definition 3.1, which allows one to identify chancy covariance relations via properties of the initial chances that could turn out to be contingent. Of course, if the initial chances are all necessary, then this distinction is completely unimportant. But as I stressed above, I don't see any good reason to assume that all the properties of the initial chances are necessary.

In sum then, the higher level state chancily covaries with the lower level state when it is necessarily the case that the lower level state at any time synchronically fixes the chances of the higher level states at that time in a way that is insensitive to whatever else we stipulate about the prior history of the world. Like supervenience relations, chancy covariance relations are entirely blind to matters of contingent fact and are invariant throughout time. And like supervenience relations, they are necessary whenever they obtain.

Having defined and illustrated the notion of chancy covariance, it is worth briefly clarifying the exact sense in which chancy covariance can be rightly described as a synchronic and indeterministic dependence relation. There are three relevant issues here. Firstly, I reiterate once more that chancy covariance is a robust and metaphysically 'thick' dependence relation. When H chancily covaries with L, it is a necessary truth that lower level happenings fix the chances of higher level happenings in a particular way that is invariant throughout time and impervious to whatever one cares to stipulate about the prior history of the world. Secondly, I observe that there is a clear sense in which chancy covariance is a synchronic relation. When H chancily covaries with L, the chance of a H state h being instantiated at t depends, in a particular sense, upon which L state is instantiated at that same time t. For, the chance that h is instantiated at t is related in a law like manner to what is happening at the lower level at t. This is clearly distinct from diachronic dependence relations like causation, where (the chances regarding) what happens on the higher level at time t' depends on what happens at the lower level at some earlier time t, but is not related in any lawlike manner to lower level happenings at time t'. Thirdly, it is clear that chancy covariance is indeterministic. Even if H strongly chancily covaries with L, fixing the L state at time t doesn't in general fully determine the H state at t. This contrasts with deterministic dependence relations like supervenience, for which a specification of the

lower level state at a time suffices to fully determine the higher level state at that time.

In the introduction I sketched an intuitive argument for the incoherence of the very notion of a a synchronic and indeterministic dependence relation. What was wrong with that argument, and how exactly does the example of chancy covariance escape it? Crucially, that argument assumed that property B indeterministically depends on property A when the instantiation of A makes a difference to how likely B is to be instantiated without fully determining it. At first glance, it looks like this definition rules out the possibility of A and B having the same temporal location, since that implies that whether B is instantiated is already settled at the time at which it is decided whether or not A is instantiated. But this reasoning relies on a particular conception of what it means for the instantiation of A to make a difference to how likely B is to be instantiated. What I've done so far is to develop another sense in which A can make a difference to how likely B is to be instantiated without fully determining it – namely, that, regardless of what else is true about the history of the world prior to A's instantiation, ensuring the instantiation of A would fix the chance of B's simultaneous instantiation in a lawlike manner. Relative to this (natural) understanding of what it means for A to make a difference to the chance of B's instantiation, it is demonstrably false that there can be no indeterministic synchronic dependence relations. I just defined one.

4 Chancy Covariance and Pseudo Physicalism

Now that I've defined and explicated the notion of chancy covariance, I hope the reader will agree that it's a rather neat new addition to the metaphysiscian's toolbox. I turn now to showing that, besides being neat, it's also useful, insofar as it allows us to carve out a promising new approach to the mind body problem.

According to classical non-reductive physicalism, mental properties supervene on physical properties without being reducible to them. In slogan form: no two worlds (histories) can be alike with respect to all their physical properties whilst differing with respect to their mental properties. In what follows I will refer to this basic thesis as 'classical physicalism', since the view I will be contrasting it with is even less reductive than non-reductive physicalism, but still aims to satisfy some of the core motivations behind a physicalist theory of the mind.

Specifically, the approach to the mind body problem that I want to introduce is characterised by the claim that, rather than supervening on the physical properties, the world's mental properties *chancily covary* with the physical properties (in the sense specified by Definition 3.2). Call this view 'pseudo physicalism'. Pseduo physicalism leaves open the possibility that there can be two distinct possible histories $\mathbf{h}, \mathbf{h}' \in \mathbf{H}$ such that (i) $\mathbf{h}$ and $\mathbf{h}'$ are indistinguishable in terms of what they say about which physical properties are instantiated at each moment in time, and (ii) $\mathbf{h}$ and $\mathbf{h}'$ disagree about which mental properties are instantiated at some moments in time, i.e. pseudo physicalism is compatible with the existence of distinct possible histories that are identical with respect to which physical properties they instantiate at each time, but which differ with respect to which mental properties they instantiate at some times. In that sense, pseudo physicalism falls on the 'dualist' side of the metaphysical tracks. It allows for mental properties to float free from the physical properties, in so far as it allows them to vary independently of any corresponding variation in the world's physical properties. However, pseudo physicalism also (i) respects several of the basic motivations for classical physicalism, (ii) fares at least as well as its classical counterpart with respect to a number of important theoretical virtues, (iii) is compatible with token physicalism, and (iv) elegantly sidesteps some of the most prominent objections to classical physicalism whilst still positing a robust synchronic metaphysical dependence of all mental properties on physical properties. Given these observations (for which I will presently argue),[17] it seems clear that physicalists should at least seriously consider trading in the classical non-reductive formulation for its pseudo counterpart. For the purposes of the present discussion, I leave aside both reductive and eliminative physicalism, and assume in the background that any acceptable physicalist theory must yield the result that mental states are both real and mulitply realisable.

To begin the case for pseudo physicalism, I reiterate once more that, like classical physicalism, pseudo physicalism posits a necessary, time invariant synchronic dependence of the mental on the physical that is impervious to the vagaries of contingent fact. Like classical physicalism, pseudo physicalism says that the mental properties of the world at a time depend on the world's physical properties at that time in a particular way that never changes, regardless of one's location in time or the space of possible histories. This raises the question: why do we need the stronger form of classical

[17] The arguments for points (i) and (ii) are spread mostly across Sections 4.1, 4.2 and 4.3. The argument for (iii) (which shows that pseudo physicalism allows for the articulation of a view that is analogous to Davidson's (1970) anomalous monism) is contained in 4.4, while the arguments for (iv) are spread over sections 5 and 6.

physicalism? If all we care about as physicalists is that the mental should (necessarily) synchronically depend on the physical in a metaphysically robust manner, then pseudo physicalism is enough. If the classical physicalist demands something more (something we can only get with supervenience), then they need to specify what that something is, and why we need it.

It seems to me that the classical physicalist has four natural options to choose from when responding to this challenge. I will consider each in turn.

4.1 Response 1: Deterministic Correlations

The classical physicalist's first response contends that, despite initial appearances, pseudo physicalism actually fails to respect one of the basic motivations for classical physicalism. In particular, classical non-reductive physicalism, the story goes, is partially motivated by the following key methodological presupposition of neuropsychology:

> In theory, all mental activities might be mapped on the brain and associated with a specific neural correlate... This neural stance... is supposed to be at the basis of neuroscientific research: a change in the mind ... must be always accompanied by a change in the brain. (Nani et al (2019), p2).

The idea here is that neuroscience aims to uncover fully deterministic synchronic correlations between brain states and corresponding mental states. And even if correlations of this sort are still hard to find in practice, the fact that the neuroscientific community seems to presuppose their existence counts as evidence that they are really there, waiting for us to discover them whenever our science becomes sufficiently sophisticated. And if these correlations do exist, that is, if, for any brain state B, it is possible to identify a corresponding mental state M such that whenever a subject is found to be in B, they are also found to be in M, then the best explanation for the existence of those correlations would surely be classical non-reductive physicalism. In sum then, the crucial difference between classical and pseudo physicalism is that the former yields an optimal explanation of the deterministic synchronic correlations posited by neuropsychology, while the latter does not.

There is a lot to be said about this response to the pseudo physicalist challenge, and the present discussion can only scratch the surface. But here are a few reasons to be skeptical. Firstly, I am

dubious of the claim that neuropsychology really presupposes the existence of deterministic synchronic correlations between brain states and mental states. Certainly, it is plausible to claim that many neuropsychologists are fascinated by the prospect of uncovering correlations of this kind, and that a lot of research in the field is presented in a way that emphasises its implications for the existence of such correlations, but none of this entails that neuropsychology, as a science, is committed to the existence of deterministic synchronic correlations between brains states and mental states. If, at the end of the day, such correlations are not found to obtain, then science needs to be ready to take that evidence seriously.

Secondly, on an empirical level, I think it is still very much an open question whether deterministic synchronic correlations really do obtain between all (suitably fine grained) brain states and corresponding (suitably fine grained) mental states.[18] Arguments in favour of such correlations will need to rely on extant brain imaging techniques, in particular EEG and fMRI. And, as has been widely noted, both techniques have major shortcomings when it comes to precisely identifying synchronic correlations between brain states and mental states. While fMRI has a comparatively coarse grained temporal resolution that makes it extremely difficult to plausibly disentangle synchronic correlations from diachronic ones, EEG has a comparatively coarse grained spatial resolution, which makes it similarly difficult to identify the relevant brain state in a suitably precise manner. Simply put, current neuroscience is not in a position to conclusively identify the kinds of deterministic synchronic correlations that are entailed by classical non-reductive physicalism. And of course, the ability to optimally explain such correlations is moot until the correlations are actually known to exist.[19]

Now, I do need to make some important qualifications here. I certainly do not deny that we have overwhelming evidence for the existence of strong, robust and ubiquitous synchronic correlations

[18]Note that pseudo physicalism is just as well placed as classical physicalism when it comes to explaining why *some* brain states are deterministically correlated with corresponding mental states (since pseudo allows that some physical states might deterministically fix the mental state while others don't). Classical physicalism only gains an explanatory advantage if it is found that *all* brain states are deterministically correlated with corresponding mental states.

[19]Note also that there exist phenomena that cast at least some doubt on the prospect of finding deterministic synchronic correlations between all brain states and corresponding mental states. For example, there is still no consensus on the neuroscientific basis of bistable perception – a phenomenon that occurs when an agent's interpretation of certain visual stimuli (e.g. the Necker cube or the duck-rabbit) periodically changes despite the apparent absence of any relevant change in their visual environment or their neurophysiology. It is at least an open challenge to show that whenever two subjects interpret an ambiguous object like the Necker cube differently, there is also a characteristic difference in their brain states that correlates perfectly with the difference in their interpretations. For discussion of the difficulties associated with identifying the neural underpinnings of bistable perception, see Wang et al (2013).

between brain states and mental states. The preceding remarks are only intended to point out that there is still much that we don't know about the exact shape of these correlations, and that we are still a long way from legitimately concluding that all such correlations are deterministic. But if all we can say is that there exist strong, robust and ubiquitous synchronic correlations between brain states and mental states, then pseudo physicalism is just as well placed as classical physicalism when it comes to explaining that fact. For, like classical physicalism, pseudo physicalism posits a robust synchronic metaphysical dependence of the mental on the physical, and therefore entails the existence of suitable correlations in all but the most extreme special cases. In essence, I agree with the classical physicalist that any prospective solution to the mind body problem must take seriously the undeniable fact, supported by both everyday experience and current science, that an agent's mental state at a time is strongly correlated with their physical state at that time. In fact, I agree with those physicalists who summarily dismiss any dualist theory that fails to posit any meaningful explanation for synchronic psycho-physical correlations. However, I also think that the current state of neuroscience is such that there is still a great deal of uncertainty around the nature of these correlations, and hence that one cannot yet argue for classical physicalism on the grounds that it is the best explanation for the ubiquitously deterministic correlations between brain states and mental states, since we do not know that correlations between brain states and mental states are ubiquitously deterministic. Again, there is much to be said here (and most of it will be much better said by neuroscientists than by philosophers), but it seems to me that there is more than enough uncertainty to prevent the classical physicalist from citing the determinism of synchronic brain/mind correlations as anything like decisive evidence for their view.

4.2 Response 2: Parsimony

Secondly, the classical physicalist can try to respond to the pseudo physicalist's challenge by contending that classical physicalism is more ontologically parsimonious than pseudo physicalism. At first blush, this doesn't look like a promising strategy. For, both pseudo physicalism and classical (non-reductive) physicalism allow for the metaphysical autonomy of mental properties, which suggests that the classical physicalist can't appeal to parsimony to tilt the scales in their favour. As long as one resists reductive physicalism (as one must if one hopes to account for the multiple realisability of mental properties), one

is forced to countenance the existence of two distinct ontological categories corresponding to mental and physical properties, respectively. So ontological parsimony, arguably the primary theoretical virtue of reductive physicalism, seems to be of no use to the classical non-reductive physicalist here.

At this stage, the classical physicalist can respond by appealing to the notion of 'fundamentality'. To see how this works, say that a property is 'fundamental' if it does not supervene on any other property. On the classical physicalist worldview, no mental properties are fundamental, since they all supervene on physical properties. In light of this, the classical physicalist could argue that their theory is in fact more ontologically parsimonious than the pseudo physicalist's since, although it posits the existence of two distinct kinds of properties, only one of those kinds is fundamental. In contrast, pseudo physicalism seems to posit two distinct kinds of fundamental property, since it implies the existence of mental properties that don't supervene on physical properties. If we should only count fundamental properties when evaluating the ontological parsimony of a theory, then it does seem that the classical physicalist's theory is more parsimonious than the pseudo physicalist's. And indeed, there is some precedent for this kind of approach. For instance, Fine (2001, 2009) and Cameron (2010) both argue for a form of deflationism about non-fundamental ontology according to which all that really counts when it comes to considerations of parsimony is how many fundamental things a theory posits.

This looks like a promising line of attack for the classical physicalist (provided they are happy to privilege fundamental properties in this way when assessing ontological parsimony). However, I think that simultaneously defining fundamental properties as those don't supervene on anything else and arguing that only fundamental properties should feature in evaluations of ontological parsimony ultimately leads to implausible consequences. To see why, consider the toy example of a world with only two times, $T = \{t_1, t_2\}$, and two states, $S = \{s_1, s_2\}$. Now suppose that we are arguing about whether this world is deterministic or not. If it's deterministic, then the state at t_1 fully determines the state at t_2, i.e. the property of being in state s_1 at t_2 supervenes on the property of being in state s_1 at t_1. If we understand fundamental properties as properties that don't supervene on anything else, this entails that the non-initial state is not fundamental, and hence that a deterministic theory of this world only posits one kind of fundamental time indexed property (namely the property of being in state s_1/s_2 at t_1). In contrast, if the world is indeterministic, then the non-initial state does not supervene on the initial state and is therefore fundamental, which means that the indeterministic theory posits

two kinds of fundamental time indexed property. So if we treat all properties that supervene on other properties as non-fundamental and only count fundamental properties in evaluations of ontological parsimony, then we have good reason to prefer the deterministic theory to the indeterministic theory in this case. But that's implausible. Indeterministic theories are not *ceteris paribus* less ontologically parsimonious than deterministic theories in this general sense. If they were, then it would be far from obvious that we should use ontological parsimony as a criterion for metaphysical theory choice since indeterministic theories are not (it seems to me) *ceteris paribus* less plausible than their deterministic counterparts.

The classical physicalist might respond to the above counterexample by claiming that time indexed properties like 'being in s_1 at t_1' are not real properties, and hence that they cannot be used in the evaluation of a theory's ontological parsimony. But that is a highly substantive and controversial position.[20] Time indexed properties play an important role in the metaphysics of time (see e.g. Merricks (1994), Parsons (2000)) and rejecting their reality would commit classical physicalists to a contentious metaphysical position that obviously lies beyond the ambit of this paper and the philosophy of mind more generally. Assuming that we do not want the classical physicalist's response to the pseudo physicalist challenge to be contingent on controversial issues in the metaphysics of time, we can reject the proposed rebuttal of the counterexample.

Furthermore, the pseudo physicalist can also make a more general challenge regarding the question of why we should count all and only properties that don't supervene on anything else when evaluating a theory's ontological parsimony. In particular, they could agree that we should only consider fundamental properties when assessing parsimony, but do so whilst employing an alternative understanding of fundamentality on which a property is fundamental only if it doesn't chancily covary with anything else. To see why this is a plausible move, note that perhaps the most obvious motivation for disregarding properties that supervene on other properties from calculations of ontological parsimony is that you get them 'for free' once you posit the properties on which they supervene. Of course, this is a loose way of talking since you don't really get them for free – they still have to be posited, since their existence is not entailed by their supervenience base (even if pain supervenes on brain states, its exis-

[20]Strictly speaking, the property of 'being in state s_1 at t_1' should be thought of as a property that the world satisfies (if at all) throughout all time, while an ordinary non-time indexed property like 'being in state s_1' is a property that the satisfies (if at all) at particular moments in time.

tence is not entailed by brain states). What is meant here is that what goes on with the supervening property is synchronically determined by what goes on with its supervenience base. But note that if P chancily covaries with Q, it's also true that what goes on with P is synchronically determined by what goes on with Q, in the sense that the chance of P being instantiated is synchronically determined by what goes on with Q in a lawlike manner, i.e. if you want to know what's going on with P at a time, the best you can do (short of getting direct information about P) is to find out what's happening with Q at that time. In light of this, one might argue that by positing Q, you get P 'for free', since what happens with P is always synchronically determined, modulo an ineliminable element of chance, by what happens with Q. In contrast, if P did not chancily covary with Q, then the P-chances would not be synchronically fixed by the Q-chances, which would make P seem more like a separate feature of reality that needs to be factored into calculations of ontological parsimony, rather than just a chancy reflection of Q. Overall, it seems to me that identifying properties that don't chancily covary with anything else as fundamental (and only counting fundamental properties in evaluations of ontological parsimony) is just as principled and plausible as the approach advocated by the classical physicalist, and that it's far from obvious why we should count all non-supervening properties as fundamental, even when they chancily covary with other properties. Again, there is much more to say here, but doing so would take us too far afield from our present focus. But as it stands, it's far from obvious whether and how a classical physicalist can plausibly use considerations of ontological parsimony to derive compelling reason to prefer their theory to the pseudo physicalist's.

4.3 Response 3: Explaining Chancy Covariance Relations

Alternatively, the classical physicalist could argue that pseudo physicalism introduces a new class of metaphysical facts that lack any satisfactory explanation, namely the chancy covariance facts themselves. If the mental chancily covaries with the physical, then one is naturally inclined to ask *why* it does so, and there are no obvious answers to that question. Pseudo physicalism is completely silent when it comes to the metaphysical source of the chancy covariance relations that it postulates. And one can reasonably take issue with this apparent postulation of a new kind of brute metaphysical fact.

But again, this objection does nothing to distinguish the classical physicalist from the pseudo physicalist. For, classical physicalism famously encounters an analogous problem, namely the problem

of explaining why the mental supervenes on the physical. Since supervenience is just a special kind of chancy covariance, the problem of explaining supervenience relations looks very similar to the task of explaining chancy covariance relations, and it's reasonable to think that any solution to one of these problems will immediately engender a solution to the other. Certainly, I see no special reason to think that chancy covariance facts must sometimes be inexplicable in a sense that is not true of supervenience facts.

4.4 Response 4: Compatibility with Token Physicalism

A fourth way that one might try to distinguish between classical and pseudo physicalism is in terms of their compatibility with token physicalism. Following Davidson (1970), many authors argue that while mental properties and states cannot be identified with the physical properties and states on which they depend, any specific token instantiation of a mental property/state *can* be identified with a specific token instantiation of some physical property/state. In other words, although mental properties can't be identified with physical properties, mental events can be identified with physical events. Call this latter thesis 'token physicalism'. Most classical non-reductive physicalists (see e.g. Fodor (1974), Kim (1992)) take token physicalism to constitute a non-negotiable presupposition of any physicalist world view. And one might worry that pseudo physicalism is somehow incompatible with token physicalism in a way that classical physicalism is not. To see how this argument might go, reason as follows. Pesudo physicalism allows that there can exist histories $\mathbf{h}, \mathbf{h}' \in \mathbf{H}$, times $t, t' \in T$ and states $p \in P$, $m, m' \in M$ such that p and m are instantiated at t in $\mathbf{h}$, but p and m' are instantiated at t' in $\mathbf{h}'$. If we are token physicalists, then we have to say that m being instantiated at t *is just the same thing as* p being instantiated at t, and that m' being instantiated at t' *is just the same thing as* p being instantiated at t'. But how can that be? How can a physical state's instantiation be the same event as the instantiation of some mental state at one time (in one history) and also be the same event as the instantiation of some other mental state at some other time (in some possibly distinct history)? If being in brain state B at some time t is the same event as being in pain at t, then surely *every* instance of being in brain state B should be identical to a co-occurent and qualitatively identical instance of being in pain.

Again, the case against the pseudo physicalist is overstated here. Firstly note that there is no

logical incompatibility of pseudo physicalism with token physicalism. That is to say, the claim that the instantiation of a physical state can be identical to the instantiation of different mental states at different points in the two dimensional space of times and histories does not strike me as inconsistent or logically incoherent.[21] The claim may sound initially implausible, but I do not think that this impression rests on any principled argument. To illustrate why I think this, note first that classical physicalism faces an analogous issue. For, classical non-reductive physicalism entails that there exist histories $\mathbf{h}, \mathbf{h}' \in \mathbf{H}$, times $t, t' \in T$ and states $p, p' \in P$, $m \in M$ such that p and m are instantiated at t in $\mathbf{h}$, but p' and m are instantiated at t' in $\mathbf{h}'$. Again, token physicalism compels us to say that m being instantiated at t *is just the same thing as* p being instantiated at t, and that m being instantiated at t' *is just the same thing as* p' being instantiated at t'. And again, there is something initially bizarre about the claim that the instantiation of the same mental property at different times/histories can be identical to *distinct* physical properties at those times/histories. That's why we call the combination of classical non-reductive physicalism and token physicalism '*anomalous* monism'. But just as many classical physicalists (justifiably) looked past the intuitive strangeness of this view in order to articulate a meaningfully physicalist view that accounts for multiple realisability, I argue that we should likewise be willing to countenance the analogous strangeness that arises from combining pseudo physicalism and token physicalism if the resultant view is sufficiently fruitful. I cannot see any principled and non question begging reason to allow for the possibility that the instantiation of a single mental state can be identical to the instantiations of two distinct physical states at different times/histories whilst refusing to countenance the possibility that the instantiation of a single physical state can be identical to the instantiations of two distinct mental physical states at different times/histories. The anomaly that arises from combining pseudo and token physicalism is no larger than the anomaly that arises from combining classical and token physicalism. Pesudo physicalists can be anomalous monists too.

Overall then, pseudo physicalism postulates a necessary lawlike synchronic metaphysical dependence of the mental on the physical in a manner that seems to be every bit as parsimonious and explicable as the supervenience based picture painted by the classical physicalist. And pseudo physicalism fares just as well as classical physicalism when it comes to identifying token mental events

[21] The fact that property dualism is in general logically consistent with token physicalism has already been noted by e.g. Stoljar (2001). However, it is important to show that the specific version of property dualism advocated here (pseudo physicalism) does not introduce any new commitments that make it incompatible with token physicalism.

with token physical evens. What's more, I will now go on to show that pseudo physicalism offers new avenues out of two of the most prominent objections to its classical counterpart.[22]

5 Causal Exclusion

It's well known that classical physicalism has problems accounting for the causal efficacy of mental properties. The best known demonstration of this fact is given by Kim's (1989, 2000, 2003, 2005) causal exclusion argument, which purports to show that classical physicalists are implicitly committed to the view that all mental properties are causally inert (unable to causally influence anything), and therefore epiphenomenal. There are a number of importantly distinct formulations of the exclusion argument in the literature, but the formulation I present here is broadly representative of several prominent extant formulations.

Assume classical physicalism as our first premise. Letting M and P denote the sets of possible mental and physical states of the world, respectively, this amounts to stipulating that M supervenes on P in the sense specified by Definitions 2.1/2.2. The second premise, known as the 'causal closure of the physical', states that the physical realm is causally closed, meaning that the optimal causal explanation of the instantiation of any physical property at a time refers only to the instantiation of physical properties at earlier times. If one knows the full physical history of the world up until the moment at which the physical property is instantiated, then one knows everything there is to know about the causal influences that lead to the property being instantiated. Specifically, one does not need to go beyond the purview of physics by referencing the prior instantiation of non-physical (mental) properties in order to causally explain why a physical property is instantiated. Again, the proper formulation of the causal closure of the physical premise has been hotly debated, but the following formalisation clearly captures the core idea behind many extant formulations.

[22]Note that I have not yet said anything about how pseudo physicalism deals with the famous conceivability (see e.g. Chalmers (1996)) and knowledge (see e.g. Jackson (1996)) arguments, or the so called 'explanatory gap' that lurks behind them. It's actually easy to see that the pseudo physicalist has a much easier time than the classical physicalist when it comes to evading these objections, which is not at all surprising when one recalls that pseudo physicalism is a nominally dualist theory in the sense that it allows for physical duplicate worlds to differ in their mental properties. This means that the pseudo physicalist has no problem accounting for the (alleged) possibility of zombies, or the idea that one can still learn something about the state of the world at a time when one has full knowledge of the laws of nature and the physical state at that time. See the comparison of pseudo physicalism to naturalistic dualism in Section 7 for further discussion.

CCP (Causal Closure of the Physical:) For any times $t_1, t_2 \in T$ with $t_1 < t_2$, the physical state at time t_1 screens off the physical state at time t_2 from the mental state at time t_1 relative to the objective chance function Ch, regardless of what else we assume about the history of the world. In other words, the physical state at t_2 is conditionally independent of the mental state at t_1 given any specification of the physical state at t_1 and any further stipulations about the actual history that are compatible with that specification. Formally, for any $p, p' \in P$, any $m \in M$ and any X that is metaphysically consistent with $< p \wedge m, t_1 >$, $Ch(< p', t_2 > | X \wedge < p, t_1 >) = Ch(< p', t_2 > | X \wedge < p \wedge m, t_1 >)$.

The intuitive content of this formalisation of CCP is as follows. If CCP is satisfied, then, from the perspective of the initial time, and regardless of what we assume about the actual history, which physical state is instantiated at a future time t_2 is independent of which mental state is instantiated at an earlier intermediary time t_1 once we hold fixed which physical state is instantiated at t_1. This means that, if we hold fixed the full physical history up until t_2, then additionally stipulating facts about the mental history before t_2 won't make a difference to the chances with respect to which physical state is instantiated at t_2. I take this to be a faithful interpretation of the claim that, holding fixed the physical state at a time, varying the mental state at that time can't causally influence the physical state at later times, which is a representative informal statement of the causal closure of the physical premise.[23] Interestingly, it actually turns out that CCP is a logical consequence of classical physicalism, even though the causal closure of the physical is often presented as an independent premise in most extant formulations of the causal exclusion argument. To see this, let M supervene on P, as required by classical physicalism, and let p, p', m, t_1, t_2 and X be as in the statement of CCP. This means that X is consistent with $< m \wedge p, t_1 >$, which in turns entails that there is a history where $< m \wedge p, t_1 >$ is true. Since M supervenes on P, this means that $< m \wedge p, t_1 >$ is equivalent to $< p, t_1 >$,[24] which in turn ensures that $Ch(< p', t_2 > | X \wedge < p, t_1 >) = Ch(< p', t_2 > | X \wedge < p \wedge m, t_1 >)$, and shows that satisfaction of CCP is guaranteed by classical physicalism. Since the version of CCP stated

[23] It is worth noting that CCP is trivially satisfied in the case where we assume that the physical history of the world is locally deterministic (in the sense specified in Section 6), since in that case earlier physical states fully determine all later physical states, which of course leaves no room for any further specification of earlier mental states to make a difference to the subsequent physical history of the world.

[24] In the sense that they are true in all the same possible histories.

above follows directly from classical physicalism, we don't actually need to assume it as an extra premise in order to see how classical physicalism runs into problems with mental causation. This observation chimes with recent analyses of the exclusion argument that have also concluded that the causal closure of the physical principle is superfluous to causal exclusion arguments (see e.g. Gebharter (2017), Stern and Eva (forthcoming)). As well as entailing CCP, classical physicalism also entails the following result.

Proposition 1 *If classical physicalism is true, then for any times $t_1, t_2 \in T$ with $t_1 < t_2$, the physical state at time t_1 screens off the mental state at time t_2 from the mental state at time t_1 relative to the initial chance function Ch, regardless of what else we assume about the history of the world. In other words, the mental state at t_2 is conditionally independent of the mental state at t_1 given any specification of the physical state at t_1 and any further stipulations about the actual history that are compatible with that specification. Formally, for any $p \in P$, any $m, m' \in M$ and any X that is metaphysically consistent with $< p \wedge m, t_1 >$, $Ch(< m', t_2 > | X \wedge < p, t_1 >) = Ch(< m', t_2 > | X \wedge < p \wedge m, t_1 >)$.*

Proposition 1 establishes the following. If the mental supervenes on the physical, then earlier physical states screen off later mental states from earlier mental states. In other words, classical physicalism entails that specifying the physical history up until a time not only renders the prior mental history irrelevant to which physical state is instantiated at that time, but also renders the prior mental history irrelevant to which *mental state* is instantiated at that time. This means that once we hold fixed the physical history up until a time, the mental history preceding that time can't have any causal influence whatsoever on either the mental or the physical state of the world at that time. If that's the case, then mental properties don't do any meaningful causal work at any level. Once we know the physical state at a time, specifying the mental state at that time can't have any causal influence on the state of the world at any later time, be it physical or mental. So classical physicalism leaves no room for mental properties to have any causal efficacy at any level of description. Of course, this flies in the face of our everyday experience, which tells us that mental properties can and do play a meaningful causal role in the world. So classical physicalism, it seems, has a hard time accounting for the apparent reality of mental causation.

What about pseudo physicalism? The first thing to note is that pseudo physicalism does not entail CCP or any analogue of Proposition 1. It's straightforward to construct examples of sets of possible histories and initial chance functions for which the mental chancily covaries with the physical, but for which CCP is violated, and for which earlier mental properties can make a difference to later mental properties, even when we hold fixed the earlier physical state. So while classical physicalism immediately entails that mental properties can't causally affect anything at either the physical or the mental level, pseudo physicalism has no such implications.

This looks like a triumph for pseudo physicalism, since, unlike classical physicalism, pseudo physicalism is in perfect harmony with our everyday experience of mental causation. However, the classical physicalist might argue that, regardless of whether earlier mental states can causally influence later mental states once the earlier physical state is held fixed, it definitely should not be possible for earlier mental states to causally influence later *physical* states once the earlier physical state has been held fixed. That is to say, the classical physicalist can insist that CCP should be satisfied (see e.g. Papineau (2001) for a survey of reasons for believing that the physical realm is causally closed). Since CCP follows directly from classical physicalism, but not from pseudo physicalism, the classical physicalist might understandably view the whole situation as a victory for their view. But that would be premature.

Although pseudo physicalism doesn't entail CCP, it is perfectly consistent with it. So the classical physicalist can't use CCP to decide the debate in their favour. Certainly, the fact that classical physicalism directly entails CCP will count in favour of that theory for those that take the causal closure of the physical as a non-negotiable premise. But the pseudo physicalist can simply add CCP to their theory as an additional postulate. And while this may not be particularly elegant (and may even appear ad hoc to some), these primarily aesthetic considerations are easily outweighed by the observation that even when we add CCP to pseudo physicalism as an additional postulate, the theory is still able to account for the causal efficacy of the mental (unlike classical physicalism, which straightforwardly entails the inefficacy of the mental at all levels). In particular, we have the following result.

Proposition 2 *The conjunction of pseudo physicalism and CCP is consistent with earlier mental*

states making a difference to the chances of later mental states, even when we hold fixed the earlier physical history. Formally, even if we assume that M chancily covaries with P and CCP is satisfied, there can exist times $t_1, t_2 \in T$ with $t_1 < t_2$, and states $p \in P$ and $m, m' \in M$ such that $Ch(< m', t_2 > | < p, t_1 >) \neq Ch(< m', t_2 > | < p \wedge m, t_1 >)$.

Informally, Proposition 2 shows that pseudo physicalism allows the mental history of the world before time t to causally influence the subsequent mental history from t onwards, even when we hold fixed the physical history up until t and assume the satisfaction of CCP (which amounts to assuming that the mental history before t can't influence the physical state at t once we hold fixed the physical history before t). So the pseudo physicalist, unlike the classical physicalist, can consistently acknowledge the causal closure of the physical, whilst also allowing for the possibility that mental properties can be causally efficacious in the sense that earlier mental states can influence later mental states, even when the relevant part of the physical history is held fixed. [25]

When it comes to accounting for mental causation, pseudo physicalists have at least two options. Firstly, they can choose to respect both the causal closure of the physical and the causal efficacy of the mental (via mental-mental causation). Secondly, they can choose to reject the causal closure of the physical and allow for both mental-mental and mental-physical 'downward' causation. Neither of these options are open to the classical physicalist, who is logically compelled to embrace the causal closure of the physical whilst denying that mental properties can have any causal efficacy at all. Overall, pseudo physicalism has a much easier time than its classical counterpart when it comes to respecting the facts of mental causation.

[25] A small caveat is necessary here. Kim (1985, 2001) has also developed some influential arguments purporting to demonstrate that mental causation is inconsistent with various forms of dualism (as well as anomalous monism). While space constraints prevent me from addressing these arguments here, it is worth noting that the observations outlined in this section are sufficient to establish the consistency of pseudo physicalism with mental causation if one adopts generic probability raising conception of causation. For, proposition 2 shows that one can consistently claim that (i) the mental chancily covaries with the physical, (ii) the physical is causally complete, and (iii) earlier mental states can affect the chance of later mental states, even when we hold fixed the earlier physical state. So any argument that purports to demonstrate the incompatibility of mental causation with pseudo physicalism will, at the very least, have to show that the relevant kind of probability raising is not sufficient for causation.

6 Free Will

It is commonly and famously argued that if we combine classical physicalism with determinism about the physical world, then we inevitably end up with determinism about the mental world, a conclusion that many take to be incompatible with the apparent freedom of the human will. In short, classical physicalists have a hard time believing in both determinism about the physical world and the freedom of the will. Here, I'll briefly note that pseudo physicalists have a much easier time advocating for the conjunction of those two popular positions.[26] I begin by formalising two natural understandings of what it means for the physical (mental) world to be deterministic.

Definition 6.1 *Say that the physical (mental) world is globally deterministic if any two histories that agree on both the mental and physical states at any time t also agree on the physical (mental) state at all subsequent times $t' > t$. Formally, the physical world is globally deterministic if and only if*

$$(\forall \mathbf{h}_1, \mathbf{h}_2 \in \mathbf{H})(\forall t \in T)(\forall t' > t)(\forall p_1, p_2 \in P)(\forall m \in M)(((\mathbf{h}_1 \models < p_1 \wedge m, t >) \wedge (\mathbf{h}_2 \models < p_1 \wedge m, t >)) \supset ((\mathbf{h}_1 \models < p_2, t' >) \equiv (\mathbf{h}_2 \models < p_2, t' >))$$

and the mental world is globally deterministic if and only if

$$(\forall \mathbf{h}_1, \mathbf{h}_2 \in \mathbf{H})(\forall t \in T)(\forall t' > t)(\forall p \in P)(\forall m_1, m_2 \in M)(((\mathbf{h}_1 \models < p \wedge m_1, t >) \wedge (\mathbf{h}_2 \models < p \wedge m_1, t >)) \supset ((\mathbf{h}_1 \models < m_2, t' >) \equiv (\mathbf{h}_2 \models < m_2, t' >))$$

Intuitively, global determinism of the physical (mental) world means that a full specification of the state of the world (at every level) at any time fixes the physical (mental) state of the world at all subsequent times. If two histories agree on both the physical and mental states at a time, then they have to agree on the physical (mental) states at all subsequent times.

Definition 6.2 *Say that the physical (mental) world is locally deterministic if any two histories that agree on the physical (mental) state at any time t also agree on the physical (mental) state at all subsequent times $t' > t$. Formally, the physical world is locally deterministic if and only if*

[26] I stress here that the point I am making concerns only the logical compatibility of determinism about the physical world with different approaches to the mind body problem. I do not assume anything about the prior plausibility of physical determinism.

$$(\forall \mathbf{h}_1, \mathbf{h}_2 \in \mathbf{H})(\forall t \in T)(\forall t' > t)(\forall p_1, p_2 \in P)(((h_1 \models < p_1, t >) \wedge (h_2 \models < p_1, t >)) \supset ((h_1 \models < p_2, t' >) \equiv (h_2 \models < p_2, t' >))$$

and the mental world is locally deterministic if and only if

$$(\forall \mathbf{h}_1, \mathbf{h}_2 \in \mathbf{H})(\forall t \in T)(\forall t' > t)(\forall m_1, m_2 \in M)(((h_1 \models < m_1, t >) \wedge (h_2 \models < m_1, t >)) \supset ((h_1 \models < m_2, t' >) \equiv (h_2 \models < m_2, t' >))$$

If the physical (mental) world is locally deterministic, then a full specification of the physical (mental) state of the world at a time fixes the physical (mental) state at all subsequent times. If two histories agree on the physical (mental) state at a time, then they have to agree about the physical (mental) state at all subsequent times. Note that local determinism of the physical (mental) world entails global determinism, but not vice-versa. Global physical (mental) determinism encodes the requirement that the *full* state of the world at any moment fully determine the subsequent physical (mental) state at all subsequent moments. Local physical (mental) determinism encodes the even stronger requirement that the physical (mental) state *alone* determines the subsequent physical (mental) state at all later times. I will now employ these definitions to explore the sense in which classical physicalism and determinism about the physical world jointly entail determinism about the mental world.

Towards this end, suppose classical physicalism and global determinism about the physical world. Global determinism about the physical world tells us that fully specifying the (physical and mental) state of the world at a time t predetermines the physical state of the world at all subsequent times $t' > t$. Choose an arbitrary time t and $h \in \mathbf{H}$, and let $\mathbf{h}_1, \mathbf{h}_2 \models < p_1 \wedge m_1, t >$. Now take an arbitrary $t' > t$ and arbitrary $m_2 \in M$. Let p_2 be any physical state that realises m_2 in the sense required by classical physicalism. By global determinism about the physical world, $(\mathbf{h}_1 \models < p_2, t' >) \equiv (\mathbf{h}_2 \models < p_2, t' >)$. Since this is true for every physical state that realises m_2, it follows that $(\mathbf{h}_1 \models < m_2, t' >) \equiv (\mathbf{h}_2 \models < m_2, t' >)$. This establishes that the mental world is globally deterministic, as desired. So classical physicalism, combined with global determinism about the physical world, entails global physicalism about the mental world.

In contrast, it's not too hard to see that local determinism about the physical world and classical physicalism do *not* jointly entail local determinism about the mental world. To see this, imagine a

world with only two times $t_1, t_2 \in T$, two possible histories, $\mathbf{h}_1, \mathbf{h}_2 \in \mathbf{H}$, and three physical states $p_1, p_2, p_3 \in P$, where p_1, p_2 both realise the mental state m_1 and p_3 realises the mental state m_2. Suppose the histories are specified as follows.

$$\mathbf{h}_1 \models < p_1 \wedge m_1, t_1 > \wedge < p_1 \wedge m_1, t_2 >$$
$$\mathbf{h}_2 \models < p_2 \wedge m_1, t_1 > \wedge < p_3 \wedge m_2, t_2 >$$

By construction, this toy setup (trivially) satisfies classical physicalism and local determinism of the physical world, but it violates local determinism of the mental world since the two possible histories agree on the mental state at t_1, but disagree about the mental state at t_2.

Overall then, it is true that classical physicalism combined with determinism about the physical world entails determinism about the mental world, *but only if we are talking about global rather than local determinism.* What does this mean for the compatibility of classical physicalism and determinism with free will? That depends on whether one thinks that free will is incompatible with both local and global determinism about the mental world, or that it is incompatible only with the stronger local version of determinism about the mental world.[27] As it turns out, discussions of incompatibilism about free will have tended to ignore the distinction between local and global versions of determinism about the mental world. One notable recent exception is List (2014), who argues for the compatibility of determinism and free will in a classical physicalist setting using a notion of 'agential possibility' that is closely related to the definition of local determinism given above. Similarly, List and Pivato (2015) argue for the compatibility of higher level indeterminism and lower level determinism (where the higher level is taken to supervene on the lower level) by employing a distinctively local notion of determinism. What I take to be the main idea behind these analyses is that since local determinism about the physical world doesn't entail local determinism about the mental world (even assuming the supervenience of the mental on the physical), local determinism is compatible with free will on the classical physicalist picture. Implicit in this contention is the idea that free will is incompatible only with local determinism about the mental world. At first blush, this seems like a reasonable idea. If my present mental state is compatible with multiple later mental states, then it seems that there is room for my free choice to make a difference to the course of my mental life. But on closer

[27] I take it as given that anybody who advocates for the incompatibility of free will with determinism takes free will to be incompatible with at least one of local and global determinism about the mental world.

inspection, I find this line of thought unconvincing, since global determinism about the mental world seems to be sufficient to preclude the possibility of any meaningful free choice. If the mental world is globally deterministic, then the mental state at a time is fully determined by a specification of the full (mental and physical) state of the world at any earlier time. So all of your mental life and choices are predetermined, although they may not be determined by the prior mental history alone. The physical history may also be needed in order to ensure full determination. But why should it matter whether your mental life is fully determined by the prior mental history alone, or by the prior mental and physical histories combined? Surely all that matters when it comes to determining your freedom is *whether* your mental life is always predetermined. And global determinism ensures that it is, which, it seems to me, entails that global determinism about the mental world leaves no room for free will. I just can't see why the *manner* in which one's mental life is predetermined should make any difference to the possibility of free will, once we grant that the mental life *is* predetermined.

If the reader agrees with me that even global determinism about the mental world seems to be incompatible with free will, then it will be completely clear why the classical physicalist has problems accepting both determinism about the physical world and the possibility of free will. For, local determinism entails global determinism, which means that both local and global deterministsabout the physical world are committed to global determinism about the physical world, and, assuming classical physicalism, global determinism about the physical world entails global determinism about the mental world, which seems to be incompatible with free will. So the classical physicalist has a lot of work to do if they want to consistently advocate both for some form of determinism about the physical world and for the possibility of meaningful free will.

Does the pseudo dualist confront the same issue? It's easy to see that they don't. Suppose pseudo physicalism and local determinism about the physical world, and let $p \in P, m \in M$ be such that for any $t \in T$, $Ch(< m, t > | < p, t >) = \frac{1}{2}$. Let $p' \in P, m' \in M, t' < t \in T$ be such that $< p' \wedge m', t' >$ predetermines $< p, t >$ (we know that such states and times must exist, by local determinism of the physical). This entails that $< p' \wedge m', t' >$ is metaphysically consistent with $< p, t >$, and hence that $Ch(< m, t > | < p, t > \wedge < p' \wedge m', t' >) = \frac{1}{2}$. This implies that there are some histories that satisfy $< p \wedge m, t > \wedge < p' \wedge m', t' >$ and some that satisfy $< p \wedge \neg m, t > \wedge < p' \wedge m', t' >$, which means that the mental state at t is not predetermined by the full state at time t', and hence

that the mental world is not globally deterministic. So even local determinism about the physical world does not entail global determinism about the mental world if we replace classical physicalism with pseudo physicalism. So the pseudo physicalist can consistently embrace any kind of determinism about the physical world whilst also rejecting any kind of determinism about the mental world, and advocating for the possibility of meaningful free will. In contrast, the classical physicalist is committed to global determinism about the mental as soon as they countenance any form of determinism about the physical world, and that leads them straight to the denial of free will. Of course, the extent to which all this counts as a genuine theoretical virtue for pseudo physicalism will depend largely on one's prior credences in determinism about the physical world and the possibility of meaningful free will, but given the great controversy that the relation between free will and determinism continues to generate, I take it that many readers will consider this to be a property of no small significance.

7 Pseudo Physicalism and Naturalistic Dualism

Before concluding, it will be instructive to briefly compare the pseudo physicalist theory expounded here to a a prominent extant version of dualism from the literature, namely Chalmers' 'naturalistic dualism' (e.g. Chalmers (1996)). In order to articulate the central thesis of this view, it is necessary to distinguish between two species of supervenience relation that correspond to two distinct notions of possibility. Firstly, if we let **H** consist of all the *logically* possible histories and find that M supervenes on L relative to **H**, then we say that M *logically* supervenes on L. This means that there are no two logically possible histories that share the same L-properties but differ in terms of their H-properties. Secondly, if we interpret **H** as the set of all *naturally* possible histories (histories that are consistent with the actual laws of nature) and find that M supervenes on L relative to **H**, then we say that M *naturally* supervenes on L. This means that there are no two naturally possible histories that share the same L-properties but differ in terms of their H-properties. The core thesis of naturalistic dualism is that mental (or more precisely, phenomenal) properties do not logically supervene on physical properties, although they do naturally supervene on them. In essence, this means that naturalistic dualism is equivalent to classical non-reductive physicalism in the special case where **H** is taken to consist of all naturally possible histories (rather than consisting of all metaphysically or logically

possible histories). It says that, holding the actual laws of nature fixed, the mental supervenes on the physical. Naturalistic dualism is motivated both by the famous conceivability arguments against the logical supervenience of the mental on the physical, and by an underlying commitment to naturalism and the project of developing a rigorous scientific understanding of consciousness. There are a few important observations that one can make about the relationship of pseudo physicalism to naturalistic dualism.

Firstly, as I noted above, naturalistic dualism is essentially equivalent to classical physicalism in the special case where **H** is taken to consist of only the naturally possible histories. However, the naturalistic dualist will reject classical physicalism in the more general case where **H** is taken to consist of all logically possible histories. Now, just as one can distinguish between these two forms of classical non-reductive physicalism, one can likewise distinguish between 'logical pseudo physicalism' (pseudo physicalism in the case where **H** consists of all logically possible histories) and 'natural pseudo physicalism' (pseudo physicalism in the case where **H** consists of all naturally possible histories). Recall that the naturalistic dualist's main reasons for rejecting the logical version of classical physicalism came from conceivability arguments that seem to show that we can conceive of logically possible worlds that are exactly like ours in respect to their physical properties, but radically unlike ours in terms of their phenomenal properties. It's easy to see that arguments like these carry no weight against logical pseudo physicalism, since that theory is perfectly consistent with the existence of pairs of logically possible histories that share all of their physical properties but none of their mental properties. For, logical pseudo physicalism requires only that the physical facts synchronically determine the chances of mental facts in a particular manner, and this is perfectly consistent with physical duplicate histories instantiating radically different mental properties. What this means is that the pseudo physicalist does not necessarily have to qualify their view as holding only when we hold fixed the actual laws of nature. The pseudo physicalist can maintain that the dependence of the mental on the physical is a matter of metaphysical and even logical necessity without running into the conceivability arguments. In that sense, the pseudo-physicalist is actually able to posit a stronger dependence of the mental on the physical than the naturalistic dualist is.

Of course, there's another sense in which the dependence posited by the pseudo physicalist is importantly weaker than that posited by the naturalistic dualist. For, once we hold fixed the actual

laws of nature, the naturalistic dualist claims that mental properties supervene on physical properties, while the pseudo physicalist is happy to claim that mental properties only chancily covary with physical properties, even in this restricted modal context. In light of the discussion from Section 5, this entails that, once we hold fixed the actual laws of nature and only consider naturally possible worlds, the naturalistic dualist must conclude that mental properties are causally inert. In contrast, the pseudo physicalist can either (i) deny the causal closure of the physical whilst embracing the causal efficacy of the mental, or (ii) accept both the causal closure of the physical and the causal efficacy of the mental (whilst denying the possibility of downwards causation). Overall, restricting our attention to naturally possible worlds reveals that the weakness of the pseudo physicalist's position grants them more flexibility in accommodating mental causation.

In sum then, the pseudo physicalist's view can be both stronger and weaker than the naturalistic dualist's. It can be stronger in the sense that one can take the dependence of the mental on the physical posited by the pseudo physicalist to be logically necessary without running into conceivability arguments. But it's weaker in the sense that, once we hold fixed the actual laws of nature, it posits a weaker kind of dependence than naturalistic dualism, and this makes it more flexible when it comes to developing a strategy for dealing with the problems of mental causation. I won't say anything here about whether and how these observations affect the comparative plausibility of these two views, since doing so would take me further afield than I can practically go here. However, I do think that these observations make it clear that pseudo physicalism occupies an interesting and potentially rich position in logical space that is consistent with several of the key desiderata that motivate prominent formulations of both physicalist and dualist solutions to the mind body problem.

8 Conclusion

Let's sum up. In the first three sections, I introduced and explicated the relation of chancy covariance: a metaphysically and modally robust dependence relation that is both synchronic and indeterministic. I subsequently used this relation to define a new approach to the mind body problem, which I dubbed 'pseudo physicalism'. I argued that pseudo physicalism fares at least as well as classical non-reductive physicalism with respect to both a number of key theoretical virtues and its coherence with token

physicalism. In Sections 5 and 6, I showed that pseudo physicalism offers elegant new approaches to two of the most intractable problems for classical non-reductive physicalism: the causal exclusion problem and the problem of free will. Unlike the classical physicalist, the pseudo physicalist can simultaneously acknowledge that (i) the world's mental properties at a time necessarily depend on its physical properties at that time in a metaphysically robust manner, (ii) the physical realm is causally closed, and (iii) mental properties are causally efficacious. And unlike the classical physicalist, the pseudo physicalist can also consistently acknowledge that (i) the world's mental properties at a time necessarily depend on its physical properties at that time in a metaphysically robust manner, (ii) the physical world is locally deterministic, and (iii) the mental world is not even globally deterministic. Finally, in Section 7, I showed that pseudo physicalism can be both stronger and weaker than naturalistic dualism: stronger in the sense that one can take the dependence of the mental on the physical posited by pseudo physicalism to be a matter of metaphysical or even logical necessity without running into the conceivability arguments, and weaker in the sense that even when one holds the actual laws of nature fixed, pseudo physicalism allows for variation in mental properties without any corresponding variation in physical properties.

Overall then, pseudo physicalism represents a promising alternative for those philosophers that take the postulation of a robust synchronic metaphysical dependence of the mental on the physical to constitute a non-negotiable desideratum for any metaphysical theory of mind, but who are also seriously concerned by classical physicalism's apparent inability to deal with the causal exclusion and conceivability arguments, or its implications regarding the incompatibility of physical determinism and free will.

Of course, there is a lot still to be said. I have not said much about about whether and how pseudo physicalism can evade extant physicalist critiques of property dualism, although I did argue that pseudo physicalism seems to be roughly on a par with its classical counterpart when it comes to parsimony, empirical adequacy and the positing of brute metaphysical relations, and that pseudo physicalism coheres with token physicalism just as well as its classical counterpart. To satisfactorily address the relation of pseudo physicalism to all extant physicalist critiques of property dualism goes well beyond the scope of the present paper, where my main aim was to introduce pseudo physicalism and make the case for its serious consideration in the arena of possible responses to the mind body problem.

But the arguments put forward here make it clear that this is work that is worth doing. Pseudo physicalism is a real alternative to its classical counterpart, and it demonstrates that the exclusion problem, the conceivability problem and the apparent incompatibility of physical determinism and free will are not straightforward consequences of any view that posits a necessary synchronic metaphysical dependence of the mental on the physical. So pseudo physicalism, at the very least, has already taught us something important about the logical relationships between classical physicalism and some of its best known challenges. I suspect that it has more to teach us.

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Appendix

Proof of Proposition 1: Suppose classical physicalism. Take any times $t_1, t_2 \in T$ with $t_1 < t_2$, any $m', m \in M$, $p \in P$ and any X compatible with $< p \wedge m, t_1 >$. We need to show that $Ch(< m', t_2 > | X \wedge < p, t_1 >) = Ch(< m', t_2 > | X \wedge < p \wedge m, t_1 >)$. Since M supervenes on P, X being consistent with $< m \wedge p, t_1 >$ implies that $< p \wedge m, t_1 >$ is equivalent to $< p, t_1 >$, which

establishes the result.

Proof of Proposition 2: The following initial chance distribution establishes the truth of the Proposition if we assume that $T = \{t_i, t_1, t_2\}$, $P = \{p, p'\}$, and $M = \{m, m'\}$.

$< p, t_1 >$	$< p, t_2 >$	$< m, t_1 >$	$< m, t_2 >$	Ch
T	T	T	T	$\frac{1}{10}$
T	T	T	F	$\frac{1}{10}$
T	T	F	T	$\frac{1}{10}$
T	T	F	F	$\frac{1}{10}$
T	F	T	T	$\frac{1}{10}$
T	F	T	F	$\frac{2}{10}$
T	F	F	T	$\frac{2}{10}$
T	F	F	F	$\frac{1}{10}$
F	T	T	T	0
F	T	T	F	0
F	T	F	T	0
F	T	F	F	0
F	F	T	T	0
F	F	T	F	0
F	F	F	T	0
F	F	F	F	0