

**STRONG EMERGENCE AS A DEFENSE OF
NON-REDUCTIVE PHYSICALISM
A PHYSICALIST METAPHYSICS FOR 'DOWNWARD'
DETERMINATION**

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Abstract

Jaegwon Kim, and others, have recently posed a powerful challenge to both emergentism and non-reductive physicalism by providing arguments that these positions are committed to an untenable combination of both 'upward' and 'downward' determination. In section 1, I illuminate how the nature of the realization relation underlies such skeptical arguments. However, in section 2, I suggest that such conclusions involve a confusion between the implications of physicalism and those of a related thesis in the 'Completeness of Physics' (CoP). I show that the truth of CoP poses a very serious obstacle to realized properties being efficacious in a physicalist universe and suggest that abandoning CoP offers hope for defending non-reductive physicalism. I then formulate a schema for a physicalist metaphysics, in section 3, which rejects CoP. This scenario is one where microphysical properties have a few conditional powers that they contribute to individuals when they realize certain properties. In such a situation, I argue, though physicalism holds true there is still plausibly both 'upward' and 'downward' determination, where the latter is crucially an under-appreciated form of determination I term 'non-causal'. Ultimately, I conclude that this metaphysical schema offers a coherent account of Strongly emergent properties that preserves the truth of NRP, albeit in a form that is purged of any commitment to CoP. Finally, in section 4, I carefully explore which of Kim's assumptions and arguments this metaphysics undermines.

The unresolved question on the agenda of nonreductive physicalism as well as emergentism is the question of whether the idea of

downward causation makes sense. The paradox, and perhaps also the appeal, of the emergentist conception of mental causation arises from the combination of two ideas, the idea that mentality emerges out of, and in that sense depends on, the physical, and the idea that, in spite of this ontological dependence, it begins to lead a causal life of its own, with a capacity to influence that which sustains its very existence — that is, a combination of “upward determination” and “downward determination” — most versions of nonreductive physicalism harbor the same two ideas, a hazardous combination that threatens the coherence of this popular approach to the mind-body problem (Kim (1992), pp 136–7)

Can there be ‘downward’ causation in a thoroughly physicalist world? Or, putting the question more precisely, is it logically coherent to defend a comprehensive ontological hierarchy, bottoming out in the entities of microphysics, and yet also claim that the realized properties in this hierarchy can still be causally efficacious? This is the worrying issue raised by Jaegwon Kim in our opening passage and I shall refer to the task of providing an affirmative answer to this question as ‘Kim’s Challenge’

It has come as a shock to defenders of non-reductive physicalism (NRP), perhaps the dominant position in much contemporary philosophy, to find Kim arguing that for their views to be logically coherent, then they too must successfully answer his Challenge. These mainstream philosophers are happy to deride emergentism, and its notions of downward causation, as less than intellectually respectable, or even downright ‘flaky’, whilst taking their own positions to face no such worries. However, in section 1, I shall argue that Kim is correct that, given its tenets, NRP is clearly committed to both a kind of downward causation and also to the intellectual burdens of what I term ‘Strong’ emergence. I shall clarify Kim’s Challenge using what I term the ‘Argument from Realization’ (AR) which I will show provides a *prima facie* reason to accept that only the entities of microphysics should be taken to be causally efficacious in a universe in which physicalism is true. This argument is grounded in the upward determination inherent in realization relations and we will see that it implies NRP should not be taken to be true.

However, my goal is not primarily negative and, in section 2, I will

explore whether arguments like AR involve a confusion between the implications of physicalism and those of a related thesis in the 'Completeness of Physics' (CoP), roughly the claim that all microphysical events are determined by other microphysical events. I will show that the truth of CoP poses a very serious obstacle to realized properties being efficacious in a physicalist universe and suggest that purging ourselves of a commitment to CoP offers hope for answering Kim's Challenge. Consequently, building upon this suggestion, in section 3, I will explore a schema for an apparently physicalist metaphysics which rejects CoP and promises to establish the coherence of both Strong emergence and NRP.

The scenario in question is one where microphysical properties have a few conditional powers that they contribute to individuals when they realize certain properties. In such a situation, CoP is clearly not true, but I will argue that it appears that physicalism does still hold true and that realized properties may be efficacious nonetheless. As we shall see, though physicalism holds true in this situation it still plausibly involves both 'upward' and 'downward' determination, where the latter is crucially an under-appreciated form of determination I term 'non-causal'. Such non-causal determination will be central to this novel metaphysics and I will explore at length how this type of determination may ease the problems of non-reductivism.

Ultimately, I will conclude that this metaphysical schema offers a coherent account of Strongly emergent properties that preserves the truth of NRP, albeit in a form that is purged of any commitment to CoP. This view, I will argue, promises to successfully answer Kim's Challenge and, in section 4, I will carefully explore which of Kim's assumptions and arguments this metaphysics undermines. I will also highlight the way in which the schema for Strong emergence, if it can be successfully outlined, would radically alter the shape of the philosophical debate and provide important new options for physicalists.

1. The Tenets of NRP, the Argument from Realization and Kim's Challenge

The metaphysical framework I shall use in my discussion is Shoemaker's "causal theory of properties" (1980). Under this account, a property is individuated by the causal powers it *potentially* contributes to the individuals in which it is instantiated ((1980), p. 114). For reasons that will become apparent below, I will be concerned with properties I term 'causally efficacious', that is properties whose instantiation *actually* determines the contribution of causal powers to an individual. I will employ 'entity' in a wide manner using it to refer to relations, properties, events, processes and individuals, and I shall use 'composition' in a similarly wide manner to refer to ontological relations such as realization or constitution. And I will take events to be the causal relata, though I shall often only refer to their properties for convenience.

Non-reductive physicalism is committed to the world being a compositional hierarchy bottoming-out in the entities of microphysics, but one where the higher level entities in this hierarchy may be metaphysically significant in their own right. Supervenience relations are now widely recognized as inadequate for framing physicalism (Horgan (1993) and Kim (1998)) and instead the realization relation is used. The first tenet of NRP, in physicalism (PHY), may therefore be stated thus:

(PHY) All individuals are constituted by, or identical to, physical individuals, and all properties are realized by, or identical to, physical properties.

The most recent forms of NRP have focussed in their second commitment on the idea that the 'metaphysical significance' of realized properties, for example mental properties, is that they are causally efficacious. Let us therefore call this second tenet 'Higher Causal Efficacy' (HCE).

(HCE) There are causally efficacious realized properties.

Given the nature of causal efficacy, HCE implies that realized properties determine the contribution of powers to individuals, whether

by directly contributing such powers or otherwise determining their contribution

As Kim notes in our opening passage, PHY and HCE are the bedrock of contemporary NRP. And we can quickly see why Kim has argued that NRP is committed to a form of emergence. This what I shall call 'Strong' emergence and is basically a property that is 'higher level' in being realized, but still causally efficacious despite its dependence upon realizer properties. For the last one hundred and fifty years a variety of emergentists have tried to show that Strong emergence is possible, with lesser and greater degrees of metaphysical insight and success.¹ We can easily frame a precise criterion for Strong emergence

(Strong Criterion) A property instance X, in an individual s, is Strongly emergent *only if* (A) X is a realized property instance and (B) X is causally efficacious²

We can see the connection between NRP and Strong emergence, for unless one can accept that some property satisfies the Strong Criterion then one will not be justified in accepting that both PHY and HCE ought to be held true together. I thus agree with Kim (1992) that establishing the possibility of a certain kind of emergence is deeply interwoven with project of vindicating NRP as a viable position.

We can also see why Kim argues NRP involves a commitment to "downward causation" and hence "downward determination." HCE takes realized properties to be causally efficacious and this implies that such properties play a role in determining the contribution of some power 'C' to an individual 's' in virtue of which some effect 'e' results. However, PHY implies that all properties and individuals are realized, and constituted, by microphysical entities and it appears that e will be a microphysical event, in the sense that it will necessarily involve a microphysical change. Thus, if HCE is true when PHY also holds, as NRP claims, then in this sense there will be "downward determination" and "downward causation." For if a realized property is causally efficacious, then this apparently implies that the realized property will determine powers are contributed to some individual that result in some microphysical effect.³ Any efficacious realized

property at a 'higher' level, if it is efficacious at all, must therefore apparently be involved in some 'downward' causal relation resulting in an effect at the 'lowest' microphysical level

Pointing out that NRP is committed to forms of downward causation, and to the obligations associated with emergence, does not necessarily pose any problems for NRP, perhaps the connection with NRP merely vindicates these notions! However, Kim outlines plausible concerns about NRP that arise from the "upward determination" that realization bring in its wake. In order to understand these worries we need to more carefully articulate the key notion of the realization of properties. Under the causal theory it is clear enough what the identity of properties consists in, but the nature of realization is less obvious. The root idea is that a realizer property "plays the causal role of" the property it realizes, but not vice versa. Thus realizer properties are such that the powers they contribute to individuals are those in virtue of which some individual has the powers individuating of the realized property. We can make the notion of realization more precise as follows

Property/relation instance(s) F_1 - F_n realize an instance of a property G , in an individual s , *if and only if* s has powers that are individuating of an instance of G in virtue of the powers contributed by F_1 - F_n to s or s 's constituent(s), but not vice versa ⁴

Realization is thus a notion of "upward" determination, for the realizer properties contribute powers that determine that the relevant individual has the powers individuating of the realized property. We should mark that this determination relation is not temporal in nature, since the upward determination involved in realization is instantaneous, and that it does not involve wholly distinct entities. It therefore appears that realization is not a species of causal determination, since the latter is both temporally extended and involves wholly distinct entities. Realization is an example of what we might term 'ontological' or 'non-causal' determination, like the relations between the individuals bearing the part-whole or constitution relation

Having a better grip upon the notion of realization we can now illuminate the concern underlying Kim's Challenge using what I take to be the most fundamental of Kim's arguments⁵ Recall that PHY implies that all properties are realized by, or identical to, microphysical properties Given this, a critic may argue that it is ontologically profligate to take any property to contribute causal powers, and hence to be causally efficacious, *in addition* to microphysical properties/relations For the critic points out that given the nature of the realization relation, and identity, we can account for *all* the causal powers of individuals simply using the contributions of powers by the microphysical properties of these individuals, or their constituents, rather than also as contributions from realized properties But we cannot account for all causal powers of individuals simply as contributions by realized properties If we assume that the causal powers of individuals are not overdetermined, then appealing to Occam's Razor the critic argues that we should accept the existence of no more casually efficacious properties than we need to account for the causal powers of individuals The proponent of this simple argument thus concludes that if PHY is true, then we should *only* accept that microphysical properties/relations are causally efficacious and hence should take HCE to be false Let us call this the 'Argument from Realization' (AR)⁶

Before we examine its wider implications, we should carefully mark that this type of argument does not merely apply to properties commonly taken to be realized, such as functional properties, but also undermines the so-called 'structural' properties (defined by Armstrong (1978)) that are identical to combinations of microphysical individuals, properties and relations This conclusion is unsurprising, for structural properties are not identical to any of their component microphysical properties/relations But what then is this relationship? Physics tells us that structural properties are not themselves ontologically fundamental and PHY thus implies fundamental microphysical properties/relations *realize* structural properties AR consequently implies that structural properties should also not be taken to be causally efficacious, for they too are realized properties⁷

AR provides a powerful *prima facie* critique of NRP, for it argues that when we take PHY to be true then we should not also endorse

HCE What AR illuminates is that realization relations provide a powerful reason to accept reductionism of a very specific kind. It may well be that multiple realization (Fodor (1974)) precludes classical Nagelian reduction (Nagel (1961)) based on derivational relations between laws. But realization does not protect the efficacy of realized properties from *metaphysical* reduction – in fact, AR illuminates a plausible reason to believe that realized properties should not be taken to be causally efficacious precisely because they are realized! Unsurprisingly given the connection we earlier noted between NRP and Strong emergence, AR thus implies that we should neither take Strong emergence to exist, nor take NRP to be true. Rather ironically, the long-time shield for the truth of NRP, in realization relations, apparently become a weapon that undermines this position once reductionism embraces metaphysics in the manner Kim highlights.

Kim's Challenge is underpinned by AR, but Kim also frames such concerns in a number of other ways and I want to explore a couple of these articulations to get a grip on Kim's underlying assumptions. For example, Kim consequently endorses what he calls the "Causal Inheritance Principle" which he states thus (where 'M' is a higher level property and 'P' a physical property)

(The Causal Inheritance Principle) If M is instantiated on a given occasion by being realized by P, the causal powers of *this instance of M* are identical to (or perhaps a subset of) the causal powers of P (Kim (1993a), p. 355)

The Principle is somewhat problematic in assuming what I have argued elsewhere is a flawed view of realization, but I will put those worries aside here.⁸ For the underlying point of the Principle is still correct even if the powers of realized/realizer properties are not always the same, as they often are not. For nonetheless all the powers individuating realized properties still result from the powers contributed by microphysical properties when PHY holds true. As the Principle's name implies, Kim presses the idea, underpinned by AR, that when PHY is true then all realized properties will merely *inherit* their powers through the upward determination involved in realiza-

tion As a result, it is implied that realized properties are a causally useless aristocratic class of property that rides upon the backs of the causal workers, in the microphysical properties that alone contribute causal powers

A corollary of the Principle and this underlying picture is that only the properties *contributing* powers should be taken to be efficacious This is what I shall call the 'Contributor Assumption' Consequently, since AR shows that PHY implies that only microphysical properties should be taken to contribute powers to individuals, we should only take such properties to be efficacious and hence must reject NRP For in a realizational hierarchy the powers contributed by the base properties determine all other powers On its face, this line of reasoning is very plausible and its underlying logic is again articulated in another important manner when Kim argues as follows

that mentality has emerged, on the emergentists view, must make a *genuinely new causal difference to the world* So the following summarizes the heart of the emergentist doctrine on mental causation *mentality must contribute genuinely new causal powers to the world — that is, it must have causal powers not had by any physical-biological properties, not even those from which it has emerged*

I submit that this is precisely the commitment of the [contemporary] nonreductive physicalists (Kim (1992), p 135 Original emphasis)

Here we see AR and the Contributor Assumption at work AR shows that realized properties should be taken to contribute no powers and the Contributor Assumption says that a property can be efficacious only if it contributes powers Thus we have an obvious conclusion mental, and other special science, properties can only be efficacious if they contribute their very own powers which 'dangle' free from the web of microphysical powers For if the causal power in question is embedded in the microphysical web, then AR shows us microphysical properties will suffice to account for this causal power! The truth of HCE, concludes this argument, must thus involve the rejection of PHY, since the realized property owning such a 'dangling' power would not be completely microphysically realized The argument thus concludes that what I will call the 'Dualistic Presumption' is

true — that the truth of HCE entails some form of dualism, involving a ‘spooky’ non-physical entity, whether an entelechy, or simply a non-physical power or force. Once again, this reasoning is like all the reasoning used to frame Kim’s Challenge. It presses the point that PHY and HCE should not both be taken to be true and hence that we should reject NRP, and notions of Strong emergence and downward causation.

2. Good CoP or Bad CoP? The Murky Implications of the Completeness of Physics

Unfortunately for defenders of NRP, we have seen that once one attends to the metaphysics of NRP and emergentism, then both positions are equally challenged by AR and related arguments. In response to AR, metaphysical reductionists like Kim counsel us to abandon HCE, whilst anti-physicalist philosophers, such as O’Connor (1994) or Humphreys (1997), suggest we reject PHY. However, both PHY and HCE are very well confirmed theses and it would clearly be preferable to accept both. Rather than having to make the painful choice of which thesis to give-up, I therefore propose to more carefully examine the argument, in AR, that putatively shows they should not both be held together. To this end, in the present section I will examine a distinct, but closely related, thesis to PHY in what I earlier termed the ‘Completeness of Physics’ (CoP). I will show that CoP generates grave problems for the truth of HCE and my hope is that philosophers may have confused the implications of CoP for those of PHY. If my suspicion is correct, then rejecting CoP may offer hope in showing that PHY and HCE can both be true, and hence that NRP may be coherent after all.

We may precisely frame CoP as follows

(Completeness of Physics) All microphysical events are determined, in so far as they are determined, by prior microphysical events and the laws of physics

We should first note that CoP is distinct from PHY and was not used in formulating AR. For while PHY makes a claim about the ontologi-

cal relations amongst all properties and individuals, CoP is concerned with the determination of microphysical events and most particularly with the nature of the laws involved in this CoP is intended to concern simple laws that directly refer only to microphysical entities and which are discovered by studying isolated systems of microphysical entities For instance, quantum mechanical theories are taken to supply such laws and CoP implies that these, and other, laws of physics suffice to determine all microphysical events, in so far as they are determined, whether these events are located in simple systems or complex aggregates We should consequently mark that PHY could apparently be true even if CoP were false Consider, for instance, a world where microphysical entities are governed by a complex patchwork of fundamental laws, some of which hold in simple systems and others which only hold in complex aggregates In such a world CoP is apparently false, but PHY is not obviously violated and I will shortly sketch a situation where this holds true

CoP is especially important because it subtly configures the projects and problems undertaken by many contemporary philosophers, whether as an explicit working assumption or often through its implicit grip upon their thinking It is therefore worthwhile to examine CoP's implications to appreciate that it considerably deepens the problems faced in answering AR For in order to block AR one must provide a metaphysical reason why instantiation of some realized property 'H' is necessary to account for the causal powers of some individual But if there were a causal power of the relevant kind, then one would need to posit the instantiation of the realized property H by some individual in order to account both for some causal power C and any microphysical event that results from an individual having C Once again, assuming the non-existence of overdetermination of causal powers, if we had a successful response to AR, then the microphysical would *not* be causally complete For not all microphysical events would be determined, in so far as they are determined, solely by prior microphysical events, since H would be a determinant of some such events Though quick, I suggest that this shows the truth of CoP is inconsistent with satisfaction of the Strong Criterion and hence provides an obstacle to the existence of realized properties that are efficacious

How does CoP generate such difficulties? I contend that it does so by embodying a very particular, and crucially unexamined, view of microphysical properties. Recall that CoP implies that the same simple set of laws, only directly referring to microphysical entities and which governs simple systems, suffices to determine the causal behaviors of microphysical properties whether they are instantiated in simple systems or complex aggregates. In essence, this assumes that the contributions of causal powers by microphysical properties are captured by such laws and are hence everywhere the same. By its nature, CoP thus promotes the twin ideas that (a) the microphysical properties are *homogeneous* in their contributions of causal powers across all conditions and (b) such contributions of powers are determined, in so far as they are determined, only by other microphysical properties. As a result, CoP implies the contributions of causal powers by microphysical properties is a determinative monopoly, where only microphysical properties have any role in determining the powers contributed by any microphysical property.

But if PHY is also true, then as we have seen *all* the causal powers of *all* properties result from the powers contributed to individuals by microphysical properties. When CoP and PHY are true together, then it appears that *only* microphysical properties can play any role in determining the contributions of powers to individuals. The combination of CoP and PHY thus extinguishes all hope of realized properties playing any determinative, and hence causal, role. When CoP is true in addition to PHY, it thus certainly is the case that the upward determination involved in realization conflicts with any form of downward determination. For CoP *by itself* implies a determinative monopoly with regard to the contribution of powers by the fundamental microphysical properties and thus consequently leaves no space for any determinative role for realized properties in a physicalist world.

These conclusions make our work in illuminating CoP's troubling implications more than worthwhile, for they support the hopeful idea I mooted earlier. Although AR actually only uses PHY as a premise, have philosophers wrongly implicitly imported CoP, and its troubling implications, when assessing AR? Have we perhaps wrongly mistaken the bleak conclusions of PHY *and* CoP, for those which flow from

PHY alone and which may be far more benign? In the next section, I will explore these important questions by considering how the prospects look for HCE and Strong emergence if we attempt to retain PHY, but reject CoP⁹

3. A Schema for a Physicalist Metaphysics of 'Downward' Determination

When Sydney Shoemaker first outlined his causal theory of properties he pointed out that many properties contribute their causal powers "conditionally" (Shoemaker (1980)) The property of being knife-shaped illustrates his point When this property is instantiated in an individual with the properties of being made of steel and being knife-sized, then this property contributes causal powers resulting in an individual that cuts flesh But when instantiated in an individual with the properties of being made of wax, or being of microscopic size, then the property of being knife shaped contributes causal powers that do *not* result in an individual that cuts flesh Wax, or minute, knives don't cut Shoemaker thus concluded that many properties have "conditional" powers, causal powers they contribute to individuals only *conditionally* upon the *instantiation of other properties* This common phenomenon is apparently another instance of ontological, as opposed to causal, determination The instantiation of certain properties partially determines the causal powers contributed by other properties and obviously not ultimately through a causal process, on pain of regress, since it is the properties' powers to cause that are themselves being determined

The usefulness of conditional powers for my purposes becomes clearer when we ask what we abandon when we purge ourselves of CoP? Crucially, we are *rejecting* CoP's two implications in (a) and (b) In exploring the metaphysical space that may appear when CoP is abandoned, I will therefore assume, contra (a), that microphysical properties are *heterogeneous* in their contributions of powers across conditions and contribute some powers only under certain conditions, thus taking such fundamental properties to have what Shoemaker terms "conditional" powers And, contra (b), I will further as-

sume that microphysical properties only contribute such conditional powers when they realize certain properties. The type of situation I want to explore thus focuses on conditional powers of a very specific kind. It is a scenario in which fundamental realizer properties contribute powers conditionally upon realizing a certain property.¹⁰

Let us therefore assume that the ontologically fundamental microphysical properties/relations, 'P1', 'P2', 'P3' ... 'Pn', instantiated in microphysical individuals 'a1', 'a2', 'a3' etc., realize an instance of a property 'H' in 's', where *s* is constituted by *a1*, *a2*, *a3*, etc. The particular situation I want to consider is one in which P1, a microphysical realizer of H, contributes one of its causal powers to individuals only *conditionally* upon realizing an instance of H. Let us call this conditional power 'C*' and take it to be the power to cause some microphysical effect 'Pz'. Thus we are assuming that C* is *slightly* different from the causal powers P1 contributes when not realizing H. In such a situation, P1 is thus individuated by one conditional power which instances of P1 contribute only when realizing H. (In spelling-out the case I shall assume that properties, and their contributions of powers, determine the laws that hold, however I will eventually show that the very same points may be made if we take laws to determine properties and their powers. I therefore leave the discussion of laws until later.)

First, is HCE true in this novel situation? It is plausible that it is. The property H partially determines the contribution of a causal power to an individual, since P1 only contributes C* to individuals when realizing H. Assuming that P1 is instantiated in *a1*, then *a1* having C* is accounted for only by ascribing the realized property H to the individual *s* that *a1* constitutes. Admittedly, the power C* is contributed by the microphysical property P1. But how could this not be the case if PHY is true? The crucial point is that in the particular circumstances, H is a necessary member of the properties which are only jointly sufficient for determining the contribution of C* to *a1*. There is thus a *prima facie* reason to believe, in this situation, first, that the realized property H is a causally efficacious property, since it partially determines the contribution of a power to an individual, and, second, that HCE is consequently also true.

An obvious question is commonly raised at this point. Why is

the realized property H the best candidate for partially determining the power contributed by P1, rather than the combination of all the microphysical individuals, properties and relations that realize/constitute H and *s*? In fact, I think there are real difficulties surrounding the metaphysics, and even existence, of such structural properties, but we can see that the point I am making still goes through even if we accept their existence. For we have already noted that structural properties, if they exist, are themselves realized properties. The combination of microphysical properties/relations is not identical to any of the particular microphysical properties/relations, but is instead realized by them. The structural property is thus not an *alternative* to some realized property instance, but is a realized property instance itself. Thus if such a combination can be a necessary member of a set of properties only jointly sufficient for determining the contribution of a certain causal power to an individual, then a realized property instance would still apparently be causally efficacious.

Would PHY still hold true in the situation sketched? In such a case, there are apparently no new, 'dangling' causal powers, nor are there consequently any new entities which are not physically composed. The partial ontological determination of powers by H would only involve a 'quantitative' rather than a 'qualitative' change at the microphysical level — it would be slight enough that the fundamental realizer properties would still contribute the vast preponderance of causal powers they contribute elsewhere. The point is that that the powers contributed by P1 are extremely numerous and differ by only one power when realizing H. Given the overwhelming overlap of causal powers between the property in the scenario in question and P1, then parsimony principles of the type noted by Shoemaker (1980) imply that, when realizing H and contributing one different power, we still have an instance of the microphysical property P1. Thus it is plausible that in this broached scenario the same fundamental microphysical forces (or other fundamental microphysical properties) would still exist when realized properties partially determine their contributions of powers, and there would be no new non-physical forces, powers or properties.

Focussing upon the non-causal nature of the determination exerted by the realized property in this case further illuminates why

there will be no new ontologically fundamental forces (or other properties) H is *not causing* P1 to contribute certain powers. Causal relations typically are mediated by forces and/or the transfer of energy – thus if H *causally* determined P1's contribution of powers then there might well be a new force. But in the scenario, H is exerting a *non-causal* determinative influence and, as with part-whole or realization relations, this does not involve the exertion of a force and/or transfer of energy. As a consequence, H's determinative role does not consequently produce any new, fundamental non-physical forces or causal powers. We can further highlight this point by focussing on the nature of the powers in this case. Although P1's contributing the causal power C* is partially determined by realizing H, the causal power C* is nonetheless *still* a causal power of a microphysical property in P1 and *still contributed* by a microphysical property. We can therefore see that all the causal powers of s, and its constituents a1, a2, a3, etc., are still had solely in virtue of the powers contributed by microphysical properties/relations. Consequently, H is still a realized property and its realizers are P1, P2, P3... Pn. We thus see that the fundamental microphysical forces, or other microphysical properties, may have conditional causal powers whose contribution is determined, in part, by realizing a certain property. But this apparently does not entail the existence of any physically unrealized property, or any fundamental non-physical power. PHY therefore also holds true in this situation, since *all* properties are still realized by, or identical to, microphysical properties/relations.

To summarize, we have so far found good reasons to think that in the broached metaphysical scenario it very well may be the case that PHY and HCE can both be true when we purge ourselves of CoP. This brief sketch already suggests that abandoning CoP provides a promising approach to re-establishing the coherence of both Strong emergence and NRP. However, in order to give a better idea of the proposed metaphysics I now want to explore the kinds of laws it implies. I will then also consider one important objection to the coherence of the broached scenario.

Before we can address the laws in this case we need to carefully describe a very specific type of law¹¹. The first feature of this kind of law is that it involves ineliminable reference to a realized property

and its second feature is a specific form of underderivability. There is a very rich range of statements that may be involved in any attempted derivation of a law and I have attempted to reflect this in my definition. (And though in the following discussion I may omit certain statements for brevity, the definition frames my precise intent about such laws). In addition, I stipulate that when discussing underderivability I do not mean a merely epistemic relation, for example the inability of humans or their theories to allow the derivation of laws. Rather, by 'underderivability' I shall mean absolute failure of entailment, whether discoverable by us or not.

Given these features, I will therefore call the laws in question 'U-underivable', since they *ultimately* fail to be entailed by the class of statements outlined. I define such laws as follows:

A law L is U-underivable *if and only if* (i) L directly refers to some realized property H, and (ii) L is not entailed by any combination of the laws governing microphysical properties in aggregates simpler than those instantiating H, statements about lower level background conditions, the compositional principles applying to simpler aggregates than those instantiating H, any analytic statements or statements of other necessary truths, and any statements about the identity, realization or constitution, of any entity by microphysical entities.

Under this definition, the laws of physics as conceived of by the proponent of CoP will not be U-underivable, since they do not take these laws to directly refer to any realized property, and they hence fail condition (i).

We can quickly see the connections between the special type of realized properties we have sketched in our scenario and U-underivable laws. In our broached situation, P1 has a conditional causal power and the instance of P1 would not contribute such a power *if* the laws governing the behavior of microphysical properties could in all cases be derived from compositional principles and laws applying to less complex microphysical aggregates, lower level background conditions, etc. For if all the laws holding of P1 were so derivable, then P1's contribution of powers would be homogeneous across all conditions. Given that the causal behavior of P1 when realizing H

in s is *different* than it would be if the laws governing P1 were all so derivable, then it appears that s and its microphysical constituents are subject to a U-underivable law. This is apparently true, for we can state this law, 'LE', as follows

(LE) For all aggregates, in an aggregate in which an instance of P1 realizes property H , this instance of P1 causes P_z ¹²

The law LE is apparently a fundamental law, since it is absolutely underivable. What LE embodies is the fact that in the case at hand the contribution of one of P1's causal powers is *brutely* and *fundamentally* indexed to its realization of a particular property. The U-underivable law simply expresses the fundamental determinative role played by instances of the realized property H in the scenario. This determination is ultimately non-causal in nature, but such non-causal determination plausibly also allows H to play a causal role and hence to be causally efficacious, since H is non-causally determining the contribution of causal powers by an ontologically fundamental property.

So far I have been assuming that properties and their powers determine the nature of laws, but, as I promised, we can now also see how one may argue for a similar conclusion if one takes laws to determine properties and their contributions of powers ¹³. In order to understand this type of argument, we first need to locate an appropriate methodological principle to use for arguing from the nature of the fundamental laws to conclusions about which entities are fundamentally determinative. In order to find such a principle let us look to the argumentative practice of the metaphysical reductionist for guidance, since this will provide a principle that is at least dialectically effective.

The metaphysical reductionist claims that scientific evidence supports CoP and the conclusion that the basic laws of the universe only directly refer to the ontologically fundamental microphysical entities. Let us use the phrase 'Microphysical Base Set' to refer to the set of statements comprising the laws of physics, statements detailing the background physical facts, and compositional principles applying to the aggregation of microphysical entities, all of which statements only directly refer to microphysical entities. The metaphysical reductionist claims that all other laws are, in principle, derivable from

the Microphysical Base Set of statements in combination with statements detailing the relations of identity, constitution or realization holding between composed entities and microphysical entities. The metaphysical reductionist allows that in such a derivation one must, of course, use the statements detailing which microphysical entities compose which other entities to effect such a derivation (and sometimes also statements of necessary truths). But she argues that such statements do not describe any further fundamentally determinative entities, for these statements, she continues, merely detail the *results* of the upward determination, deriving from realization, exerted by the entities directly referred to in the Microphysical Base Set.

The entities directly referred to in the Microphysical Base Set of statements therefore *exhaust* the fundamentally determinative entities, argues the metaphysical reductionist, since this is the simplest set of statements from which we can derive all the other laws and facts. In drawing this conclusion, the metaphysical reductionist therefore implicitly assumes that we can 'read-off' the fundamentally determinative entities from the minimal set of statements needed to derive all the other facts and laws, in combination with statements detailing relations of realization, constitution or identity. Consequently, given their arguments about the Microphysical Base Set, the metaphysical reductionist takes the ontologically fundamental *microphysical* entities to be the *only* fundamentally determinative entities.

Bearing in mind the reductionist's key methodological assumption, about when we may 'read-off' the nature of the fundamental determinative entities, let us now return to our very different scenario. Recall that we have assumed that in the case of the individual *s* the laws governing the microphysical properties of *s*'s constituents will *not* be entailed by the laws of physics, the background microphysical conditions holding of the aggregates, and the compositional principles holding of aggregates simpler than *s*. Even when the statements fully describing all the microphysical properties/relations of the microphysical constituents of *s* are added to this set of statements, then these statements will *still* not entail the law LE. This is just what it means for the law LE to be U-undervivable. Therefore in the situation we have sketched, reference to the realized property H, through the

law LE, is unavoidable in the minimal set of statements needed to entail the laws and facts holding of *both* the realized and the *microphysical* properties of *s* and its constituents. What answer do we get in such a case when we apply the reductionist's methodological principles that we can 'read-off' the fundamentally determinative entities from the minimal set of statements needed to derive all the other facts and laws, in combination with statements detailing relations of realization, constitution or identity? In such a situation, the minimal set of statements needed to entail all the laws, and facts, directly, and ineliminably, refers to a realized property in H. It therefore appears that, given the nature of the laws involved, the reductionist's own principle implies we must conclude that a realized property plays a *fundamental* determinative role in such a case.

Our examination of the nature of the laws involved in the broached scenario further supports the conclusion that realized properties may be causally efficacious by non-causally determining the powers contributed by the microphysical properties that realize them. This type of realized property provides a promising idea about satisfying the Strong Criterion and I shall henceforth refer to such realized properties as 'Strongly emergent' where we may define this notion precisely as follows

(SE) A property instance X is Strongly emergent, in an individual *s*, if and only if (i) X is realized by other properties/relations, and (ii) X partially non-causally determines the causal powers contributed by at least one of the fundamental properties/relations realizing X.¹⁴

As we have seen, such Strongly emergent properties provide a promising response to Kim's Challenge, and hence potentially vindicate NRP, since they apparently underpin a scenario in which both PHY and HCE are both true. However, I want to conclude the section by testing the metaphysical schema we have developed against a common objection that seeks to show that the proposed scenario is not coherent after all because it faces a "Chicken-and-the-Egg" type paradox.

This kind of worry can roughly be framed as follows.¹⁵ Can one explain, asks the objector, *how* the property instance H could deter-

mine that the instance of the microphysical property P1 contributes the power C* to *a*1? For, the objector argues, it appears that the instance of H needs to exist *prior* to the instance of P1's contribution of C*, since H is supposed to determine this contribution. And yet the instance of H is only brought into existence *after* the contribution of C* has been determined, since the instance of P1 realizes H in part by contributing C*! Thus we can see that the situation proposed is not logically possible, concludes the objector, for either P1 precedes H or H precedes P1, and either way the scenario is incoherent.

A crucial, and mistaken, assumption apparently underlies this objection: that the *only* type of determination is *causal* in nature, and thus temporally extended, occurring between wholly distinct entities, and usually involving the transfer of energy and/or the mediation of some force. Thus the objector assumes that the determination relation holding between the instances of P1 and H is causal and therefore temporally extended. But such an assumption is highly contentious, since we have seen there is strong *prima facie* evidence that there is another, and very different, kind of determination in cases of parts-wholes, realization or conditional powers. This is what I termed *non-causal*, or *ontological*, determination. Non-causal determination, as we have seen, is instantaneous, does not involve wholly distinct entities, and apparently involves no transfer of energy and/or mediation of force. Since we have two kinds of determination, why assume that the determinative relations between the instances of H and P1 will be causal in nature, rather than being an instance of non-causal determination?

Furthermore, it appears that the relation between H and P1 is not one between wholly distinct entities and is therefore of a kind with realization, or part-whole relations, rather than causation. Just as with any non-causal determinative relation between properties, such as in a case of realization, the instances of P1 and H are *not* wholly distinct entities, the determinative relations between them are *not* mediated by a force and/or an energy transfer. And the determination involved is thus presumably *instantaneous* in nature, since it is ontological determination. With the distinction between the types of determination firmly in mind, it appears to be a promising response to the objection to argue that it is based on something close to a cate-

gory mistake in asking whether the instance of P1, or that of H, exists first

Having noted this response, we now have an especially appropriate point at which to summarize our findings in this section. For, at its root, the metaphysical schema we have been exploring is interesting precisely for what it reveals about the important, and underappreciated, role that non-causal determination can play in a physicalist world. The objection we have just examined is based around a failure to pay sufficient heed to non-causal determination and such a failure also underlies, and fatally undermines, the recent arguments against NRP. For we have found that once one throws off CoP, and its determinative monopoly, then there is space for realized properties to play a role in a physicalist world. Crucially, one must abandon the idea that causal determination is the only variety of determinative relation, as one must if one endorses the existence of part-whole relations, realization or conditional causal powers. Non-causal determination means that a Strongly emergent realized property need not step outside the microphysical web of properties, and powers, in order to be causally efficacious. We have found that microphysical realization need not be a straitjacket choking any possibility of a realized property being causally efficacious. For if a realized property instance partially, and non-causally, determines some of the powers contributed by its microphysical realizers, then the realized property can be efficacious *through* these microphysical realizers and their powers, and without the existence of any non-physical forces or powers.

With the schema for Strong emergence, it appears that we have successfully outlined a conceptual representation in which HCE and PHY are both true. One establishes that a set of statements is logically coherent by conceiving of a situation in which these statements are all true, usually by building a conceptual representation of such a case. The metaphysical schema outlined in this section thus shows that AR is in fact either invalid and/or unsound, for we have found a logically coherent situation in which we ought to take both PHY and HCE to be true. That Kim and others have failed to appreciate the non-causal determinative role that realized properties might play even in a physicalist universe is perhaps unsurprising. For as I earlier suggested, it appears that these philosophers may indeed have im-

explicitly imported the implications of CoP when trying to assess those of PHY. Nonetheless, we have now found a reason to reject Kim's key argument in AR.

4. Strong Emergence, Patchwork Physicalism and an Altered Landscape

The schema for Strong emergence presented in the last section must obviously be fleshed-out in far more detail in order to be defensible, and I have barely begun the large amount of work needed to defend such an original metaphysical account.¹⁶ However, I want to conclude the paper by examining whether it would be worthwhile to seek such a detailed articulation by considering how the intellectual landscape would be altered by a successful defense of this kind of Strong emergence. In order to do this, I want to close the paper, as I began it, by discussing a passage from Kim. This will be doubly useful, since in the course of my discussion I will more carefully detail which of Kim's arguments, and assumptions, are challenged by such a notion of Strong emergence.

In the passage, Kim questions whether defenders of NRP can abandon the Completeness of Physics. After noting that emergentists explicitly reject CoP, or the "causal closure of physics" as he terms it, Kim says

I doubt that contemporary non-reductive physicalists can afford to be so cavalier about the problem of causal closure [i.e. the truth of CoP] to give up this principle is to acknowledge that there can in principle be no complete physical theory of physical phenomena, that theoretical physics, insofar as it aspires to be a complete theory, must cease to be pure physics and invoke irreducibly non-physical causal powers — vital principles, entelechies, psychic energies, élan vital, or whatnot. If that is what you are willing to embrace, why call yourself a 'physicalist'? Your basic theory will have to be a mixed one, a combined physical-mental theory, just as it would be under Cartesian interactionism. And all this may put the layered view of the world itself into jeopardy. (Kim (1993a), pp. 209–10)

As a result of his arguments about the problems of non-reductivism,

Kim thus seeks to frame the state of the debate in the following manner¹⁷ On one side, on Kim's view, we have reductive physicalists who accept both PHY and CoP. These metaphysical reductionists accept Kim's arguments, such as AR, and hence deny the causal efficacy (and possibly even the existence) of realized properties. However unintuitive this may seem, the reductive position can be coherently articulated. In contrast, on the other side, Kim argues we have the standard non-reductive physicalism that accepts PHY, and also CoP, but which further claims that realized properties are causally efficacious and endorses HCE. Such a non-reductive physicalism Kim argues, and I believe rightly, has yet to answer his Challenge and show itself to be a coherent position.¹⁸ For as we have seen, it appears that PHY and CoP together imply that we should not take HCE to be true. The incoherence of the standard version of NRP, Kim implies, means that the metaphysically reductive position is the 'only (coherent) game in town' for physicalists. For, using what I earlier called the Dualistic Presumption, Kim argues physicalists cannot give up on CoP on pain of falling into a commitment to "irreducibly non-physical causal powers — vital principles, entelechies, psychic energies, *elan vital*, or whatnot". Thus, even given its unsettling consequence that mental and other realized properties are not causally efficacious, physicalists must adopt a metaphysically reductionist version of physicalism on pain of collapsing into either incoherence or dualism.

So much for Kim's view of the state of the debate. If Strong emergence of the type sketched in section 3 can be successfully defended, then we can see that a number of Kim's arguments are fatally flawed, and that the debate has a very different character. Let me detail these points in turn. Through the schema for Strong emergence we can now see the fallacious steps in Kim's central argument for metaphysical reductionism. Apparently following CoP, AR implicitly assumes either that all the causal powers of microphysical properties are unconditional in nature and/or that when microphysical properties have conditional powers these powers are contributed conditionally upon the presence only of other microphysical properties. But our schema shows that nothing about PHY or the realization relation, as opposed to CoP, supports this assumption. When PHY is true the

causal powers of microphysical properties can be contributed conditionally on the presence of the properties they realize if these realized properties non-causally determine the contribution of powers by their realizers. As a result, when PHY is true, it may be necessary to posit a realized property in order to account for the powers of individuals and it thus appears that we should reject AR.

Our schema for Strong emergence also indicates that the Contributor Assumption is mistaken. We have now found that it is wrong to assume a property can only be efficacious in a physicalist world by directly contributing powers, for a property may non-causally determine some other property's contribution of powers and hence still be efficacious, though not directly contributing the relevant power. Consequently, Strongly emergent realized properties that exist as a result of the upward determination of realization need not be a useless aristocratic class of properties. The underlying point of Kim's famous Inheritance Principle may thus be correct, but he is wrong to assume that it impugns all realized properties. For though they may, in a sense, inherit all their causal powers, nonetheless such realized properties can be amongst the causally efficacious workers if they are Strongly emergent and non-causally determine the contribution of powers by the fundamental realizer properties.

The Dualistic Presumption is also shown to be too quick by our schema for Strong emergence, for we can now see that HCE can be true even though realized properties do not contribute powers distinct from, or "over-and-above", the powers contributed by the ontologically fundamental microphysical properties. Kim's assertion, in our closing passage, that non-reductivists cannot give up on CoP without falling into a position of a kind with "Cartesian interactionism" is thus unwarranted, since all properties can be realized by microphysical properties even when CoP fails to be true. In the kind of universe outlined in section 3, both PHY and HCE are apparently true simultaneously without the existence of any new forces. For Strongly emergent realized properties are efficacious and involve no new 'dangling' non-physical powers or forces, for all the powers of Strongly emergent properties result from the powers contributed by microphysical properties/relations.

I suggest that a suitable name for this new form of non-reductiv-

ism is 'Patchwork physicalism'¹⁹ For such a position agrees with metaphysically reductive forms of physicalism that all properties are microphysically realized, but differs over the nature of the basic laws, the determinative entities, and the range of causally efficacious properties. Metaphysical reductionism claims the laws of physics are the only basic laws, but as we have seen the Patchworkian claims there is a 'patchwork' of such laws including certain U-undervivable higher laws. The patchwork metaphor also works well for the claims about determination in the schema for Strong emergence. Metaphysical reductionism claims there is just one set of fundamentally determinative, and hence causally efficacious, entities in those of microphysics. In contrast, Patchwork physicalism is committed to a mosaic of fundamentally determinative entities, not just the microphysical properties but also the Strongly emergent realized properties with which the microphysical properties share the determination of some fundamental causal powers.

We might even push the Patchwork metaphor still further. For many reductionists have suggested that since realized properties are not actually causally efficacious then we should not take any such *properties* to exist, but should instead only endorse the existence of useful higher level *predicates* and *concepts* (Kim (1997) and (1998)). The Patchwork picture provides grounds to resist such conclusions. For its truth would justify us in accepting the existence of Strongly emergent realized properties, for they may be causally efficacious under the Patchwork position. Thus in contrast to the metaphysical reductionist, who claims that there are *only* microphysical properties, relations and individuals, the Patchworkian may argue that the universe contains a patchwork of higher and lower properties, as well as the layers of individuals instantiating them. Far from the layered view collapsing when we reject CoP, as Kim also suggests in our last quote, Patchwork physicalism *preserves* a layered universe with its patchwork of properties. In fact, contra Kim, exactly the reverse conclusion is supported. For it is the one-dimensional world of the *reductionist*, resulting from CoP, that only contains microphysical properties and which is lacking levels.

Admittedly, Kim is quite correct that in accepting the Patchwork version of non-reductive physicalism, and its underlying notion of

Strong emergence, then one must abandon CoP as our expression of the manner in which physics is comprehensive, or complete. However, after we reflect upon the very strong claims that we have now found to be embodied in CoP this may not be such a great price for physicalists to pay. For if the schema for Strong emergence outlined can be successfully be supported in detail, then it appears there would actually be *two* coherent options for physicalists to choose between. On one side, there is still a metaphysical reductionist position, favored by Kim in his pessimistic moments, that embraces both PHY and CoP, but which rejects HCE and the efficacy of our own mental properties, as well as those of the special sciences generally. On the other side is a Patchwork physicalism that posits the existence of Strongly emergent properties and hence endorses both PHY and HCE, allowing a space for mental, and other realized, properties to be causally efficacious, whilst rejecting the truth of CoP.

Do we have more evidence for CoP, or for the existence of causally efficacious realized properties and hence HCE? How one answers this large, and difficult, question will decide which option one chooses, i.e. reductionist or Patchwork physicalism. This choice will involve a careful interpretation, and evaluation, of the evidence provided by all the sciences, including the special sciences and the sciences of complexity, as well as physics. When framed in these terms, I contend that it is presently far from obvious whether our present evidence favors a metaphysically reductionist, or a Patchwork, physicalism. My conclusion is consequently that non-reductive physicalists should further investigate the schema for Strong emergence that I have begun to illuminate. And, though I have not pursued it here, non-reductivists must also pursue the parallel project of exploring whether empirical findings, and most especially those of the new sciences of complexity, support the existence of such Strongly emergent properties.²⁰ For such projects of showing that we live in a Patchwork physicalist universe offer one of the few hopes for vindicating NRP and the causal efficacy of mental, and other realized, properties.²¹

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Notes

¹ See Gillett (Forthcoming-c) for a detailed overview of the accounts positing Strong emergence such as Alexander (1920), Sperry (1992) and Newman (1996), amongst many others

² Note that my notion of "Strong" emergence is importantly different from that referred to by Mark Bedau's (1997) and his paper in this volume. We should also note that this is only a *criterion*, a way of picking out this concept, offering one necessary condition for a property to be Strongly emergent and, plausibly, there will be other conditions. In section 3, I will sketch one account of the nature of these further conditions.

³ For Kim's own precise argument for NRP's commitment to downward causation see Kim (1992)

⁴ I defend this definition at length in my (Forthcoming-a) and (Unpublished-c). As I explain in these papers the definition is more complex than the usual definitions of realization, but this is needed if one is to respect the different individuals in which realized/realizer properties may be instantiated and the different powers they may contribute.

⁵ I have defended the claim that the AR is Kim's basic argument at length in Gillett and Rives (2001)

⁶ Kim has perhaps done the most to illuminate the nature of these problems in a series of papers and books, see for example Kim (1993a), (1993b), (1997), (1998) and (1999). Kim's arguments are primarily focussed on the causal efficacy of realized properties and similar arguments, including arguments directed at dispositional properties, are also found in Prior, Pargetter and Jackson (1982), Martin (1997) and Heil (2000), amongst others. Note also that as I have framed it, put precisely AR's conclusion is that we should not accept the truth of HCE when PHY is true. However, there are arguments that seek to establish stronger claims, see for example Kim (1999)

⁷ Lycan (1987) and others have all pressed this general type of point. Gillett (Forthcoming-a) and (Unpublished-c) offers a metaphysical argument for the claim.

⁸ The latest version of the principle, which does not differ in substance, is found in Kim (1998), p. 54. The problem with all these versions of the

principle is that they assume that realizer/realized properties contribute all, or at least some, of the same powers to individuals. But there are very many cases of realization illuminated by the sciences where realized/realizer properties contribute *no common powers* to individuals. Thus the underlying metaphysical assumptions about realization embodied in the principle are mistaken. Here I do not pursue these problems, but for a full account see Gillett (Forthcoming-a) and (Unpublished-b)

⁹ Some may doubt whether one can have a 'physicalism' if the position rejects CoP and Melnyk (1995), for example, makes just this claim. I shall argue below that we can see such views are mistaken and that a robust physicalism, for example PHY, may be true even when we reject CoP. (Crook and Gillett (2001) defends the position that such a physicalism may be successfully formulated)

¹⁰ I have argued elsewhere (Gillett (Unpublished-a)) that the general type of position to be outlined in this section was defended by Samuel Alexander (1920) and the view is based on a number of his insights. In addition, this metaphysics also overlaps with suggestions of Meehl and Sellars (1956) and I contend it vindicates their conclusions.

¹¹ In my definition of these laws, though not in my arguments about their implications, I follow Broad (1923) and also McLaughlin (1992)

¹² Obviously, there may be more U-undervivable laws that hold of P1 when it realizes H and there may also be other microphysical realizers of H that are subject to U-undervivable laws. For simplicity, however, I will assume that there is only one such law for P1 and that P1 is the only realizer subject to a U-undervivable law when realizing H.

¹³ I should note that U-undervivable laws are a very particular kind of undervivable law. As a result, I am committed to a very particular kind of what I have elsewhere called "Weak" emergence (Gillett (Forthcoming-c)) supporting the existence of Strong emergence. However, this is very different from the claim that any kind of undervivable law, i.e. any kind of Weak emergence, is sufficient for Strong emergence. Furthermore, my conclusions do not ameliorate the problems raised in my (Forthcoming-c) for recent writers who claim certain kinds of Weak emergence different from U-undervivability are sufficient for Strong emergence, for example Newman (1996). (And see Bedau (1997) for evidence that Weak emergence can support a reductionist position)

¹⁴ Could there be more than one metaphysical route to satisfying the Strong Criterion? For all I know there could, and I am therefore being rather presumptuous in using necessary and sufficient conditions. However, I have framed the definition in such terms, since I presently know of no other co-

herent account of Strong emergence

It is now also easy to give an alternative definition of this account of Strong emergence, for those who take laws to determine properties, as follows

(SE*) A property instance X is Strongly emergent, in an individual s , if *and only if* (i) X is realized by other properties/relations, and (ii*) the fundamental properties/relations that realize H are such that at least one of the laws governing their causal behavior, when realizing H in s , is U-underivable and directly refers to H

If my foregoing arguments are sound, then the U-underivable law mentioned in (ii*) will entail satisfaction of (ii), the conditional power clause, in the definition SE

¹⁵ This kind of argument for the logical impossibility of Strong emergence is offered by Kim (1999), pp 28–31. Kim has a more technical and careful presentation of the worry, but I contend my response applies equally to Kim's version of the objection. I refer the reader to Kim's paper for the details.

¹⁶ I pursue this project further in Gillett (Unpublished-a) and (Forthcoming-b).

¹⁷ See Kim (1992) and (1993a).

¹⁸ Thus, for example, perhaps the most sophisticated standard non-reductivist is Shoemaker (2001). Although Shoemaker has an ingenious response to AR based on his notion of realization, Shoemaker still does not address the implications of PHY when combined with CoP, which he apparently also endorses. (I have argued that in fact Shoemaker's response to AR fails in my (Unpublished-b).)

¹⁹ I borrow the patchwork metaphor from Cartwright (1994) which provides an intriguing critique of CoP and the evidence in its support, though Cartwright apparently also rejects PHY as well.

²⁰ For this type of investigation, and the interesting results it may provide about the possible empirical support for Strong emergence, see Mark Bedau's article in this volume, and particularly his comments about "robust" weak emergence which is suggestive about the possibilities for Strong emergence in my sense.

²¹ For discussion of issues related to those of the paper my thanks to Mark Bedau, Seth Crook, Jeffrey Goldstein, Barry Loewer, Brad Rives and the editor.