Taking Realization Seriously: No Cure for Epiphobia[*]

1. Non-reductive Physicalism, Realization and Mental Causation

The debate about mental causation is one is one of the most contentious issues in current philosophy of mind. On the one hand, it seems obvious that our mental states—our wishes, intentions, beliefs, fears, sensations, feelings etc.—can causally affect the course of the world: we raise our arm because we want to make a bid at an auction and believe we can do this by raising our arm, we go and see the doctor because we fear being sick, and we dial 911 because we've just witnessed an accident.

On the other hand, many philosophers succumb to what Fodor called 'epiphobia', the fear "that one is turning into an epiphenomenalist" (Fodor 1989, 137), because they cannot see how mental causation could be possible in a naturalistic world. The mental appears to be distinct from the physical—our intentions, beliefs, fears etc. may depend upon the neurophysiological processes in our brains, but at least from a first person point of view they seem to be something 'over and above' these processes, something not reducible to the merely physical. Yet, a scientific worldview apparently requires that the physical world is causally closed in the sense that physical effects can be fully accounted for without recourse to non-physical entities or forces. Since our bodies are part of the physical world, this also holds for the alleged bodily effects of our mental states (our raising of our arm, our going to the doctor, our dialing 911 etc.). But if it is always possible, at least in principle, to account for our behavior in purely physical terms, and if the mental is distinct from the physical, then,

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it seems, the mental does not contribute to the production of our behavior. There just seem to be 'no gaps' in the physical causal nexus that the mental could use to unfurl its own causal efficacy.

It is not clear exactly how to expand this line of reasoning into a watertight case against the possibility of mental causation, but in some form or other it has been a and perhaps the reason for epiphobia throughout the history of the philosophy of mind. It already convinced Thomas Huxley (1874) to denigrate the mental to an epiphenomenon, and more recently it was underlying Jaegwon Kim's supervenience argument.[1] Interestingly, Kim's argument is directed not only at dualist accounts of the mind, but also at non-reductive physicalism, a position whose declared aim it is to combine our self-conception as autonomous agents that are able to causally affect the course of the world with a naturalistic worldview.[2] According to non-reductive physicalism, mental properties are not identical to but only realized by physical (in particular: neurophysiological) properties. The non-identity is supposed to secure the ontological autonomy of mental properties, while the realization relation serves the twin goal of making them "naturalistically kosher" (Polger 2007, 233) and of making their causal efficacy compatible with the causal closure of the physical. The necessary connection

[1] See Kim (1992a) for the original version of the supervenience argument and Kim (1998), (2005), and (2009) for various caveats and elaborations.

[2] In AUTHOR (2006a, 2008) I argue that the supervenience argument fails as an argument against non-reductive physicalism because its central premise—the principle of exclusion according to which "[n]o single event can have more than one sufficient cause at any given time—unless it is a genuine case of causal overdetermination" (Kim 2005, 42)—can be defended only by presupposing a 'production conception of causation' (i.e., causation as transfer of momentum, energy or some other physical quantity) which is both implausible and rejected by the non-reductive physicalist.

between mental and physical properties expressed by the realization idiom, it is thought, alleviates any competition between the mental and the physical that might cause epiphobia. Dualism postulates two independent causes, and this is unattractive because it entails a strange coincidence of causes (like two assassins' simultaneously and independently hitting their victim lethally) and the redundancy of the putative causes (had one of the assassins not hit the victim, the other still would have). The realization relation is supposed to avoid this problem for the non-reductive physicalist: it ensures that the co-occurrence of a mental and a physical cause is not coincidental, but systematic, and shows why mental causes are not redundant (had the mental cause been absent, its physical realizer would have been absent as well).

Given that the realization relation plays such a crucial role for the non-reductive physicalist—it accounts for the ontological autonomy of mental properties, for their naturalistic 'kosherness' and for their causal efficacy in a causally closed physical world, despite their irreducibility—one should expect that quite a lot has been said about what precisely it means to say that one property realizes another. Strikingly, however, the exact nature of the realization relation has long been ignored. In his 1993 state of the art review for Mind, Terence Horgan observed correctly that the "notion of physical realization, which has been widely employed in philosophy of mind for some time, obviously deserves philosophical investigation in its own right", adding that "as yet this project remains to be undertaken in a systematic way" (Horgan 1993, 573, n. 20), and for the following decade his assessment remained correct. Only recently the insight has prevailed that a thorough defense of non-reductive physicalism is impossible without a better understanding of realization. If the realization relation is to secure the ontological autonomy of mental properties and to make their autonomy compatible with their ability to affect the course of the causally closed physical world, then one has to take it ontologically seriously. That is, one has to say exactly

what it means, ontologically, to say that one property realizes another (Gillett 2002, 2003; Melnyk 2003; Pereboom 2002; Polger 2007; Shoemaker 2001, 2003, 2007).

Given the recent interest in the ontological nature of the realization relation, I suggest to take a fresh look at the non-reductive physicalist's trouble with mental causation by asking whether a proper explication of the realization relation can help explain how physically realized mental properties can be causally efficacious in the causally closed physical world.

After a preliminary historical digression in section 2, section 3 discusses two traditional approaches to realization, shows why the non-reductive physicalist cannot solve the problem of mental causation unless she takes realization ontologically seriously. Section 4 sketches a couple of recent attempts to take realization ontologically seriously by characterizing it against the background of a causal theory of properties, and section 5 shows that they cannot help to solve the problem of mental causation. Taking realization ontologically seriously is laudable, and was overdue, but it is no cure for epiphobia.

2. Functionalism, Realization, and Multiple Realizability

The term 'realization' was introduced into the philosophy of mind in the context of Hilary Putnam's invention of machine functionalism, where Putnam argued that a "'Turing machine' is an abstract machine which may be physically realized in an almost infinite number of different ways" (Putnam 1960, 371). The realization idiom is by now well-entrenched, and it is customary to say that mental properties are realized by physical properties, no matter whether one accepts a functionalist conception of mental properties or not. To prepare the ground for the discussion to follow, five brief remarks about functionalism and the notion realization are expedient.

(1.) Unless it is explicitly ruled out that mental properties can be realized by non-physical properties, functionalism is compatible with dualism (e.g., Baker 2009, 110–111).[3]

(2.) If functional properties are to be ontologically autonomous, they cannot be identical to physical properties. If naturalism is to be true, they cannot be non-physical properties in any ontologically dangerous sense either. The autonomy of functional properties is achieved by treating them as higher-order properties that are characterized in terms of their functional or causal role. If that role can be occupied by more than one physical property, the functional property is said to be multiply realizable, and this multiple realizability allegedly guarantees its irreducibility and hence autonomy (AUTHOR 2003, 2006b). The ontological 'innocence' of functional properties, in turn, is achieved by restricting the class of possible realizers to physical properties.

(3.) The causal efficacy of functional properties seems to be built already into their individuation conditions—to individuate a property in terms of its causal role just is to individuate it in terms of its (or its instantiations') typical causes and effects.

(4.) Since the non-reductive physicalist is not committed to a functionalist conception of mental properties, functionalism is only one brand of non-reductive physicalism. Non-reductive physicalists that reject functionalism cannot characterize realization as the relation that holds between a property characterized in terms of its causal role and the property that occupies this causal role and have to offer an alternative account of realization.[4]

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[3] Compare Putnam (1967, 436): "the functional-state hypothesis is not incompatible with dualism!"

[4] Some alternatives will be discussed in sections 3 and 4. Apart from functionalism, Donald Davidson's Anomalous Monism (Davidson 1970) is the second historically important version of non-reductive physicalism.

(5.) Since the realization relation is meant to secure the ontological autonomy of functional, or more generally: realized, properties, it is taken to be asymmetric, in contrast to the symmetric identity relation,[5] and this asymmetry is why realization and multiple realizability are often not clearly distinguished. However, realization and multiple realizability are different things, and arguably realization is conceptually prior (Polger 2007, 255 disagrees). Adequately understanding realization requires more than appreciating its asymmetric character, but once it is understood what it means that a property is realized by another property, it is also clear what it would mean for it to be realizable by still other properties. The unfortunate but ubiquitous intermingling of realization and multiple realizability is largely responsible for the fact that much ink has been spelled on the alleged multiple realizability of mental properties and its potential consequences for reductionism (e.g., Bickle 1998; Clapp 2001; Shapiro 2000, 2004), while the nature of the realization relation itself has been largely ignored until a few years ago Carl Gillett (2002, 2003), Andrew Melnyk (2003), Derk Pereboom (2002), Tom Polger (2007), or Sydney Shoemaker (2001, 2003, 2007) made realization a more fashionable topic. Their work will be the topic of section 4. Section 3 will discuss two classical conceptions of realization. The goal is to show that and why an ontologically light-minded approach is unable to do the work the non-reductive physicalist wants the notion of realization to do.

3. Realization as Occupying a Causal Role and as Explanatory Asymmetric Dependence

[5] To distinguish it from the also asymmetric causal relation, the realization relation is taken to be synchronic, not diachronic.

At the core of the realization idiom is the idea that realization is at least an asymmetric dependence relation between properties. Property P realizes property F only if the instantiation of P in a context u necessitates the instantiation of F in u, but not vice versa.[6] However, asymmetric necessitation is not sufficient for realization: the property is human asymmetrically necessitates the property has a lung, and the property is red asymmetrically necessitates the property is spatially extended, but is human and is red do not realize has a lung and is spatially extended, respectively—at least not in the sense in which physical properties are said to realize mental properties.

One way to transform asymmetric necessitation into a sufficient condition is based on the functionalist's idea that a functional property is a second-order property, i.e., the property of having a first-order property that occupies an appropriate causal role. Realization can be understood as the relation between a second-order property that is characterized in terms of its causal role and the first-order property that occupies that role in a given context: "One

[6] The context contains more than the time. Claiming that pain is realized in humans by c-fiber firings does not commit one to claiming that artificially stimulated c-fibers in a laboratory lead to pain experiences. It is only in the right context, i.e., given an appropriate structural embedding in a complex system (typically specified by a property's functional role), that the dependence expressed by the realization idiom holds. Shoemaker (1981) distinguishes between core realizers and total realizers: a core realizer is a physical property which together with other structural properties realizes a mental property (c-fiber firing could thus be a core realizer of pain), while the total realizer is a combination of the core realizer and these structural properties. Strictly speaking, when the realization relation is characterized as a dependence relation between a property and its realizer, 'realizer' thus always means 'total realizer'. In the text this fact is captured by the talk about contexts. For a more detailed discussion of the context-dependence of realization see Wilson (2001).

common view, often advanced by functionalists, says that a mental property is a 'higher-order property,' the property of having one or another of the first-order properties that satisfy a certain condition, and that realization is the relation the first-order properties satisfying that condition stand in to the higher-order property" (Shoemaker 2003, 1).

> Realization$_{func}$: Property P realizes property F iff F is individuated by causal role r and r is occupied in context u by an instantiation of P.

F's ontological autonomy allegedly follows from the fact that r cannot only be played by P, but also by other (physical) properties P′$_1$, …, P′$_n$. F's causal efficacy, it could be thought, is guaranteed by the fact that it is a functional property and as such individuated in terms of its causal role. However, the property that is supposed to play the causal role is precisely not the second-order property F, but its first-order physical realizer P (Block 1990). As Shoemaker (2001, 75–76) puts it:

> Being in pain, for example, is the higher-order property something has just in case it has some first-order property or other that plays a certain causal or functional role. But then whatever causal role we might be inclined to attribute to the mental property will be done by one or other of its first-order realizer properties. The first-order realizer properties will 'preempt' whatever causal role the mental property might be supposed to have.

This observation not only undermines the causal efficacy of functional properties but the coherence of functionalism in general: it is barely intelligible to say that functional properties

are properties characterized in terms of their causal role but that that which occupies that causal role is not the functional property but its physical realizer.[7]

A second way to transform asymmetric necessitation into a sufficient condition for realization is to add that the instantiation of the realizer property must explain the instantiation of the realized property:

> The usual conception is that e's being P realizes e's being F iff e is P and there is a strong connection of some sort between P and F. We propose to understand this connection as a necessary connection which is explanatory. The existence of an explanatory connection between two properties is stronger than the claim that $P \rightarrow F$ is physically necessary since not every physically necessary connection is explanatory. (Lepore and Loewer 1989, 179)

Lenny Clapp (2001, 112–113) proposes a similar suggestion as his "rough working definition" of realization:

> [A] property P of an object (or event o) realizes a property F of o if and only if (i) it is necessary that, if o instantiates P, then o instantiates F, and (ii) o's instantiating P in some metaphysical sense explains o's instantiating F …"[8]

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[7] $\text{Realization}_{\text{func}}$ has regained supporters in the more recent debate. Polger, for instance, argues that "[p]roperty/state instance P realizes property/state instance G iff P has the function $F_G(x)$" (Polger 2007, 251), and Larry Shapiro says that "[t]o say that a kind is multiply realizable is to say that there are different ways to bring about the function that defines the kind" (Shapiro 2000, 644; see also Shapiro 2004, 67). However, neither Polger nor Shapiro is interested in the problem of mental causation.

[8] The importance of such an explanatory element was also stressed by Horgan: "the sort of inter-level relation needed by the materialist … is not bare supervenience, but rather what I

Although this remains vague as long as the nature of the explanatory connection is left unspecified, it suggests the following account of the realization relation:

> Realization$_{expl}$: Property P realizes property F iff the instantiation of P by an object o in context u necessitates the instantiation of F by o in u, but not vice versa, and the instantiation of P by o in u explains the instantiation of F by o in u.

The problem with Realization$_{expl}$ is that it is (1.) inadequate as an explication of the realization relation and (2.) unable to dismantle the intuition of a competition between the mental and the physical that underlies the problem of mental causation.

(1.) Adding an explanatory element does not transform asymmetric necessitation into a sufficient condition for realization. The property is human asymmetrically necessitates the property has a lung, and that Paul is human explains why he has a lung, but is human still does not realizes has a lung in the sense pertinent to the philosophy of mind. Of course, one could try to avoid this difficulty by means of a stronger notion of explanation according to which Paul's being human does not explain why he has a lung. First, however, one would then like to hear more about the stronger notion of explanation in question. Second, and more importantly, albeit there is undoubtedly an explanatory aspect to the realization relation, the fact that the instantiation of the realizer property explains the instantiation of the realized property should follow from an adequate explication of the nature of the realization relation, rather than being built into the notion of realization by definition.

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hereby dub superdupervenience: viz., … supervenience that is robustly explainable in a materialistically explainable way …" (Horgan 1993, 566) and Kim: "to have a physical realization is to be physically grounded and explainable in terms of the processes at an underlying level" Kim (1992b, 328).

(2.) To be asymmetrically dependent upon a causally efficacious property is not necessary for a property's being causally efficacious (Menzies 1988, 555–556), and it is not sufficient either, because a causally efficacious property can asymmetrically necessitate a causally inefficacious property (as the failure of Kim's (1984a,b) account of 'supervenient causation' amply demonstrates). Even adding an explanatory element does not help: Although is human asymmetrically necessitates having a lung and Paul's being human explains why he has a lung, Paul's life and dignity are protected by law because he is a human being and not because he has a lung.

It is illustrative to see exactly why $\text{Realization}_{\text{func}}$ and $\text{Realization}_{\text{expl}}$ fail to provide an adequate solution to the problem of mental causation. According to both accounts the realized property F and its physical realizer P are ontologically distinct (after all, that secures the autonomy of the realized property). However, this immediately prompts the question how F could possibly be causally efficacious if everything that could be attributed F in a given context can also be attributed to P. Kim thinks his supervenience argument irrevocably establishes that the non-reductive physicalist's answer to this question can only be 'Not at all.' I disagree. There is no straightforward argument from a causal competition between the mental and the physical to epiphenomenalism (see note 2 and AUTHOR 2008). However, the question makes sense, and if the non-reductive physicalist maintains that the ontological autonomy of mental properties is compatible with their causal efficacy and the causal closure of the physical, she has to provide an answer—she has to explain how exactly it can be that an irreducible mental property can causally affect the course of the causally closed physical world. I do not want to rule out that she can provide such an explanation,[9] but she has to

[9] Influential attempts at answering this question include the appeal to explanatory considerations (Baker 1993; Jackson and Pettit 1990a,b), counterfactual connections (Lepore and Loewer 1987, 1989), or non-strict mentalistic laws (Fodor 1989; McLaughlin 1989), and

provide one. The appeal to an asymmetric explanatory dependence between the instantiations of P and F does not help, for as long as they are ontologically distinct, the intuitive competition between them remains, even if F depends upon and is explained by P.

The non-reductive physicalist apparently has to square the circle: in order for mental properties to be autonomous, they must be distinct from their physical realizers, but in order to alleviate the intuition of competition, the two may precisely not be distinct. In is here that the idea of realization unfurls its ontological potential, and where it can be seen why an ontologically austere approach to realization is unsatisfying. The realization relation must be understood in such a way that mental properties are on the one hand ontologically distinct from their realizers, but on the other hand tied so closely to their realizers that despite their distinctness the intuition of competition loses its appeal. What is needed is an account of the realization relation that shows why a realized property and its physical realizer are distinct enough for them to be two properties, but not distinct enough for them to compete with each other. Providing such an account requires addressing the ontology of properties: We must understand what properties are, why they are the kinds of things that can be said to realize each other, and why the realization relation has the ontological consequences just sketched: distinctness without competition. That is why ontologically austere conceptions like $\text{Realization}_{\text{func}}$ and $\text{Realization}_{\text{expl}}$ can neither foster an adequate understanding of the realization relation, nor provide us with a satisfying solution to the problem of mental causation.

4. Taking Realization Ontologically Seriously: Properties and Causal Powers

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Stephen Yablos's suggestion that mental properties are determinables of their physical realizers. Baker's approach is criticized in AUTHOR (2007a), Jackson and Pettit's in AUTHOR (2005), and Yablo's in AUTHOR (2007b).

One of the earliest attempts to spell out the realization relation in an ontologically serious way can be found in (Kim 1992b). There Kim argues that the idea that mental properties are realized by physical properties carries with it a certain ontological picture of mental properties: mental properties are dependent upon their physical realizers in the sense that "when we look at concrete reality there is nothing over and beyond instantiations of physical properties and relations, and that the instantiation on a given occasion of an appropriate physical property in the right contextual (often causal) setting simply counts as, or constitutes, an instantiation of a mental property on that occasion" (Kim 1992b, 313–314). To capture this fact, Kim formulates his 'Principle of Causal Inheritance' according to which a realized property F inherits its causal powers from the its physical realizer P in the sense that if an instantiation of P realizes an instantiation of F, then the causal powers of this instantiation of F are identical to the causal powers of this instantiation of P:

> Principle of Causal Inheritance: If mental property M is realized in a system at t in virtue of physical realization base P, the causal powers of this instance of M are identical with the causal powers of P. (Kim 1992b, 326; emphasis original)

Regarding the nature of the realization relation, this yields the following suggestion:

> Realization_K: Property P realizes property F only if an instantiation of F by an object o in context u has causal power c iff the instantiation of P by o in u has c.

Kim's aim is of course not to solve the problem of mental causation in a way that is acceptable to non-reductive physicalists, but, by identifying the causal powers of the instantiations of realized properties with the causal powers of the instantiations of their

realizers, to pave the way for local reductions of mental properties.[10] Nevertheless, Kim's account is illustrative for our current purpose, for the most of the recent work on the realization relation also uses the idea of causal powers to explicate the nature of the realization relation. Before we turn to these attempts, however, a couple of remarks about causal powers and properties are necessary.

Kim is assuming a causal theory of properties (Shoemaker 1980, 1998) according to which properties are individuated in terms of causal powers. Like many others, Kim frequently talks as if it were the properties themselves that have the causal powers, but this can at best be metaphorical: properties are just not the kind of entities that can have causal powers or be constituted by causal powers. It is objects, not properties, that have causal powers: Objects are bearers of causal powers in the sense that they can causally affect other objects—a knife has causal powers that enable it to cut meat, a pen has causal powers that enable it to stain a white sheet of paper etc. What is true is that objects have their causal powers in virtue of having properties—a knife can cut meat because it has a sharp metal blade, a pen can stain white paper because it contains colored ink etc. Hence, it is wrong to say that properties have causal powers. Rather, as it is often said, they bestow or confer causal powers to their bearers. But even that is misleading. First, to say that properties bestow or confer causal powers still suggests that properties have causal powers that they then bestow or confer to their bearers. Second, Shoemaker has argued persuasively that causal powers are (almost) always conditional causal powers. Conditional causal powers are causal powers an object has given appropriate circumstances, not causal powers an object has simpliciter, i.e.,

[10] It is hard to see how, given that an identity of causal powers is required, Realization_K can do justice to the fact that realization is an asymmetric relation and that the realizer properties are 'more basic' than the realized properties.

independent of the circumstances it is in. A knife does not cut meat per se, but only if the blade is hard and sharp enough, if the meat is not frozen, etc. As Shoemaker puts it:

> A thing has a conditional power if it is such that if it had certain properties it would have a certain power simpliciter, where those properties are not themselves sufficient to bestow that power simpliciter. … Some properties confer causal powers simpliciter all by themselves … But the more usual case is for the powers simpliciter of a thing to be determined jointly by a number of different properties of it … Saying what conditional powers a property confers specifies what contribution its instantiation can make to the powers simpliciter of the object in which it is instantiated. (Shoemaker 2001, 77)

Given this, one should say that a property contributes to the causal powers of its bearers, not that it bestows or confers causal powers to them. A bit more formally, this idea could be captured as follows:

> Contribution to Causal Powers: The instantiation of a property P by an object o in context u contributes to o's having causal power c iff (1.) the fact that o in u instantiates properties P, P'_1, …, P'_n is minimally sufficient for o's having c in u, and (2.) the fact that o in u instantiates P is necessary for o's having c in u.

According to the present conception, that properties are individuated in terms of causal powers means that they are individuated in terms of the causal powers of their bearers to which they contribute: F and G are the same property iff they contribute to the same causal powers of their bearers in all contexts, i.e., together with all possible combinations of other properties. As John Heil puts it: "If property A and property B affect, or would affect, the causal powers of objects in precisely the same way, then A and B are the selfsame property" (Heil 1999, 193).

Let us now have a closer look at various recent attempts to specify a non-reductive realization relation between properties in terms of causal powers. Shoemaker's (2001, 2003, 2007) so-called 'Subset Model of Realization' differs from Realization_K in two points. First, as said above Shoemaker talks about conditional causal powers, not about causal powers simpliciter. Second, Shoemaker only requires that the causal powers individuative of the realized property, i.e., the causal powers to which the instantiations of the realized property contribute, be a subset of the causal powers individuative of the realizer property:

> Suppose … that pain is a functional property, and that someone is in pain in virtue of instantiating a particular physical realization of pain, physical property P1. What makes P1 a realization of pain is that the conditional powers conferred by the instantiation of P1 include the conditional powers conferred by the instantiation of the property of being in pain. … In general, then, property X realizes property Y just in case the conditional powers bestowed by Y are a subset of the conditional powers bestowed by X … (Shoemaker 2001, 78)

The same idea can be found in Clapp (2001):

> P realizes Q if and only if (def.), where p and q are the sets of powers constituting P and Q, $q \subset p$. (Clapp 2001, 129)

If we ignore that Shoemaker talks as if properties (or their instantiations) conferred causal powers to their bearers and that Clapp thinks properties are constituted by causal powers, their account of the realization relation can be summarized as follows:

> $\text{Realization}_{S/C}$: Property P realizes property F iff for all (conditional) causal powers c_1, …, c_n of o, if the instantiation of F by an object o in context u contributes to $c_i \in \{c_1,$

…, c_n}, then the instantiation of P by o in u contributes to c_i, but not (necessarily) vice versa.[11]

Pereboom (2002) makes a similar suggestion. He rejects Kim's Principle of Causal Inheritance because a strict identity of causal powers would, he argues, undermine the ontological autonomy of the realized property.[12] Yet, he accepts a weaker principle of causal inheritance according to which the causal powers individuative of the realized property are constituted by the causal powers individuative of its realizer:

> The Weaker Causal Inheritance Principle: If mental property M is realized in a system at t in virtue of physical realization base P, the causal powers of this instance of M are wholly constituted by the causal powers of P. (Pereboom 2002, 504)

Ignoring again that Pereboom talks about the causal powers of properties (or their instantiations), this yields the following explication of the realization relation:

> Realization_P: Property P realizes property F only if for any causal power c of an object o to which the instantiation of F by o in context u contributes, c is in u constituted by the

[11] $\text{Realization}_{S/C}$ nicely illustrates what has been claimed on p. XXX. Here the explanatory connection between P and F is not stipulated by definition, but a result of the nature of the realization relation: that the causal powers individuative of F are a subset of the causal powers individuative of P explains why the instantiation of P by an object in a context explains the instantiation of F by that object in that context.

[12] Compare Pereboom (2002, 500): "But neither will a … token-identity thesis for these causal powers hold. For if it did, then the causal powers to which the psychological explanation refers would in the last analysis, in fact, be microphysical."

> causal powers $\underline{c'}_1$, …, $\underline{c'}_n$ of $\underline{o}$, and the instantiation of $\underline{P}$ by $\underline{o}$ in $\underline{u}$ contributes to $\underline{c'}_1$, …, $\underline{c'}_m$.[13]

Finally, Carl Gillett (2000, 2003) has argued that by insisting that the realized property and the realizer property be properties of the same individual, the accounts of realization discussed so far—he calls them 'flat' accounts—are unable to capture some central and uncontroversial cases of realization.[14] Instead, Gillett suggests a 'dimensioned' view of realization which explicitly allows that a realized property and its realizers are properties of different objects:

> Property/relation instance(s) $\underline{F}_1$–$\underline{F}_n$ realize an instance of a property $\underline{G}$, in an individual $\underline{s}$, if and only if $\underline{s}$ has powers that are individuative of an instance of $\underline{G}$ in virtue of the powers contributed by $\underline{F}_1$–$\underline{F}_n$ to $\underline{s}$ or $\underline{s}$'s constituent(s), but not vice versa. (Gillett 2003, 594)

Gillett does not require that the causal powers individuative of a realized property are identical to, a subset of, or constituted by the causal powers individuative of its realizers. For him it is essential that $\underline{s}$ has the causal powers individuative of the realized property $\underline{F}$ because ('in virtue of') $\underline{s}$ or $\underline{s}$'s mereological parts has/have the causal powers individuative of the realizer properties $\underline{P}_1$, …, $\underline{P}_n$:

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[13] Just like $\underline{\text{Realization}}_{S/C}$, $\underline{\text{Realization}}_{P}$ entails an explanatory connection: "on this view there will be a significant degree to which causal powers of higher-level tokens could be explained in terms of the causal powers of their microphysical constituents" (Pereboom 2002, 504).

[14] For instance, Gillett argues, the hardness of a diamond is realized by the (instantiations of the) properties of the atoms that constitute the diamond (Gillett 2003).

> $\underline{\text{Realization}}_{\underline{G}}$: Properties $\underline{P}_1, \ldots, \underline{P}_n$ realize property $\underline{F}$ iff $\underline{F}$ is a property of an object $\underline{o}$ individuated in terms of causal powers $\underline{c}_1, .., \underline{c}_m$, $\underline{P}_1, \ldots, \underline{P}_n$ are properties of $\underline{o}$ or of the mereological parts $\underline{o}_1, \ldots, \underline{o}_k$ of $\underline{o}$, the instantiations of $\underline{P}_1, \ldots, \underline{P}_n$ by $\underline{o}$ or by $\underline{o}_1, \ldots, \underline{o}_k$ in context $\underline{u}$ contribute to the causal powers $\underline{c'}_1, .., \underline{c'}_l$, and $\underline{o}$ has causal powers $\underline{c}_1, .., \underline{c}_m$ individuative of $\underline{F}$ because $\underline{o}$ or $\underline{o}_1, \ldots, \underline{o}_k$ has/have $\underline{c'}_1, .., \underline{c'}_l$.

These accounts of realization differ in the details, but they all take realization ontologically seriously in the sense that they acknowledge that the nature of the realization relation cannot be understood without understanding the nature of properties and consequently try to explicate the notion of realization against the background of a causal theory of properties according to which properties are individuated in terms of causal powers. Despite their differences they all try to accommodate the twin requirement mentioned at the send of section 3: On the one hand, they try to show why the realization relation preserves the ontological autonomy of realized properties—realized properties, according to $\underline{\text{Realization}}_{\underline{S/C}}$, $\underline{\text{Realization}}_{\underline{P}}$, and $\underline{\text{Realization}}_{\underline{G}}$, cannot be identified with their realizers because they are individuated by different sets of causal powers. On the other hand, they try to tie a realized property so closely to its realizer that despite their distinctness they cannot sensibly be said to compete with each other. Realizer properties turn out to be complex properties that contain the realized properties, more or less literally, as constituents, so these properties are not ontologically distinct in a way which would allow the intuition of a competition which traditionally gives rise to the problem of mental causation to arise. John Heil, in a discussion of Shoemaker's position, is very explicit about this:

> [W]e can see how realized properties could make their presence felt causally. Realized properties do not 'float above' their realizers in a way that would permit preemption or screening off by the realizers. (Heil 2003, 20)

Clapp writes:

> [T]he problems forcefully presented by Kim concerning causal and explanatory exclusion of mental properties by physical properties do not arise. … Just as there is no causal and/or explanatory competition between a whole and its parts, so there is no causal and/or explanatory competition between instances of mental properties and their physical realizors. (Clapp 2001, 133)

And although Pereboom does not say what exactly the relation of constitution between causal powers is supposed to amounts to,[15] he illustrates his case by means of the mereological part/whole relationship (Pereboom 2002, 503). On the one hand, just as a ship is not identical to the sum of its sails, planks, and masts etc., the instantiation of a realized property is ontologically autonomous and not identical to the instantiation of its realizer. On the other hand, a realized property and its realizer no more compete with each other than a ship competes with the sum of its parts for causal efficacy:

> Just as Kim claims that no competition … arises in the case of reduction and identity, I propose that no competition arises in the case of mere constitution … For if the token of a higher-level causal power is currently wholly constituted by a complex of microphysical causal powers, there are two sets of causal powers at work that are constituted from precisely the same stuff … (Pereboom 2002, 505)[16]

[15] He refers to Pereboom and Kornblith (1991, 131) who argued that "[t]he causal powers of a token of kind F are constituted of the causal powers of a token of kind G just in case the token of kind F has the causal powers it does in virtue of its being constituted of a token of kind G." However, the 'in virtue of' locution invoked here to elucidate the relation of constitution between causal powers is at least as unclear as the constitution idiom itself.

[16] See also Pereboom and Kornblith (1991, 143–144):

The accounts of realization discussed in this section do not try to solve the problem of mental causation by formulating sufficient conditions of causal efficacy that can be fulfilled by physically realized mental properties, like explanatory considerations, counterfactual connections, or non-strict mentalistic laws (see note 9). Rather, they try to nip the problem in the bud by explicating the realization relation in such a way that the intuition of competition that renders mental causation problematic does not even arise. Can epiphobia be cured so easily?

5. Taking Realization Ontologically Seriously: No Cure for Epiphobia

There are various reasons why the recent attempts to solve the problem of mental causation by means of an ontologically serious explication of the realization relation are unsatisfying.

(1.) Ultimately, the properties that are responsible for an object's having the causal powers it has are the physical realizer properties, not the realized properties. Once the physical properties of the objects in the world (and their relations) are fixed, the causal nexus of the world is fixed, too, while fixing the realized properties of the objects in the world (and their relations) leaves some causal relations unspecified. The causal powers individuative of realized properties may only partially overlap with the causal powers individuative of their realizers, they may be distinct, but determined by them, and the whole may not be identical to

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> [M]ental causal powers are wholly constituted of physical causal powers; they are neither identical to (nor are they necessary and sufficient for) them, nor wholly independent of them. The psychological explanation of an event does not compete with its physical counterpart because the mental causal powers referred to in the psychological explanation are wholly made up of the physical causal powers referred to in the physical explanation.

the sum of its parts, but nevertheless there is nothing more for the realized properties to do, causally speaking, once the physical properties of the objects in the world are fixed. This leads to two related problems.

(1a.) If realized properties contribute to the causal powers of their bearers, they do so only in a weak sense. Either they contribute only to those causal powers of their bearers to which their realizers also contribute (Realization$_{S/C}$), or they contribute to them only because ('in virtue of') their physical realizers contribute to other causal powers of the same object (Realization$_{P}$) or other objects (Realization$_{G}$).[17] Hence, it is already built into the accounts of realization discussed in section 4 that realized properties do not exert their own causal efficacy but are ridding 'piggyback' on their physical realizers.

Moreover, it seems that at least in the case of Realization$_{S/C}$ realized properties cannot even be said to contribute to the causal powers of their bearers. The instantiation of a property P by an object o in context u contributes to o's having causal powers c iff (1.) the fact that o in u instantiates properties P, P'_1, …, P'_n is minimally sufficient for o's having c in u, and (2.) the fact that o in u instantiates P is necessary for o's having c in u. The instantiation of a realized$_{S/C}$ property is not necessary for its bearer's having the causal powers it has because had it only had the realizer properties, it would have had the same causal powers.

One could object that it is unreasonable to expect realized properties not to ride piggyback on their physical realizers and just stipulate that in whatever weak sense realized

[17] The problem is most obvious in the case of Realization$_{S/C}$: If we insist that a realizer property and the property it realizes contribute to the same causal powers of their bearers, we are double-counting causal powers, so to speak. This is a major flaw in the metaphor of causal inheritance: If Paul inherits thousand bucks from his uncle, it is not that now each of them has thousand bucks, there is only a thousand bucks in total to distribute, and likewise for causal powers.

properties contribute to the causal powers of their bearers, this is what 'causal efficacy' means. Of course, 'causal efficacy' is a philosopher's term of art and different people can explicate that notion in different ways, but it seems that those who profess to have an interest in mental causation and therefore reject epiphenomenalism want more than piggyback causal efficacy. However, this is a contentious issue and intuitions may vary, so I'm not going to dwell upon this here.

(1b.) In what sense are realized properties ontologically autonomous, if they are, in a more or less strict sense, parts of the realizer properties? Maybe the causal powers individuative of a realized property are not individuative of any of their realizers, but is that sufficient to render them ontologically autonomous in any significant sense? It does not seem so because it is unclear whether an object that has a physical realizer property has, over and above that, also a realized property. Suppose that, as many would accept, the relation between determinables and their determinates, i.e., between a generic property like being red and its concrete manifestations, like being burgundy red or being fire red, is one of realization. Suppose a car, call it 'a' is red—burgundy red, to be precise—and weighs 1.000 pounds. If the realization relation secured the ontological autonomy of realized properties in any significant sense, then the statements

(1) a has two properties: the property of being burgundy red and the property of being red

and

(2) a has two properties: the property of being burgundy red and the property of weighing 1.000 pounds

should semantically be on a par. However, they are not. The sense in which a is both burgundy red and red is not the sense in which a is both burgundy red and weighing 1.000 pounds. The car has a color and a weight, but it does not have two colors.[18]

Hence, the accounts of realization discussed in section 4 do not seem to preserve the ontological autonomy of realized properties.[19] At the very least, they would owe us an explanation for why they think having a proprietary set of causal powers suffices for being ontologically autonomous in the sense that matters to the non-reductive physicalist.

(2.) $\text{Realization}_{S/C}$, Realization_{P}, and Realization_{G} presuppose that every property that can plausibly be said to be a realized property can be individuated in terms of causal powers. To my knowledge, it has never been asked by the proponents of these accounts whether mental properties can indeed be individuated in terms of causal powers. In fact, it seems that a significant class of mental properties cannot be so individuated. Functionalism has replaced the type identity theory amongst other things because it allowed for the possibility that creatures with a (radically?) different biological make-up (mammals, reptiles and mollusks, to take Putnam's (1967) example) that are in pain have, despite their differences, a property in

[18] Otherwise, the result would be an unacceptable inflation of properties: in addition to having a maximum speed of 130mph, the car would then also have the property of having a maximum speed of less than 140mph, the property of having a maximum speed of less than 150mph, the property of having a maximum speed of more than 130mph and so on.

[19] Clapp is very clear about this:

> [T]he definition [of realization stated above on p. XXX; AUTHOR] helps to clarify that NRP [non-reductive physicalism; AUTHOR] is incompatible with the metaphorical claim … that mental properties exist 'over and above' their realizors. According to the above well-motivated definition, multiply realized mental properties, though real and causally efficacious, are better thought of as parts of their physical realizors. (Clapp 2001, 132–133; see also Heil 1999, 194)

common, viz., the property of being in pain. Yet, to the very degree that the property of being in pain manifests itself differently in creatures of different species, or in different members in the same species, it evades a characterization in terms of a set of causal powers had by all and only the creatures that are in pain. Humans that are in pain wince and call the doctor, dogs that are in pain mewl and scratch themselves, and reptiles and mollusks that are in pain do something else instead. It is not for nothing that functionalism is often said to be plausible for intentional mental properties but implausible for phenomenal mental properties. Phenomenal mental properties just cannot be characterized in terms of their causal role, and that is the reason why they cannot be individuated in terms of the causal powers of their bearers to which they contribute. Then, however, if $\underline{\text{Realization}}_{S/C}$, $\underline{\text{Realization}}_{P}$, or $\underline{\text{Realization}}_{G}$ are correct, phenomenal mental properties cannot be realized properties.

(3.) Even if these problems could be overcome, $\underline{\text{Realization}}_{S/C}$, $\underline{\text{Realization}}_{P}$, and $\underline{\text{Realization}}_{G}$ would still fail to solve the problem of mental causation. Suppose it could be shown that mental properties, despite a significant sense of autonomy, are not ontologically distinct from their physical realizers in a way that would allow the intuition of competition to arise. Suppose, that is, it could be shown that realized properties do not 'float above' their realizers in a way that would permit preemption or screening off by the realizers, as Heil (2003, 20) puts it. In that case, one important obstacle on the way to a satisfying solution the problem of mental causation would be removed, for then Kim-style exclusion arguments against the causal efficacy of realized properties could no longer get off the ground. However, that alone is not sufficient. It is one thing to show that realized mental properties are not screened off or preempted by their physical realizers, but it is an entirely different thing to show that mental properties actually are causally efficacious. It is not that every property is by default causally efficacious and only fails to be causally efficacious if it is screened of by its

realizers. Maybe mental properties are not screened off by their realizers, but not causally efficacious either.

Solving the problem of mental causation not only requires that a necessary condition be fulfilled (mental properties may not be screened off by their realizers), but that a sufficient condition for causal efficacy be formulated which can actually be fulfilled by mental properties. One possibility would be to appeal to one of the well-known suggestions made by non-reductive physicalists earlier: explanatory considerations, counterfactual connections, or non-strict mentalistic laws etc. (see note 9). Another possibility, more salient in the present context, is suggested by the talk about causal 'inheritance' and would be to take the fact that mental properties are realized by physical properties not only as showing that they are not screened off, but as a sufficient condition: realized mental properties are causally efficacious in virtue of being realized by causally efficacious physical properties whose causal efficacy they inherit.

The problem is that it is simply not true that every property that is realized by a causally efficacious property is thereby ipso facto itself causally efficacious. Suppose Paul approaches a traffic light, sees that it is red, and slows down. That the traffic light is red undoubtedly plays a causal role for Paul's slowing down, and being red realizes being colored. But the fact that the traffic light is colored is irrelevant for Paul's slowing down, for if the traffic light had been colored, but green, Paul would not have slowed down.

At a more general level, the problem is the following: In some cases, in particular when the possibility of mental causation is at issue, we want that both a realized property and its realizer are causally efficacious, and here the idea that the realized property automatically inherits its realizer's causal efficacy would be helpful. In other cases, however, for instance in the traffic light case above, we do not want that both the realizer and the property it realizes are causally efficacious, and in those cases an automatic inheritance is detrimental. Stephen

Yablo, for instance, is very clear about this: He thinks that realized properties (determinables) are not screened off by their realizers (determinates), but he vigorously denies that realized properties automatically inherit their realizers' causal efficacy: "I am not saying that redness inherits causal relevance from scarlet; I am just denying that scarlet can deprive redness of causal relevance" (Yablo 1997, 275 n. 25). Yablo's reason resembles the traffic light example above:

> Imagine a glass which shatters if Ella sings at 70 decibels or more. Tonight, as it happens, she sang at 80 db, with predictable results. Although it was relevant to the glass's shattering that the volume was 80 db, it contributed nothing that it was under 90 db. Therefore, an efficacious determinate can have an irrelevant determinable. (Yablo 1992, 259 n. 32).

In fact, $\text{Realization}_{S/C}$ nicely illustrates why a causally otiose property can have a causally efficacious realizer. If the causal powers individuative of the realized property are a subset of the causal powers individuative of the realizer, then an inheritance of causal efficacy is plausible only if the causal powers that have de facto been operative in a given causal transaction are ones that not only the realizer but also the realized property contributes to, but not if they are ones which only the realizer, but not the realized property, contributes to.

A related reason why having a causally efficacious realizer is not sufficient for being causally efficacious and why the idea of causal inheritance is thus no solution to the problem of mental causation is the following. If one accepts that a causally efficacious property can realize more than one property, then it would be impossible, not as a matter of contingent fact, but by the very nature of the realization relation, that a causally efficacious and a causally otiose property could have the same realizer, and this seems to be false. For instance, Frank Jackson and Philip Pettit have argued that the thermal conductivity of metals is realized by properties of the free electrons that permeate the metal and that these same properties also

realize the metal's electrical conductivity, while the metal's thermal conductivity can be causally efficacious in cases where its electrical conductivity isn't, and vice versa:

> The categorical basis in metals of the different dispositional properties of electrical conductivity, thermal conductivity, ductility, metallic lustre and opacity is essentially the same, namely, the nature of the cloud of free electrons that permeates the metal. Nevertheless, the person who dies because she allows her aluminium ladder to touch power lines does not die because her ladder is a good conductor of heat, or because it is lustrous or ductile or highly opaque; she dies because her ladder is a good electrical conductor. Although one and the same property is the categorical basis of all these dispositions, out of these dispositions it is only being a good electrical conductor which is causally relevant to her death. (Jackson and Pettit 1990b, 204)

Cases where one and the same property (categorical basis) can realize various properties (dispositions) not all of which must be causally efficacious whenever one of them is provide additional support for the claim that the problem of mental causation cannot be solved merely by an appeal to the idea of causal inheritance, cached out in terms of $\text{Realization}_{S/C}$, Realization_{P}, or Realization_{G}.

To sum up: Even if the metaphorical talk about causal powers can be transformed into a theory about the nature of properties that can provide the background for an ontologically serious account of the realization relation, the non-reductive physicalist's trouble with mental causation will not vanish. First, it is unclear whether such an account can accommodate the intuition that mental properties are autonomous. Second, it is unclear that mental properties are the kind of property for which it is plausible to assume that they can be individuated in terms of causal powers. Third, a complete solution to the problem of mental not only requires that mental properties are not screened off by their realizers, but that sufficient conditions for causal efficacy be specified that can be fulfilled by mental properties, and as a sufficient

condition the idea that what makes a realized property causally efficacious is that it is realized by a causally efficacious physical property whose causal efficacy it inherits is inadequate.

6. Conclusion

I am not claiming that the non-reductive physicalist is irrevocably committed to epiphenomenalism. She can always argue that one of the other well-known candidates for a non-reductive account of mental causation, like explanatory considerations, counterfactual connections, or non-strict mentalistic laws can do the job. It is not my business here to pass a judgment on these attempts. My point here is only that although the recent interest in the ontological nature of the realization relation is laudable, it is a mistake to think that taking realization ontologically seriously can help us make a significant advance on the problem of mental causation. It is true that we must seek a detailed understanding of the realization relation if non-reductive physicalism is to have a chance. But explicating realization against the background of a causal theory of properties along the lines of $\underline{\text{Realization}}_{S/C}$, $\underline{\text{Realization}}_{P}$ or $\underline{\text{Realization}}_{G}$ does not explain how autonomous, physically realized mental properties can unfurl their own causal efficacy in a causally closed physical world. There is still enough breeding ground for epiphobia.[20]

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[20] In AUTHOR (2009a,b) I argue that perhaps this shows that there is no such thing as mental causation, and that maybe, just maybe, epiphenomenalism is not as absurd as is usually supposed.

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