

# New Hope for Non-Reductive Physicalism

Julie Yoo, Easton, Pennsylvania, USA

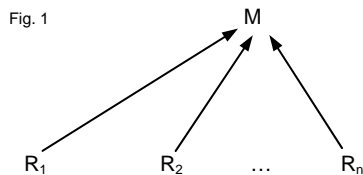
## The Problem

Non-reductive physicalists want to hold on to the idea that higher-level properties – mental properties, especially – have an autonomous ontological standing, and hence, their own distinctive causal powers. But their equal commitment to physicalism threatens to undermine this commitment to the autonomy of higher-level properties. This is, in effect, Kim’s dilemma for non-reductive physicalism: it is inherently unstable because the physicalism denies the irreducibility thesis, while the irreducibility thesis denies physicalism (Kim 1989, 1993, 1998, 2005). In this paper, I shall propose a novel way of solving this dilemma.

## The Way Out of the Bind: Reducing Higher-Level Properties While Retaining their Powers

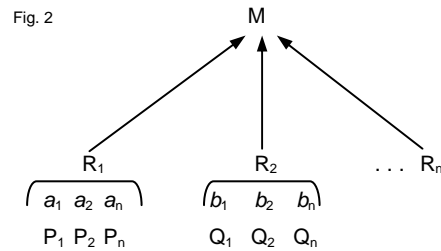
My argument, in a nutshell, is this. A property exists if and only if it can confer causal powers upon its bearers. Properties are individuated in terms of the distinctive range of causal powers each of them are capable of conferring. Now, mental properties confer causal powers completely in virtue of the physical properties on which they logically supervene, but no mental property is identical with a physical property. The concept of *property realization* renders possible the consistent conjunction of these two strands – irreducibility and physicalism.

Let us get started with a picture of multiple realizability to get us oriented with respect to its sister notion of property realization. On standard accounts of multiple realizability, it is believed that different physical properties – different physical types of kinds –  $P_1, P_2, \dots, P_n$ , can each necessitate one and the same type of mental  $M$  (or higher-level) property:



While this picture isn’t wrong, the schematic nature of the diagram engenders an oversimplified way of thinking about realization that is misleading. It is misleading in that it gives the impression that a given realization  $R$  is a *single* physical property. But this convenient simplification obscures an important detail, much attended to by the emergentists, to their credit, and it is that a mental property is a property of a system made up of concrete aggregates and whose micro-physical properties and relations make the operations of the whole system or mechanism possible. To say that a property is multiply realizable is to say that a number of different kinds of systems or mechanisms – ones that are not only made up of different kinds of materials, but that also have different kinds of architectural configurations – can execute one and the same function. Think of the indispensable corkscrew: there is the rack and pinion model, the waiter’s corkscrew, and the rigid coiled wire with a convenient handle. Each of these different kinds of mechanisms counts as a distinct type of realization; that is,

the rack and pinion model is  $R_1$ , the waiter’s corkscrew is  $R_2$ , and so on. A more careful look at what’s going on suggests that a concrete instance of a given realization is best represented as being made up of inter-related micro-physical aggregates  $a_1, a_2, \dots, a_n$ , having micro-physical properties  $P_1, P_2, \dots, P_n$ , whose causal powers “constitute” the causal powers of  $M$ :



The realizing base of  $M$  is the micro-physical properties  $P_1, P_2, \dots, P_n$  of the constituent aggregates  $a_1, a_2, \dots, a_n$ , which they instantiate in virtue of being the type of material or substance they are.<sup>1</sup> Now, if physicalism is true, then each of these properties have causal powers that fully determine the causal powers of  $M$ .  $M$ , to use an emergentist term, is a *resultant* of each of the micro-physical properties  $P_1, P_2, \dots, P_n$ . The question, then, is how  $M$  is capable of having its own *distinctive* causal powers, given that  $M$ ’s powers are fully derived from its realizing base. The answer lies in drawing a connection between two things: a causal power conception of the nature of properties (Shoemaker 1984), now often called the “Eleatic theory of properties,”<sup>2</sup> and the phenomenon of *universalizability*, as described by Robert Batterman (2000, 2001). I begin with universality.

To the extent that each mental property, by all appearances, has a unique array of causal powers (the total facts about which a complete empirical functionalist analysis of mental properties would deliver) it satisfies a necessary condition for being a distinctive genuine property. Now, one of the remarkable things about nature is that there are higher-level regularities that are realized by very heterogeneous mechanisms. That is, wildly different kinds of systems manage to accomplish the same kinds of tasks. This phenomenon is what Jerry Fodor 1997 has called a “metaphysical mystery” – how, in essence, things that are so different can still give rise to things that are the same:

1 Actually, Fig. 2 may also be too schematic. Depending on how we want to individuate the  $a$ ’s, it is possible for a given  $a$  to have many properties  $P$ , not just a single property in the way Fig. 2 represents. Take a particular corkscrew  $x$  and say that  $x$  is the rack and pinion kind. The individual  $x$  has the macro-property  $M$  of being a corkscrew in virtue of  $x$ ’s being composed of two handle bars, a flange, spindle, metal spiral, etc.. These are the  $a$ ’s that have the  $P$ ’s whose collective instantiation makes it possible for the  $a$ ’s to constitute  $x$  and enable it to do its thing. Now, the handle bars alone would have the properties of being handle-bar shaped, being rigid, being made of metal, and so on, so a given  $a$  is most likely to have properties  $P$ . I won’t be too fussy about this detail, as Fig. 2 is sufficient as a working model.)

2 The Eleatic theory of properties is so called because the conception goes back to Plato’s Eleatic stranger in the *Sophist*, who suggests that the mark of being is power. This idea is also codified in what Kim calls “Alexander’s principle,” named after the emergentist, Samuel Alexander, who argued that a property must have causal powers to exist.

The very existence of the special sciences testifies to reliable macro-level regularities that are realized by mechanisms whose physical substance is quite typically heterogeneous. - - Damn near everything we know about the world suggests that unimaginably complicated to-ings and fro-ings of bits and pieces at the extreme *micro*-level manage somehow to converge on stable *macro*-level properties.

On the other hand, the ‘somehow’ really is entirely mysterious, ... [for we don’t] see why there should be (how there could be) [macro-level regularities] unless, at a minimum, macro-level kinds are homogeneous in respect of their micro-level constitution. Which, however, functionalists in psychology, biology, geology, and elsewhere, keep claiming that they typically aren’t. (Fodor 1997, pp. 160 – 61)

We see the mystery across the special sciences: an animal’s fitness, for example, can be realized by its reproductive success, lack of predators, abundance of food, and the good fortune of not suffering odd accidents; pain, to use everyone’s favorite example, can be realized by C-fiber stimulation, silicon chips, or hydraulic mechanisms – all at least in principle. With all the heterogeneity at this lower level, it is indeed mysterious how they manage to give rise to stable, recurring, patterns and regularities that appear to hold with nomological force. (The converse is equally mysterious, namely, how such few types of fundamental particles, laws, and forces, give rise to the complexity and heterogeneity of our world, but this is a slightly different matter that will not be addressed here.)

In his “Multiple Realizability and Universality,” Batterman explains how the mysterious phenomenon, called “universality,” is explained in physics. Multiple realizability is an instance of universal behavior. Universal behavior is where vastly different systems – systems with different microstructures, different architectures, different properties – exhibit identical behavior when characterized at some level of description:

To begin to get an idea about the concept of universality as well as its ubiquity, consider the following homely example. One wants to explain the observed common behavior of pendulums – one wants, for example, to understand why pendulums with bobs of different colors, rods of different lengths, different masses composed of diverse materials, etc., all have periods (for small oscillations) that are directly proportional to the square root of the length of the rod from which the bob is hanging. At one level the explanation is quite straightforward: one solves the very simple equation of motion for such a system. - - But there is another why-question which is far from simple. Why, one might ask, are factors such as the color and (to a large degree) the constitution or micro-structural makeup of the bobs irrelevant for answering our why-question about the period of the pendulums? Why is this equation, rather than one in which, say, a color parameter plays a prominent role, explanatory? In other words, what allows us to bracket, or set aside as ‘noise’ these other features of the individual pendulums as inessential or irrelevant for the explanation of the behavior of interest? These latter questions concern the explanation of universal behavior. (Batterman 2000, pp. 120 – 121)

As Batterman explains, physics has managed to identify universal behavior in all kinds of systems – systems of thermodynamics near their critical points, certain limit theorems of probability – and construct very detailed explana-

tions of those variables that are relevant for the behavior of a system’s macro-level behavior (the length of the bob of the pendulum) and those that are mere negligible to the salient macro-level properties of the system (the color of a pendulum). The lesson to take away from this, according to Batterman, is that there are “*physical reasons why the details of the makeup of the individual realizers may be largely irrelevant for the upper level behavior of the system*” (Batterman’s emphasis, 2000, p. 124).

Now, while it is interesting that some of explanatory methods are sophisticated enough to handle universal behavior, *our* question is how our world is *constructed* so that it can display universal behavior while being composed of such a diverse heterogeneity of more basic physical (micro-physical) constituents. The question is decidedly about the metaphysics of the phenomenon, the “truth-makers” in the world that make our explanations of universality true. On my view, we need to look to the Eleatic theory of properties to lay out that metaphysics.

On the Eleatic theory, properties are those things in virtue of which the objects having them can enter into causal relations. Thus, a property X is not the thing that *has* causal power K. Many people speak this way, but what they really mean is that a property *confers* causal powers. The things that *have* causal powers are individuals, like physical objects or events or other kinds of concrete particulars. A property, then, is individuated in terms of the unique array of causal powers it confers upon the individuals that have it. Its unique array is what I call its *causal profile* (see also Gillett 2002). The notion is drawn from two observations. First, that a property in isolation from other properties is not enough to confer its bearer with a causal power, as many other contributing properties must also be instantiated. A property, then, is one among many others that contribute to the causal power of an object:

- (α) A property X contributes to a causal power K in a given circumstance just in case
  - i. X is necessary for K, and
  - ii. X, together with a set of properties  $\Gamma$ , is minimally sufficient to confer K.

Thus, the relationship between a property and a causal power is not one-to-one. And this is the second observation: it is, in fact, many-many. For any property X, its instantiation in different circumstances can confer different causal powers, and for each type of causal power, different individuals can have that type of causal power though it instantiates different properties.

- (β) Possibly, for any property X,  $X_i$  contributes to  $K_i$  and  $X_j$  contributes to  $K_j$  and  $X_i = X_j$ , but  $K_i \neq K_j$ .
- (γ) Possibly, for any causal power K,  $X_i$  contributes to  $K_i$  and  $X_j$  contributes to  $K_j$  and  $K_i = K_j$  but  $X_i \neq X_j$ .

The individuation conditions for a property can be stated thus:

- (δ) X and Y are the same property just in case they have exactly the same *causal profile*: for all actual and possible  $K_i$  and  $K_j$ , X contributes to  $K_i$  and Y contributes to  $K_j$  and  $K_i = K_j$ .

The basic idea of (δ) is that X and Y are the same property if under all possible circumstances – all possible sets of properties  $\Gamma$  with which they can be conjoined – they contribute to all and only the same causal powers. For instance, if the property of having heat contributes to various causal powers in various circumstances – melt wax, boil

water, bake brownies, ... – and the property of having a mean kinetic energy contributes to exactly the same causal powers in those same circumstances, then heat and mean kinetic energy are the same property. But given that mean kinetic energy is only one realization of heat among other realizers, this means that there is a circumstance where heat and mean kinetic energy contribute to different causal powers and thus count as different properties.

This theory about the nature of properties and their conditions for individuation gives us a very intuitive way of explaining the phenomenon of universality. On my view, the capacity to behave in universal ways is built into the profile of each physical property. That is, the things that make up the profile of a higher-level property are the profiles of many lower-level properties acting in concert. This is not emergentism. Let us return to the theological story about our cosmology to see why. A physicalist says that to create our world, God created physical particles, physical properties, and their governing laws, and nothing more. I would add that God also created ways for those physical properties to combine with each other in *universal-behaving ways*, ways that the special sciences are so adept at describing. These higher-level properties are genuine because higher-level predicates refer to entities that have unique causal profiles. The comparison with fractals may be instructive here: larger patterns, which are made up of smaller patterns, have properties that are unique to them. But those properties are entirely derived from or are “resultants” out of the properties of the smaller constituent patterns; it just so happens that the smaller patterns are constructed in such a way that they generate the larger patterns with their distinctive properties. So we get the higher-level properties and regularities because of the complex ways that physical systems can behave, and solely due to their physical nature.

Perhaps another example will be helpful here. A wall will have certain properties that its individual component bricks do not have. An obvious property will be its mass  $m$ . For the purposes of illustration, let's say that all bricks have somewhat different masses. Now supposed that the wall were to engage in universal behavior with respect to its mass. Then bricks of different masses would regularly combine to create a wall with mass  $m$ , in a variety of different contexts (inside, outside, during the day, during the night, ...), and in a number of different ways (the left side gets done first, then the right, or the layers get added one level at a time, or diagonally, ...). They all lead to instances of *wall-of-mass- $m$* . This is quite remarkable, but there is nothing but physical ingredients and physical laws at work here. There need be no irreducible *wall-of-mass- $m$*

property that imposes its causal powers from above. All the causal powers for the wall with its mass come strictly from the causal powers of the individual bricks and their mode of combination. Emergence doesn't come into the picture. It is a part of the nature of these bricks to form an object with the property of being a *wall-of-mass- $m$* . But this is no more mysterious than the fact that it is a part of the nature of an electron to attract protons. Insofar as the property of being *wall-of-mass- $m$*  makes a causal difference, and makes it in its uniquely distinctive ways, then by the theory of properties I have laid out, this is a genuine property, as genuine as the properties at the fundamental level.

The Eleatic theory is purely democratic when it comes to determining which properties exist. The level doesn't matter. What matters is its profile. If my approach to the metaphysics of universality is right, then a whirl of

many properties  $P_1, P_2, \dots, P_n$  and their corresponding profiles can give rise to a “larger” stable property  $M$  and with its corresponding profile, all thanks to nothing but the nature of the properties  $P_1, P_2, \dots, P_n$ .

## Non-Reductive Physicalism and Downward Causation

One would be right to wonder whether my view preserves the original non-reductive physicalist conception of the world as having different “layers” or “levels” that are hierarchically arranged. On one way of looking at it, my view places everything in one grand level, so that there is no hierarchy of different levels that exist in a metaphysically robust way. Instead, all the entities and properties postulated by the sciences, special and micro-physical, are equally fundamental and mutually irreducible, living side by side, and running in and out of each other's lives. This picture is consistent with my view. As long as it does not violate the supervenience relations between properties that belong to traditionally different levels – the biological supervening upon the chemical, and mental supervening upon the biological, and so on – it certainly does not force us to alter our ways of how the sciences are related to each other.

The important part of this proposal is that the supervening properties do indeed have their own causal powers, and hence, ultimately brings about physical changes when the supervening properties are instantiated. But it does so, not by exercising downward causation as on the classical emergentists view, but by constraining how the physical changes come about. The view, then, that I present, may better be described as an account of *downward determination*.

## Literature

- Alexander, S. (1920). *Space, Time, and Deity*, 2 vols. London: Macmillan.
- Batterman, R. (2000), “Multiple Realizability and Universality,” *British Journal of the Philosophy of Science*, 51: 115 – 145.
- Batterman, R. (2001), *The Devil In the Details: Asymptotic Reasoning in Explanation, Reduction, and Emergence*. Oxford: Oxford University Press.
- Beckermann, A., Flohr, H., Kim, J., eds., (1992), *Emergence or Reduction?* Berlin: Walter de Gruyter.
- Bedau, M. (1997), “Weak Emergence,” *Philosophical Perspectives*, 11: 375 – 399.
- Bedau, M. (2002), “Downward Causation and the Autonomy of Weak Emergence,” *Principia*, 6(1): 5 – 50.
- Broad, C.D. (1925), *The Mind and Its Place In Nature*, London: Routledge and Paul.
- Chalmers, D. (1996), *The Conscious Mind: In Search of a Fundamental Theory*, Oxford: Oxford University Press.
- Crane, T. (2001), “The Significance of Emergence,” in Loewer and Gillett, eds., (2001), *Physicalism and Its Discontents*. Cambridge: Cambridge University Press.
- Davidson, D. (1992), “Thinking Causes,” in Heil, J. and Mele, A., eds., (1993), *Mental Causation*, Oxford: Clarendon Press.
- Gillett, C. (2002), “The Dimensions of Realization: A Critique of the Standard View,” *Analysis*, 62: 316 – 323.
- Gillett, C. (2003), “The Varieties of Emergence: Their Purposes, Obligations, and Importance,” *Grazer Philosophische Studien*, 65: 89 – 115.
- Fodor, J. (1997), “Special Sciences: Still Autonomous After All these Years,” *Philosophical Perspectives*, 11: 149 – 63.

- Heil, J. (1999), "Multiple Realizability," *American Philosophical Quarterly*, 36: 189 – 208.
- Heil, J. and Mele, A., eds., (1993), *Mental Causation*, Oxford: Clarendon Press.
- Horgan, T. (1993), "From Supervenience to Superdupervenience: Meeting the Demands of a Material World," *Mind* 102: 555 – 586.
- Humphreys, P. (1996), "Aspects of Emergence," *Philosophical Topics*, 24 (1), pp. 53 – 70.
- Humphreys, P. (1997), "How Properties Emerge," *Philosophy of Science*, 64, pp. S337 – S345.
- Kim, J. (1984), "Concepts of Supervenience," *Philosophical and Phenomenological Research*, 45: 153 – 76.
- Kim, J. (1989), "The Myth of Nonreductive Materialism," *Proceedings of the American Philosophical Association*, 63: 31-47, reprinted in Kim (1993).
- Kim, J. (1992), "'Downward Causation': in Emergentism and Reductionism," in Beckermann, et al, eds. (1992), *Emergence or Reduction?* Berlin: Walter de Gruyter.
- Kim, J. (1993), "The Non-Reductivist's Trouble With Mental Causation," in Heil and Mele, eds., (1993): 189-210.
- Kim, J. (1998), *Mind in a Physical World*, Cambridge: Cambridge University Press.
- Kim, J. (1999), "Making Sense of Emergence," *Philosophical Studies*, 95, pp. 3 – 36.
- Kim, J. (2005), *Physicalism, or Something Near Enough*, Princeton: Princeton University Press.
- Klee, R.L. (1984), "Micro-Determinism and Concepts of Emergence," *Philosophy of Science*, 51: 44 – 63.
- Loewer, B. and Gillett, C., eds., (2001), *Physicalism and Its Discontents*. Cambridge: Cambridge University Press.
- Lowe, E.J. (2000), "Causal Closure Principles and Emergentism," *Philosophy*, 75, pp. 571 – 585.
- McLaughlin, B. (1992), "The Rise and Fall of British Emergentism," in Beckermann, et al, eds. (1992), *Emergence or Reduction?* Berlin: Walter de Gruyter.
- McLaughlin, B. (1995), "Varieties of Supervenience," in Savellos, E. and Yalcin, U., eds., *Supervenience: New Essays*, (1995), Cambridge: Cambridge University Press.
- Melnyk, A. (2003), *A Physicalist Manifesto: Thoroughly Modern Materialism*. Cambridge: Cambridge University Press.
- Meyering, T. C. (2000), "Physicalism and Downward Causation In Psychology and the Special Sciences," *Inquiry*, 43: 181 – 202.
- Mill, J.S. (1843), *The System of Logic*, London: Longmans, Green, Reader, and Dyer. (8<sup>th</sup> edition, 1872).
- Morgan, (1923), *Emergent Evolution*, London: Williams and Norgate.
- O'Connor, T. (1994), "Emergent Properties," *American Philosophical Quarterly*, 31, pp. 91 – 104.
- O'Connor, T. (2000), *Persons and Causes*, Oxford: Oxford University Press.
- Rueger, A. (2000), "Robust Supervenience and Emergence," *Philosophy of Science*, 67: 466 – 489.
- Savellos, E. and Yalcin, U., eds., (1995), *Supervenience: New Essays*, Cambridge: Cambridge University Press.
- Shaffer, J. (2003), "Is There a Fundamental Level?", *Nous*, 37: 498-517.
- Shoemaker, S. (1980), "Causality and Properties," in P. van Inwagen (ed.), *Time and Cause*, Dordrecht, Netherlands: R. Reidel Publishing Co., pp. 109 – 135.
- Shoemaker, S. (2002), "Kim on Emergence," *Philosophical Studies*, 108: 53 – 63.
- Sperry, R. (1969), "A Modified Concept of Consciousness," *Psychological Review* 76: 532 – 536.
- Van Gulick, R. (2001), "Reduction, Emergence and Other Recent Options on the Mind/Body Problem: A Philosophical Overview," *Journal of Consciousness Studies*, vol. 8, no. 9 – 10: 1 – 34.
- Yablo, S. (1992), "Mental Causation," *The Philosophical Review*, 101: 245-280.