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Cosmopsychism and the Laws of Physics

A Hylomorphic Perspective

Abstract: *I outline a hylomorphic account of physical reality in which the cosmos as a whole has mental properties which explain its nomological order. According to this theory, the cosmos is directed in its temporal development toward certain ends or goals which it intends, and these ends are* immanent *to the cosmos rather than being imposed upon it. My object in doing so is to argue that, contrary to Sean Carroll (2021), a view of physical reality as having intrinsically mental aspects need not induce any modifications of the known laws of physics nor violate 'causal closure' under physical laws. Rather, this soft form of naturalism, which includes final causes within nature, provides a foundation for the laws of physics that is lacking in Carroll's hard form of naturalism, which excludes mind from fundamental reality. I propose a trilemma for Carroll in which he should either: abandon naturalism, by admitting that the laws of physics are imposed by a divine mind; abandon realism, by conceding that 'laws' are constructed by human minds; or embrace cosmopsychism, by acknowledging that the cosmos as a whole instantiates a mind. I argue that cosmic hylomorphism, which links consciousness with intentional cognition, is preferable to non-hylomorphic versions of cosmopsychism, which tend to prioritize consciousness over intentionality.*

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1. Preliminary Remarks

When God made the physical world, did God have to *add* anything to physical reality in order for there to be mind(s)?[2] According to Sean Carroll, the hard-nosed physicist should respond in the negative: 'We don't fully understand consciousness… We do, on the other hand, understand the basic laws of physics' (Carroll, 2021, p. 16). If we are going to include mind within any rigorous account of reality, in that case, we had better get things the right way round: the mental must be understood as 'a (weakly) emergent phenomenon that leaves physical ontology untouched' (*ibid.*, p. 17) because the physical is better understood than the mental and is *causally closed* to non-physical influences. We have reason to believe that this is so because physical reality can be described in terms of universal and mathematically perspicuous laws. In short, according to Carroll, someone who is a realist about physics should be a physicalist who *excludes* mind from fundamental reality.

Yet this traditional form of physicalism,[3] which still dominates analytic philosophy, is increasingly being called into question by contemporary philosophers, who have reason to doubt that it can incorporate the kind of conscious and intentional beings who do physics (Koons and Bealer, 2010). One symptom of its decline is the resurgence of panpsychism among philosophers of mind. Panpsychists seek to offer naturalists a *via media* between a physicalism that reduces mind to non-mental properties and a dualism that situates mental properties beyond nature (Goff and Moran, 2021). They aim to do so by conceiving the mental properties exhibited by humans as being grounded in the mental properties of nature's basic constituents. For Carroll, however, a world governed by physical laws has no room for mind on the same level of reality described by physics: '[not] without dramatically upending our understanding of quantum field theory' (Carroll, 2021, p. 17).

My aim in this paper is to challenge the *hard* form of naturalism espoused by Carroll (traditional physicalism), which excludes mind from fundamental reality, and to elaborate a *soft* form of naturalism (cosmic hylomorphism), in which the cosmos *as a whole* is 'minded'. I aim to create logical space for this alternative by constructing a

2 Some readers will prefer to take this as a metaphor.

3 To be contrasted, for instance, with Galen Stawson's construal of physicalism (2006/2024).

trilemma for traditional physicalism concerning the *nature* of physical laws, in which each horn of this trilemma affirms the fundamental existence of mind. I shall argue that cosmic hylomorphism is conceptually preferable to traditional physicalism. Contrary to Carroll, a cosmos which has mental aspects need not induce any modifications of the laws of physics nor violate causal closure under physical laws. Rather, a soft form of naturalism that conceives the cosmos as being minded offers a more intelligible account of nature's laws than a hard form of naturalism which reduces mind to the physical. I will also contend that cosmic hylomorphism is conceptually preferable to standard forms of cosmopsychism because it links consciousness with intentional cognition. The discussion is divided as follows.

In Section 2, I discuss the hard form of naturalism espoused by traditional physicalists like Carroll and identify its key philosophical assumptions, including its claim that the natural world is causally closed under physical laws that exist independently of any mind and its espousal of a mechanical view of the world's dynamics that excludes ends or goals from nature. I press for a deeper account of laws, drawing attention to the dualism implied by cosmic fine-tuning given a 'governing' account of laws, and questioning whether a merely 'descriptive' conception of laws can provide truthmakers for the laws of quantum mechanics. I favour a more recent 'neo-Aristotelian' conception of laws, which is consistent with naturalism, realism, and causal closure but which rejects a mechanical view of nature's dynamics. I then advance my trilemma for traditional physicalism.

In Section 3, I put forward my alternative to traditional physicalism: the cosmos is a hylomorphic substance with a power to choreograph its own particles or fields, and this substance is a psychophysical whole. This metaphysic preserves Carroll's commitment to the causal closure of the physical, treating the law of motion that governs the particles as the expression of a cosmic power. It parts ways with traditional physicalism, however, by espousing a non-mechanical view of the world's dynamics in which the Cosmic Mind is the *final cause* of the fine-tuning of physical laws. In my theory, the Cosmic Mind is part of fundamental reality and yet it is immanent to the physical world. In Section 4, I highlight the advantages of cosmic hylomorphism over dualism, micropsychism, and standard cosmopsychism, whilst calling for further philosophical development.

2. Physicalism and the Laws of Physics

2.1. Four physicalist assumptions

According to the theoretical physicist Sean Carroll, whilst physicists may not have arrived yet at a theory of *everything*, our best physics is nonetheless very encompassing and 'we have excellent reasons to believe that the entirety of the "everyday life regime" supervenes on the ontology and dynamics of this theory' (Carroll, 2021, p. 18). This includes anything that could possibly be relevant to the operations of the mental faculties of humans or animals. Carroll is an eloquent spokesman for a view of reality that I shall call 'traditional physicalism', which I shall characterize in terms of four philosophical claims:

(I) **Ontological naturalism**: every entity that has causal powers to act within the world exists within the domain of reality explored by the natural sciences.
(II) **Scientific realism**: the laws of physics, or the causal powers of things within nature, exist independently of (the conceptual activities of) human minds.
(III) **Mechanical dynamics**: the laws of physics, or the causal powers of things within nature, operate blindly without any (immanent) direction, purposes, or goals.
(IV) **Causal closure**: the temporal development of the natural world is closed under the laws of physics such that only physical causes bring about physical effects.

Whilst ontological naturalism (I) is notoriously difficult to define, it is sufficient for my purposes to say that a naturalist is someone who seeks to avoid ontological commitments to 'spooky' entities which stand outside of the world explored by the natural sciences. She doubts whether we could gain any knowledge of their existence and believes we can explain all that we need to explain without making any metaphysical detours into an entirely separate realm of reality. In particular, ontological naturalism is supposed to rule out the sort of divine being that exists as a separate substance from the natural world yet manipulates what happens within it (theological dualism). It fits well with a form of scientific realism (II) in which the laws of nature or the causal powers of things in nature explain how the world unfolds, instead of this order being extrinsically imposed.

A strong commitment to ontological naturalism and scientific realism, however, is not sufficient to make one a traditional physicalist. It

is the last two assumptions, I suggest, which supply the *hardness* in this vision of nature that resists permeation by mind. According to the assumption of mechanical dynamics (III), the engine of change in the world operates blindly without reference to the purposes or intentions of anything that exists within nature. In addition, Carroll claims that modern physics 'provides evidence for what philosophers call [the] "causal closure of the physical" [assumption (IV)]: physical events have purely physical causes' (Carroll, 2021, p. 17). Whilst Carroll admits that quantum field theory — which he considers to be our best physics at present — can only provide us with effective descriptions of the physical world, he believes we ought to think of our best physics as providing us with both 'a complete specification of the quantum state' of a system and 'a specific equation that unambiguously predicts how it will evolve over time' (*ibid.*, p. 20) for all practical purposes. The physical state of the world at one moment of time is sufficient to determine its state at some subsequent time in virtue of the laws connecting these states.

Together, these four assumptions (I–IV) entail a commitment to there being one level of reality that is determinative of what happens in the natural world; a basic level described by our best physics. It follows that 'the entirety of the "everyday life regime" supervenes on the ontology and dynamics of this [physical] theory' (*ibid.*, p. 18), including the mental lives of human beings. After all, if there is only one level of existence which is closed under mechanical laws that operate independently of the goals and purposes of any mind — whether human or divine — then there is simply nothing for mind to *do* in the physical world. If the only kind of causation is efficient causation and the only type of efficient causes are physical causes, then 'there is no room for any new influences' (*ibid.*, p. 17), and mental properties can have no causal powers to make a difference to how nature unfolds (qua *mental* properties). In order for them to make a difference, they would have to be reducible to (or weakly emergent from) those purely *physical* properties and laws that are determinative of how nature develops. Together, these four assumptions (I–IV) comprise the *hard* form of naturalism that I am calling 'traditional physicalism'.

2.2. Three conceptions of physical laws

Yet what *are* physical laws? Do they constitute some special *addition* to nature's ontology, over and above the properties and entities

disclosed by our best physics, or do they merely *supervene* upon them? Do they exist independently of mental or conceptual activities, or are they dependent in some way upon the prior existence of mind? I suspect traditional physicalists like Carroll may be helping themselves to conceptions of laws which are mind-dependent, in spite of their determination to conceive mind as 'a (weakly) emergent phenomenon that leaves physical ontology untouched' (*ibid.*, p. 17).

Let us press then for more clarity on what a commitment to true laws of nature might entail in a world like ours. Helen Beebee claims there are 'two main camps in the debate about the metaphysics of laws of nature' (Beebee, 2000, p. 571). On the one hand, there are those who adopt a *governing* conception of laws, in which laws are relations of necessity that obtain between universals that somehow make it the case that one thing should follow another. On the other hand, there are those who adopt a purely *descriptive* conception of laws, in which laws are simply those generalizations which happen to figure in the most economical axiomatization of the empirical facts. Such was the lie of the land until recently. A third camp has gathered a following for whom laws express the essence of *causal powers* (Bird, 2007).[4] What conception of laws should a naturalist espouse today?

2.2.1. Governing laws

Suppose a traditional physicalist should opt for a governing conception of laws, in which laws *explain* why one physical state should follow another in virtue of certain special relations which *necessitate* that it should. In the Armstrong-Dretske-Tooley theory of laws, these necessitation relations are primitive, second-order relations between universal properties (Armstrong, 1983; Dretske, 1977; Tooley, 1977; 1987). The concept of a 'law of nature' has a complex history within Western philosophy, however, and some philosophers of science have argued that it is impossible to separate the notion of laws that literally *govern* what happens from the theological context in which this conception of order arose.[5] I have no space to press those arguments here. The only point I wish to make is that the fact of 'fine-tuning' has

[4] This is not an exhaustive list. Wilson, for instance, argues for necessitarianism about laws without powers (Wilson, 2013). Nonetheless, these are the three I consider to be the most plausible contenders.

[5] This conception of divinity is characterized by theological voluntarism and theological dualism. According to the philosopher of science Nancy Cartwright, 'the concept of a [governing] law of Nature cannot be made sense of without God' (Cartwright, 2005).

made the conjunction of a governing conception of laws with the assumption of ontological naturalism (I) more difficult to sustain.

By cosmic fine-tuning, I am referring of course to the discovery that certain fundamental parameters associated with the laws of physics have to be set with exquisite precision in order for there to be life and complexity — a fact which has recently been receiving more serious attention from analytic philosophers and whose possible implications are discussed in detail elsewhere (Goff, 2023; Hawthorne and Isaacs, 2018; Lewis and Barnes, 2016). It is enough for my purposes to note that these finely tuned features provide evidence for what Goff calls a 'Value-Selection Hypothesis', which claims that these physical parameters 'are as they are *because* they allow for a universe containing things of significant [axiological] value' (Goff, 2023, p. 28).

To affirm the value-selection hypothesis is to endorse the idea of a cosmic purpose in which 'goal-directedness plays a fundamental role' such that some 'things happen for the sake of some future goal' (*ibid.*, p. 22). This claim is to be contrasted with the cosmic fluke hypothesis, which says it is mere happenstance that these parameters are what they are.[6] The scientific evidence that the laws of physics are extraordinarily fine-tuned for life and complexity, however, overwhelmingly supports the value-selection hypothesis over the cosmic fluke hypothesis. But is this goal-directedness or purposiveness something *imposed* upon the cosmos or something *immanent* to the cosmos?

One well-known version of the value-selection hypothesis, though it is not the only version, is the theological conjecture that these physical laws were imposed upon nature by a divine mind that values life and complexity. To see why this theologically dualist version of the value-selection hypothesis fits well with the governing account of laws, we should recall that the necessitation relations which it posits are not fixed by the *natures* of the things they relate and are wholly contingent. The same set of properties might just as well have instantiated a different set of relations. Nothing in nature can be said to be *intrinsically* aimed in any direction, or to act according to any intrinsic values or purposes, just so long as we affirm the assumption of mechanical dynamics (III). The fine-tuning of physical laws will thus have to be explained by something which is *extrinsic* to nature but is

6 Some opponents of the value-selection hypothesis may argue that there is no well-defined chance distribution over possible universes. Their position could be characterized as the *cosmic no-explanation hypothesis*.

capable of *imposing* a purpose. If these laws are made by a divine lawmaker who is a separate substance from the physical world but has the power to impose laws which regulate its behaviour, then we can readily see why the laws of physics might be fine-tuned. As Cartwright observes: 'in its origins in the Scientific Revolution modern empiricism was neither conceived nor intended to be at odds with governance. Laws were God's plans: the blueprints according to which God makes things happen. They are visible in the Book of Nature in the way in which an architect's plan is visible in the finished building or the laws of a good society are visible in its functioning' (Cartwright, 2005).

It is commonly supposed that the best recourse for a naturalist is to claim that fine-tuning is equally evidence (or perhaps better evidence) for the existence of a multiverse in which *all* the possible values of the parameters are 'tried out' within separate pockets of space-time. According to this reasoning, we just happen to be located inside a pocket which is conducive to life. Of course, if we weren't, we wouldn't be able to make this observation — so there is nothing improbable about the fact that *our* world is fine-tuned!

This kind of argument does not pass muster. Goff has recently observed that the multiverse hypothesis, as it is typically employed in debates in the philosophy of religion, is an example of the *inverse gambler fallacy*, or at best a version of the cosmic fluke hypothesis (Goff, 2023, pp. 30–7). In doing so, he is drawing upon the work of Hacking (1987), the philosopher of science, who argued that it is fallacious to infer the existence of a multitude of *other* universes which fail to have the right physical parameters for life and complexity on the basis of the fine-tuning of *our* universe — the only universe we know and are able to observe. It's like being told that a rambunctious relative enjoyed an extraordinary run of good luck in the casino last night, and inferring that it must have been full of less fortunate players, otherwise it would have been highly improbable that *they* would have got so lucky! Of course, the number of other players can have no bearing on the odds of the one person you happen to know about having such luck.

One escape route that sceptics will wish to explore is whether we have any independent evidence for a multiverse that is worth taking

seriously.[7] The debate rumbles on and I have no room to elaborate any further here. But I hope enough has been said to indicate that (hard) naturalism and the governing account of laws are at best uneasy bedfellows. A philosopher today who adopts the governing account has reason to doubt the assumption of ontological naturalism (I).

2.2.2. Descriptive laws

It seems safer for someone who is determined to keep a divine foot out of the door to adopt a Humean conception of laws, in which laws do not govern but merely describe what takes place in the physical world. This appears to be Carroll's preference. In this picture, laws do not *add* anything to our basic ontology but *supervene* upon a mosaic of properties which lack any necessary connections. They are generalizations which are neither metaphysically prior to, nor in any sense responsible for, what happens in nature.

According to the 'best system account' of laws — the nomological flagship, so to speak, of the modern Humean — a generalization is said to be a law in virtue of its being an axiom in the 'best system' that balances strength and simplicity in deriving the empirical facts.[8] The fine-tuning of the laws of physics, for the modern Humean, could just be an artefact of human theorizing; part of the 'balancing act necessary for compact, systematic representation in science' (Halpin, 2022). Halpin concedes that 'the laws of physics are indeed designed on this view, but only by theoreticians in an attempt to get at the ideal or "best-system"' (*ibid.*, p. 2). The traditional physicalists who embrace a descriptive conception of laws, such as the Humean best system account, might be better equipped to evade the value-selection hypothesis and defend the assumption of ontological naturalism (I). I cannot examine that claim here but I am willing to grant it for the sake of argument.

A significant worry arises for this account of laws, however, which was expressed by one of its foremost proponents, David Lewis: 'when we ask where the standards of simplicity and strength and balance come from, the answer may seem to be that they come from us' (Lewis, 1994, p. 479). Why should anyone think that? In the first

7 String theory offers an independent motivation for a string landscape multiverse, but there is (so far) no experimental evidence which unambiguously favours string theory.

8 See Ramsey (1978), Lewis (1973, pp. 73–5; 1987, postscript), and Mill (1875, Bk. III, chapter IV).

place, this account seems to lack any objective measure of simplicity that can be used to sift between different theories. One theory might be simpler than another in terms of its mathematical vocabulary, for instance, but more complex in terms of the number of kinds of entities it postulates. Who is to say which sort of 'simplicity' is paramount? In the second place, this account lacks a consensual definition of explanatory strength. One theory may be stronger than others in terms of its power to derive a broad range of facts, for example, yet less accurate in what it predicts than another theory of somewhat narrower scope. How should we adjudicate between the different 'strengths' of these competing theories? In these ways, this account of the lawfulness of laws is in danger of making the facts about laws depend on human preferences and practices, and hence depend upon the existence of human minds. In so doing, it puts itself at variance with the requirements of the second assumption of scientific realism (II). Why should such laws count as being *true*?

In responding to this worry, Lewis speculated that, 'if nature is kind, the best system will be robustly best — so far ahead of its rivals that it will come out first under any standards of simplicity and strength and balance' (*ibid.*, p. 479). The idea is that, in order to decide whether a statement of regularity is part of the best system, the proper way to proceed is to compare different systems formulated in a common language of basic predicates that pick out certain elite properties. Such an account makes metaphysical demands of the world. According to Lewis:

> All there is to the world is a vast mosaic of local matters of particular fact, just one little thing and then another… We have geometry: a system of external relations of spatiotemporal distances between points… And at those points we have local qualities: perfectly natural intrinsic properties which need nothing bigger than a point at which to be instantiated. For short, we have an arrangement of qualities. And that is all. There is no difference without difference in the arrangement of qualities. (Lewis, 1986, p. ix)

This is the so-called doctrine of Humean supervenience. The laws of nature, for Lewis, are supposed to supervene upon this Humean mosaic.

The difficulty with Lewis's doctrine, thus stated, is that it is blatantly inconsistent with the quantum theory of matter that Carroll believes to be our best physics. Specifically, the claim that the world consists of nothing but local qualities instantiated at points in space-time, which are uniquely eligible for being systematized within a best

system account, is inconsistent with the 'non-local correlations' that have been seen to arise between the measured properties of entities which are quantum-entangled (Maudlin, 2007, chapter 2). For example, the spins of the particles in a two-particle system which is said to be in the 'singlet state' are anti-correlated in such a way that, if we measure one particle to be 'spin-up', then we shall measure the other to be 'spin-down', and vice versa, however far apart the two particles are spatially separated. These are the only two possible outcomes and each has the probability of 1/2. Of course, this anti-correlation does not prove there is a special connection between the particles, since their spins might have been predetermined (and anti-correlated) before they were measured, even if scientists cannot know what their spins are before a measurement is made. Yet the assumption that the properties of each particle are locally determined prior to their measurement entails a constraint upon the statistics known as Bell's inequalities, and this constraint is violated by the statistics predicted by quantum mechanics. Although this two-particle system is composed of spatially separated particles, the state of this system cannot be factored into the separate states of its constituent particles. In fact, the physical state of any system whose parts are quantum-entangled does *not* supervene upon the states of its local parts. Its parts appear to be connected in a way that violates Humean supervenience.

Whilst Lewis declared his unwillingness to 'take lessons in ontology from quantum physics' (Lewis, 1986, p. xi), other Humeans have sought to come up with ways of responding to the problem posed by entanglement. However, they require stark revisions to the account put forward by Lewis, and it is not clear that they succeed in securing a Humean mosaic which can be summarized using a best system account of laws. For example, one simple solution is to evict from the Humean mosaic every property which might cause trouble. According to Michael Esfeld, the Humean mosaic consists solely of the positions of 'matter points', which are nothing over and above the distance relations in which they stand (Esfeld, 2014; Esfeld and Deckert, 2017). Esfeld believes that, in the end, all of our empirical evidence for the truth of quantum laws comes from observations of the positions of pointers on measuring devices, and that with sufficient ingenuity one can always conceive physical theories in terms of a law that specifies a spatio-temporal distribution of matter. In this vision of reality, it is not only the law of motion and the quantum state which supervenes upon the total Humean mosaic, but also all the physical

properties that physicists predicate of particles, such as mass, spin, and charge.

Such a move, however, comes with significant theoretical costs,[9] and only serves to exacerbate our worries about the subjective character of Humean laws. According to Matarese: 'if we do not regard some properties other than particle position as ontologically fundamental, it is impossible… to achieve a consensus… on what the best system may be' (Matarese, 2020a, p. 4007). To decide whether a statement of regularity is part of the best system, we are supposed to compare different systems formulated in a common language of basic predicates that pick out basic properties in the mosaic. The problem with Super-Humeanism is that 'it is not possible to perform such a comparison if the different systems use significantly different languages, and thus different sets of basic kinds, to formulate the laws of nature' (*ibid.*, p. 4008).

A second way of saving the doctrine of Humean supervenience is to abandon the notion that the pieces of the Humean mosaic are related in ordinary, three-dimensional space, and to situate the whole of physical reality within the high-dimensional space in which the quantum state is mathematically defined. The non-local correlations between micro-objects in three-dimensional space can then be treated as being emergent rather than part of the fundamental ontology. In non-relativistic quantum mechanics, in which the number of particles N in the world is fixed, the quantum state of the universe can be represented as a wave function in a $3N$-dimensional configuration space, and the wave function may be treated as a field in this high-dimensional space. The doctrine of Humean supervenience can then be restated in terms of local points in this high-dimensional space.

It is far from clear that this strategy is successful. Esfeld complains that it surrenders a 'central tenet not only of common sense realism, but also of all working science' (Esfeld, 2014, p. 455). It not only shifts the theatre of scientific enquiry away from the ordinary space in which scientists conduct their experiments, but it also fails to provide a plausible account of how three-dimensional objects are supposed to emerge, such as the measuring devices that scientists depend upon to conduct their experiments. According to Robert Koons, all of the

[9] See Bigaj and Vassallo (2020); Lazarovici (2018); Matarese (2020a,b); Simpson (2020); Wilson (2018).

current proposals lead to a radical underdetermination of the world of observation and experimentation:

> If the only conditions on the extraction of a phenomenal or quasi-classical world from the wavefunction are mathematical (i.e., the existence of some isomorphism and some measure of closeness that jointly preserve dynamics and the truth-value of conditionals), then any imaginable world can be extracted from any wavefunction. The world of Greek mythology, The Matrix, The Lord of the Rings, or Alice and Wonderland would be every bit as real as the world represented in our science and history textbooks. (Koons, 2021, p. 18)

Such attempts to save Humean supervenience fail to connect with the *empirical facts* that a Humean law is supposed to generalize.

Of course, the debate about how to construct a Humean account of the laws of quantum mechanics has hardly concluded, and some Humeans might prefer to explore an anti-reductive 'better Best System account of lawhood' which admits an element of relativism (Cohen and Callender, 2009). Yet I do not believe this is something a traditional physicalist like Carroll would care to consider. In short, I think a naturalistic philosopher who is committed to the assumption of causal closure (IV) has reason to doubt that a purely descriptive account of laws is consistent with the assumption of scientific realism (II). As Cartwright observes, for the philosopher who believes that laws do not literally govern but merely describe what happens in nature, 'it is an additional piece of metaphysics to suppose that there are *true* generalizations about the facts' (Cartwright, 2017, p. 15, emphasis added).

2.2.3. Neo-Aristotelian laws

There is another way of being a realist today, however, in which laws neither govern the world nor merely describe regularities in nature which are entirely contingent. Rather, according to this 'neo-Aristotelian' account, laws express the *essence* of causal powers (Bird, 2007, chapter 9). Recent metaphysics has been marked by a resurgent interest in the relationship between the *properties* of things that exist in nature, such as the charge of an electron, and the *causal powers* they confer upon the entities that possess them, such as the power to attract or repulse other particles.

On one side of the debate are philosophers who reject powers ontologies. Those who adopt governing or descriptive accounts of laws may differ regarding the places of laws in their ontologies, but they agree that the relationship between something's properties and its

powers is entirely contingent. It is not essential to any of the objects or properties of empirical enquiry that they should be connected in certain nomological ways. In this sense, those who hold a governing view of laws are 'semi-Humean': they agree with Humeans that, since any nomic profile is compatible with the identity of a given property, there is a possible world *W** in which things have exactly the same properties as in the actual world *W* but their causal powers are swapped.[10]

On the other side are the 'powerists', for whom the causal powers conferred by a property are intrinsic to the nature of that property itself. For a powerist, it is not the case that there is a possible world in which the powers of two properties get swapped. Indeed, powerists commonly *identify* properties with causal powers. This conception of the relationship between properties and their causal powers distinguishes powerism from Humeanism in three significant ways, resulting in a very different conception of laws.

First, whereas the Humean divorces the identity of a property from its causal powers, the powerist identifies (or individuates) properties in terms of their powers. The Humean 'condemns us to necessary ignorance' concerning the identities of properties, but the powerist conceives their nature as being disclosed by the sciences (Bird, 2007, p. 78). Secondly, whilst the semi-Humean concedes the existence of necessary connections within nature in the form of extrinsic relations between certain properties, the powerist conceives such relations as being grounded in the natures of the properties that they connect. Indeed, the powerist assumes that, if a system is situated in the appropriate circumstances, its causal powers will *necessarily* manifest their nomic profiles. Thirdly, it follows that, on a neo-Aristotelian account of laws, in which the relevant properties are powers that produce necessary change, some laws will be *necessary* rather than contingent; a claim that Humeans or semi-Humeans who adopt descriptive or governing accounts of laws will flatly deny.

To what extent is this account of laws consistent with the four assumptions I identified (I–IV)? It is clear that the neo-Aristotelian account of laws, like the descriptive account, is consistent with the naturalistic assumption that entities which have causal powers to act in

10 For example, like-charged particles in *W* might have the power to attract rather than repel in *W**, whilst oppositely charged particles might have the power to repel instead of attract (Bird, 2007, pp. 70–81).

the world exist *within* the natural world. Likewise, it is clear that the neo-Aristotelian account, like the governing account, is committed to a form of scientific realism (II) in which there are causal powers in nature that exist independently of the conceptual activities of human minds. What of the remaining assumptions? For the neo-Aristotelian, 'causal closure' is a matter for empirical enquiry: powers typically depend upon certain conditions obtaining in order for them to manifest, and new powers might manifest that produce novel regularities. At any rate, it is not inconsistent with closure (III). Is there a role for powers to play in a world which is closed under quantum mechanical laws?

There are two standard interpretations of quantum mechanics which maintain strict closure under quantum-physical laws: the Everettian and de Broglie-Bohm theories. Carroll favours Everett's interpretation, in which the different possible measurement outcomes predicted by quantum mechanics obtain in different causally isolated 'worlds'. I shall opt here for de Broglie's and Bohm's interpretation instead; in particular, a contemporary form known as 'Bohmian mechanics' (Bohm, 1951; 1952; de Broglie, 1928). According to this theory, the world is made of a distribution of particles (or fields) and a wave function choreographs their temporal development. In the version championed by Dürr, Goldstein and Zanghí (1992), the role of the wave function is expressed in an equation of motion that determines the velocities of the particles. The particles have determinate positions and the wave function establishes a velocity field that fixes the trajectory of each particle according to its initial position. The total particle configuration, which includes all the particles in the cosmos, is characterized by a universal wave function which evolves deterministically according to the quantum dynamics.

I have argued elsewhere that the best way to apply a neo-Aristotelian account of laws to Bohmian mechanics is to conceive this particle configuration as instantiating a Cosmic Power to choreograph the trajectories of the particles (Simpson, 2021; 2023b; Simpson and Pemberton, 2021). It is this power that is expressed by the Bohmian law of motion. According to my interpretation, the wave function represents this power to choreograph the particles' trajectories through ordinary space by specifying potential trajectories which are actualized in different possible worlds according to the initial

configuration of the particles.[11] So it seems that there could be a role for powers in a world which is closed under quantum mechanical laws. I shall return to this interpretation presently.

There is some reason to think, however, that a mechanical conception of the world's dynamics (IV) cannot be squared with powerism in any strict sense. Packaged within the concept of a power, which was reintroduced into philosophy toward the end of the last century,[12] was a feature of Aristotle's philosophy of nature that Hume had vociferously rejected: powers are supposed to be essentially *directed* toward their manifestations. According to Molnar, 'powers… are properties *for* some behaviour, usually of their bearers… Having a direction is constitutive of the power property' (Molnar, 2006, p. 60). Powers are conceived to be the ultimate engine of change in the physical world in virtue of the intrinsic impetus which they bear *toward* their manifestations (Mumford and Anjum, 2011). The directedness of powers calls for a teleological explanation (Kroll, 2017).

According to a mechanistic understanding of the world, however, change is merely a matter of instantiating different properties at different times. What happens at some time t (or the probability of what happens at t) is determined by the properties instantiated at some prior time $t' < t$ and by laws which operate blindly without reference to anything's ends or goals. If we accept the assumption of mechanical dynamics, then we should think of the temporal development of the world as consisting of a sequence of events which lacks any intrinsic ordering or direction. For the philosopher of science and atheist activist Alex Rosenberg, the lesson of science is 'absolutely clear: no teleology, no purposes, goals, or ends' (Rosenberg, 2012, p. 43). According to this Whiggish reading of history, the reintroduction of powers that are intrinsically directed toward something must be rejected as regressive. The neo-Aristotelian account of laws may be consistent with the assumptions of ontological naturalism (I) and scientific realism (II), but the powerist commits heresy by repudiating the assumption of mechanical dynamics (III).

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11 I have distinguished this view from the Suarez's theory of 'Bohmian dispositionalism' (Simpson, 2023b).

12 It was reintroduced by Harré, Madden, and Molnar (Harré and Madden, 1975; Molnar, 2006).

Although early philosophers of science rejected the notion that there are final causes within nature, however, many early modern thinkers postulated a divine being who imposes a purposeful order. Philosophers of recent times, by contrast, have no shared commitment to theological dualism, and have tended to think of life as being merely a product of time and chance. They are only beginning to come to grips with the fact of fine-tuning. With a powerist or neo-Aristotelian conception of laws, I suggest, another version of the value-selection hypothesis has become available: one in which the cosmos has certain *intrinsic* ends which explain why its laws are fine-tuned for life and complexity. It is *necessary* that the laws should have the form which they have for the sake of a cosmic purpose, and they only appear to be contingent when we abstract away from that immanent purpose. Such a theory requires further development and neo-Aristotelian support for natural teleology is not ironclad. It is not clear to me, however, that the assumption of mechanical dynamics has to be part of the naturalist's creed.

2.3. A trilemma for traditional physicalism

To recapitulate: traditional physicalists like Carroll believe the mental must take a backseat to the physical because the physical is causally closed under universal physical laws. There is simply no room, they suppose, to incorporate mind at any fundamental level of description 'without dramatically upending our understanding of quantum field theory' (Carroll, 2021, p. 17). Besides the claim about causal closure (IV), three other assumptions characterize the traditional physicalist's vision of nature: the assumptions of ontological naturalism (I), scientific realism (II), and mechanical dynamics (III).

In digging a little more deeply for an account of the physical laws which are supposed to evict mind from fundamental reality, however, I disclosed reasons for thinking at least *one* of these assumptions will have to be relinquished in the light of contemporary physics, depending on *which* account of laws is adopted. If the reasons I have given are cogent, and the various escape routes I indicated turn out to be dead ends, then traditional physicalists like Carroll will be confronted with the following trilemma, where to seize any one of its horns is to reject traditional physicalism by accepting a fundamental role for mind:

1. First, it is difficult to make sense of a governing account of laws given the fact of fine-tuning without affirming the existence of a

divine lawmaker. Yet that would be to bring mind back into the fundamental ontology in the form of a theological dualism which is inconsistent with the assumption of ontological naturalism (I).

2. Secondly, it is difficult to explain how there could be a single set of merely descriptive laws without admitting an element of subjectivity in determining how competing systems of laws are to be adjudicated. But that would be to reintroduce mind at a fundamental level by making laws depend upon human conceptual activities, which is inconsistent with the assumption of scientific realism (II).
3. Thirdly, there is reason to think a neo-Aristotelian account of laws admits an element of teleology back into our philosophy of nature, although this is inconsistent with the assumption of mechanical dynamics (III). Might this also involve admitting mind into the fundamental ontology — at least, in some qualified sense? In what follows, I intend to answer that question in the affirmative.

3. Cosmic Hylomorphism

Suppose we're unwilling to drop the assumptions of ontological naturalism (I), scientific realism (II), or causal closure (IV), yet we consider ourselves to be free — unlike Rosenberg — from any dogmatic attachment to the assumption of mechanical dynamics (III). Does the neo-Aristotelian path I have outlined offer a way of thinking about physical laws which excludes mind from our fundamental description of reality? I'm not so sure.

There are two standard ways of characterizing the mental which divide modern philosophers: Descartes and Locke conceived mind as a capacity for *consciousness*; for Brentano, *intentionality* was the mark of the mental. Some philosophers have suggested that what makes mental states intentional is the fact they function in certain physical ways. Whilst modern philosophers have tended to treat the physical and the mental as separate in definition, however, David Charles argues that Aristotle held a distinctive view of the psychological in which a living organism is an 'inextricably psycho-physical subject' (Charles, 2021, p. 8). On the one hand, an organism has no purely psychological features that are essential to perceiving or desiring something, for instance, which can be defined without explicit reference to some specific internal physical functions or

capacities. On the other hand, it has no purely physical functions or capacities which can be defined without explicit reference to some relevant psychological features.

The reason Aristotle conceives psychological beings to be intrinsically physical and their physical constituents to be intrinsically mind-related is because he is a hylomorphist who holds that a psychological being has a *form* which unifies its parts and its powers. A hylomorphic substance is a composite of matter and form, where matter is something determinable which is determined by form (Simpson, 2023a). The matter of a psychophysical substance is determined in such a way that the type of physical capacities it exercises and the type of physical activities in which it is engaged 'cannot be defined without explicit reference in their definition to some psychophysical activity' of the whole (*ibid.*, p. 5). Any purely mental or purely physical features we might attribute to such a being should be understood as an *abstraction* from what is psychophysical and basic. The hylomorphist links consciousness and intentional cognition within the unified activity of a psychophysical whole. In a psychophysical whole, the parts and powers of the whole are caught up in the pursuit of its intentions and goals.

The two questions I wish to raise are whether a cosmos that exercises a global power is a hylomorphic whole, and if so, whether a cosmos which is directed toward life and complexity counts as a *psychophysical* whole. According to the theory of cosmic hylomorphism, which adopts a neo-Aristotelian account of laws, a world which is described by the laws of Bohmian mechanics would indeed constitute a hylomorphic whole (Simpson, 2021; 2023b; Moško and Simpson, 2024). After all, why should we suppose the *same* power to be instantiated by the particle configuration at *different* times, if the particle configuration is continually changing? Would the particle configuration have to contain a certain number of particles in order for it to instantiate a power that is expressed by the Bohmian law? The cosmic hylomorphist accounts for the persistence of the Cosmic Power and its identity across possible worlds that contain different numbers of particles by postulating the existence of a Cosmic Substance which exercises this power. The Cosmic Substance is a thing which persists through time, in spite of change in its parts, in virtue of having an essential and unchanging nature.

According to this theory, the Cosmic Substance is not an ontologically simple entity but has an interiority consisting of both *matter* and *form* (Simpson, 2021). Matter and form are *metaphysical*

constituents that contribute to the physical reality of a substance (Simpson, 2023a). The matter in this case may be conceived as a substrate of metaphysical atoms that have the *potential* to be electrons, positrons, or other kinds of particles, inasmuch as they have the potential to move in relation to one another in different ways. The form is the principle which *actualizes* the potentiality of the matter by determining the trajectories of the particles in accordance with the *telos* of the substance.[13] The particles comprising the Cosmic Substance may change their positions, and the Cosmic Substance may possess a different number of particles in other possible worlds, yet however many particles it contains they will derive their identities from its form. For the cosmic hylomorphist, it is the form of the Cosmic Substance that explains the persistence and transworld identity of the Cosmic Power, because it is the form which confers upon a substance its essential and unchanging nature (Simpson, 2023b).

If there is a Cosmic Substance whose parts and powers are unified by a Cosmic Form, should we think of this hylomorphic whole as being minded — a psychophysical whole? Contemporary powers theorists like Molnar, who are not typically hylomorphists, have sometimes noted that physical powers have an *intentional* character (Molnar, 2006, chapter 3). Molnar observed how it is essential to an intentional state of the mind that it should be directed toward something beyond itself, just as a physical power is directed toward its manifestation, and that the thing to which it is directed may be existent or non-existent, just as a physical power may or may not be in manifestation. In other words, he believed that the domain of the intentional extended beyond the mental to encompass the physical. Nonetheless, Molnar was concerned to avoid being charged with the heresy of panpsychism, preferring to characterize the mental in terms of *consciousness*. He thought of particles as physical entities having their own intrinsic powers, but not as hylomorphic entities — or parts of hylomorphic entities — unified by their forms. He saw no reason to regard such simple physical entities as being in any sense conscious.

For the cosmic hylomorphist, however, no wedge is driven between consciousness and intentionality, and the powers of microscopic particles are grounded in the form of a complex whole which is engaged in a unified, teleological activity. If the *telos* to which the Cosmic

[13] The form can be related to Bohm's and Hiley's (1993) concept of *active information*.

Substance is directing all of its particles is one which is properly characterized as an intention toward life and complexity, then the cosmic hylomorphist, I suggest, has reason to think of the cosmos as being more like a conscious organism than a purely physical mechanism. The theory of cosmic hylomorphism may be construed by the panpsychist as a hylomorphic version of cosmopsychism (or, indeed, as an alternative to cosmopsychism) by relating the *form* of the Cosmic Substance, which is immanent to the physical world, to the ancient idea of a World Soul (Dumsday, 2019; Wilberding, 2021),[14] which infuses mind into physical reality. The particles of the cosmos may move according to the Bohmian law of motion, but this physical law is an abstraction. The power which choreographs the trajectories of the particles, according to the hylomorphic cosmopsychist, is a psychophysical power.

4. Concluding Remarks

In this paper, I have extended the theory of cosmic hylomorphism, which posits a Cosmic Substance composed of matter and form, by conceiving the form of this substance as a World Soul which infuses physical reality with mind and purpose. If the metaphysic that I have sketched is viable, then God did not have to *add* anything to physical reality in order for there to be mind(s), nor is it necessary to abandon causal closure (IV) under physical laws for mind to exist in a way that makes a causal difference (even if there are at base no *purely* physical causes). Ontological naturalism (I) and scientific realism (II) are also preserved and dualism is averted. What my theory demands, however, is an openness to *final causation*, which is consistent with affirming the laws of physics without modification but inconsistent with a dogmatic commitment to mechanical dynamics (III).

My theory differs from any dualism that imposes a dichotomy between mental properties (or substances) and physical properties (or substances), in which the mental interacts with the physical by violating causal closure. Likewise, it differs from an epiphenomenalism that creates a dichotomy between physical properties which are causally powerful and mental properties which are causally inert. Rather, my theory conceives the whole of physical reality as having an

[14] In the Timaeus, for instance, Plato conceives the cosmos as thing which has soul and reason.

interiority that admits of analysis in terms of matter and form, where matter is the *potential* for conscious, intentional, and powerful being, but form is needed to *actualize* that potential. It neither separates the mental from the physical nor deprives the mental of causal power.

The theory of cosmic hylomorphism is also to be distinguished from micropsychist formulations of panpsychism, since it attributes mental properties to the cosmos as a whole rather than to microscopic particles, avoiding the notorious combination problem for panpsychism, which concerns how the consciousness of micro-subjects could combine to form the consciousness of macro-subjects. It improves upon cosmopsychist versions of panpsychism too by explaining *why* the cosmos might count as a unified subject which has intentions (Nagasawa and Wager, 2016).[15]

I have not attempted here to address the infamous 'decombination problem' that confronts cosmopsychism, however, which concerns how a cosmic subject and its conscious experiences can be decomposed into familiar subjects and their conscious experiences (for example, human beings and animals) (Miller, 2017). I suspect that this problem can be addressed by means of a deeper fusion of hylomorphism and panpsychism which incorporates 'local' as well as 'cosmic' forms. These local forms will have a unifying role to play in explaining the existence of local psychophysical wholes. They will also have a role to play as 'contextual constraints' in the temporal development of the particles comprising the cosmic whole. There are important questions to address concerning whether these local wholes can count as substances in their own right, however, and whether local substances can be parts of a cosmos which is a hylomorphic whole. I hope to pursue this idea and address these questions in future work. (For some initial ideas, see Simpson and Koons, 2025.)

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15 Simply positing that the whole is conscious, in the modern sense of the term, does not explain why it should be intentional or purposeful, or why anything else in the cosmos should be intentional or purposeful.

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