

# Derivatives and Consciousness

David Builes

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## Abstract

Many philosophers of physics think that physical rates of change, like velocity or acceleration in classical physics, are extrinsic. Many philosophers of mind think that phenomenal properties, which characterize what it's like to be an agent at a time, are intrinsic. I will argue that these two views can't both be true. Given that these two views are in tension, we face an explanatory challenge. Why should there be any interesting connection between these physical quantities and consciousness in the first place? In a speculative spirit, I close by developing a panpsychist view which promises to explain this connection in a particularly satisfying way.

## 1. Introduction

Suppose an apple was gradually changing its color between two times. It seems like, for any time within that period, the apple would have some particular color purely in virtue of how the apple is at that very time. The color that an apple has at a time doesn't seem to *constitutively* depend on how the apple was at any other past (or future) times, nor does it seem to constitutively depend on what's going on in the apple's external environment.<sup>1,2</sup> Similarly, suppose your visual experience was gradually changing its phenomenal color between two times. It seems like, for any time within that period, your visual experience would have some particular phenomenal color purely in virtue of how your visual experience is at that very time. At least in our more naïve moments, many of us are inclined to think of our conscious experiences as some kind of 'internal movie', playing

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<sup>1</sup> Of course, the color of an apple at a time *causally* depends on the prior states of the apple and its environment, but causal dependence and constitutive dependence are importantly different. The shape of an object, for example, might not constitutively depend on anything outside of that object, yet the fact that an object has a particular shape typically causally depends on all sorts of facts about the past. The property of *being the tallest person in the room*, on the other hand, is an example of an extrinsic property that constitutively depends on the heights of other people in the room. For more on constitutive dependence, see Dasgupta (2017), and for more on the similarities and dissimilarities between causal and constitutive dependence see Wilson (2018) and Bernstein (2016).

<sup>2</sup> This is merely a *prima facie* intuition. A naïve realist view about colors, according to which colors are objective, intrinsic, irreducible qualities of objects is especially friendly to this intuition (e.g. see Watkins (2005) and Allen (2017)). However, those who identify colors with dispositions to cause certain appearances in normal perceivers will think that colors partly depend on external perceivers (e.g. see Peacocke (1984), Johnston (1992), and Levin (2000)).

directly before us. Just as ordinary movies have intrinsic states at particular times (just hit pause!), it is natural to think that our conscious experiences do as well.

These intuitions support the view that when  $x$  has some phenomenal property  $p$  at some time, then  $p$  is an *intrinsic* property of  $x$  at that time. In other words, the fact that  $x$  has property  $p$  at some time does not constitutively depend on anything *external* to  $x$  at that time, such as its external environment or the past or future states of  $x$ .<sup>3</sup> Let's call such a view *Phenomenal Internalism*, and let's call the opposing view *Phenomenal Externalism*.

Phenomenal Internalism is compatible with any of the main views concerning the ultimate metaphysical basis of consciousness. For example, if Physicalism is true, Phenomenal Internalism could be true if phenomenal properties at a time were reducible to intrinsic brain states at that time. If Dualism is true, Phenomenal Internalism could be true if phenomenal properties at a time were fundamental intrinsic properties of an agent at a time. In fact, since other fundamental physical properties we know of are thought to be intrinsic, Phenomenal Internalism is an especially attractive position given Dualism. Other views beyond this standard dichotomy are also compatible with Phenomenal Internalism. Russellian Panpsychists, for example, adopt the view defended by Russell (1927) that physics only reveals to us the *structure* of matter but not its intrinsic, categorical nature. For example, physics may tell us a lot about what mass *does* (e.g. it resists acceleration and attracts other masses), but it tells us nothing about what mass is intrinsically like. Russellian Panpsychists go on to say that the intrinsic nature of matter is (at least partly) phenomenal, and that these more basic phenomenal properties are part of the ultimate ground of our own consciousness.<sup>4</sup> Such a view in fact needs to assume that phenomenal properties are intrinsic to a time in order to get off the ground. After all, the fundamental physical properties which they are supposed to be the intrinsic basis of (e.g. mass and charge) are intrinsic to a time.

Phenomenal Internalism is a thesis that has been defended by many different philosophers in different ways.<sup>5</sup> However, my main goal in this paper is to draw out some striking implications of the view. After drawing out an important consequence of Phenomenal Internalism (section 2), I will be arguing that Phenomenal Internalism is incompatible with a popular view in the philosophy of physics (sections 3-4). Rather than giving up on Phenomenal Internalism however, I will go on to argue that Phenomenal Internalism is particularly well suited to account for this surprising

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<sup>3</sup> This definition of intrinsic follows Rosen's (2010) definition in terms of grounding or constitutive dependence. Lewis (1983) also writes, 'A thing has its intrinsic properties in virtue of the way that thing itself, and nothing else, is... The intrinsic properties of something depend only on that thing; whereas the extrinsic properties of something may depend, wholly or partly, on something else' (197).

<sup>4</sup> For defenses of Russellian Panpsychism, see Strawson (2006) and Chalmers (2015).

<sup>5</sup> Pautz (2013) argues against Phenomenal Externalists who believe that conscious experiences may constitutively depend on features external to the brain. See Chuard (2011) and Prosser (2016: ch. 5) for a defense of the claim that phenomenal properties may be instantiated at a single time rather than an extended interval of time, against proponents of the 'specious present'. Historical defenders of the view that phenomenal properties may be instantiated at a single time also include St. Augustine (1961) and Thomas Reid (1855). For more on this debate, see Dainton (2008).

tension between consciousness and physics, so long as it is supplemented with a distinctive kind of panpsychism (section 5).

## 2. Phenomenal Internalism

Phenomenal Internalists should endorse the following thesis:

(\*) *Given the psycho-physical laws* (if there are any), any two intrinsic physical duplicates at a time are also phenomenal duplicates at a time.<sup>6</sup>

For orthodox Physicalists, (\*) directly follows from Phenomenal Internalism. According to Physicalists, phenomenal properties must be fully grounded in wholly physical properties. Moreover, by Phenomenal Internalism, if  $x$  has some phenomenal property  $p$  at time  $t$ , then this phenomenal property cannot constitutively depend on any physical properties *external* to  $x$  at that time. So, the fact that  $x$  has phenomenal property  $p$  at a time must be fully grounded in the fact that  $x$  has a certain intrinsic physical property  $p^*$  at that time. However, since any perfect physical duplicate of  $x$  will share the intrinsic physical property  $p^*$ , it will also share the phenomenal property  $p$  that  $p^*$  fully grounds.

For Russellian Monists, (\*) will also follow from Phenomenal Internalism for similar reasons. According to these philosophers, the intrinsic categorical nature of physical properties (which physics does not capture) grounds our conscious states. Since any two physical duplicates will share all the same physical properties with the same intrinsic categorical natures, it follows that they will also share the same phenomenal properties that are fully grounded in these intrinsic categorical natures.

However, for Dualists, there is no *inconsistency* in holding onto Phenomenal Internalism and denying (\*). For example, on a Dualist view, it might be that the psycho-physical laws correlate fundamental intrinsic phenomenal properties at a time with physical facts concerning the external environment. This wouldn't be inconsistent with Phenomenal Internalism since the intrinsic phenomenal properties would not *constitutively* depend on these external physical properties, but rather they would merely be lawfully correlated with these external physical properties out in the environment.

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<sup>6</sup> Some philosophers have argued against Phenomenal Internalism on the ground that some object is conscious only if it is, in a certain sense, 'maximal' (e.g. see Merricks (1998, 2003), Sider (2003), and Mørch (2019-a)). However, this way of denying Phenomenal Internalism (by adding a non-intrinsic maximality constraint) will still be vulnerable to the arguments later in the paper. In order to accommodate a non-intrinsic maximality constraint we may modify (\*) to be the thesis that, given the psycho-physical laws, any two *maximal* intrinsic physical duplicates at a time are also phenomenal duplicates at that time. The argument in section 3 that Phenomenal Internalism cannot be combined with an extrinsic theory of rates of change can be run equally well with this modified version of (\*).

Still, however, denying (\*) violates much of the spirit behind Phenomenal Internalism in the first place. In particular, there are two standard thought experiments that Phenomenal Internalists typically appeal to, which cumulatively provide strong support for (\*). Here is the first:

Brain in a Vat: Consider a disembodied brain in a vat which is being stimulated in such a way so that it is an *intrinsic duplicate* of your own brain. However, its external environment is radically different than your own. What is it like to be the brain in a vat?

The intuitions that support Phenomenal Internalism also support the claim that the brain in the vat would have all the same conscious experiences as you do. The fact that different things are going on in the external environment of the brain in a vat shouldn't be relevant to whether it is consciousness. If this is true, then the psycho-physical laws cannot correlate phenomenal properties at a time with facts about the external environment, since brains in vats have radically different external environments than we do.

Alternatively, it might be that (\*) is false because the psycho-physical laws correlate  $x$  having a phenomenal property  $p$  at a time with past or future physical states of  $x$  itself. For example, it might be that phenomenal properties at a time are lawfully correlated with past brain states at previous times. In response, here is the second thought experiment:

Swampman: Suppose you finished a hike through the swamp yesterday. The next day at 5 pm, perhaps by some wildly improbable quantum event, a lightning bolt strikes in the swamp and creates an atom-for-atom duplicate of you in the exact same place that you were yesterday at 5 pm, in the exact same environmental conditions. Call this atom-for-atom duplicate *Swampman*. What is it like to be Swampman at 5pm?

A natural answer for the Phenomenal Internalist to give is that Swampman is not only a physical duplicate of you at 5 pm, but he is also a *phenomenal* duplicate of you at 5 pm. An alternative answer is that Swampman is a *zombie* - there is nothing it is like to be Swampman at 5 pm. Some philosophers have defended this answer on the grounds that conscious states at a time depend on facts about the past – perhaps past brain states or past environmental states.<sup>7</sup> However, such a view leads to several awkward questions. Suppose Swampman continues on his hike for several hours, exactly as you did the previous day. By doing so, he starts becoming integrated with his environment and starts having past brain states. At what point does Swampman stop becoming a zombie? It's implausible to think that he remains a zombie for the rest of his life. However, if he stops becoming a zombie at some point, *exactly how long* does it take for him to start having conscious experiences? A few days, hours, minutes, seconds? Does Swampman's conscious

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<sup>7</sup> For example, some philosophers have defended *Externalist Intentionalism*, which combines an externalist theory of representation with the claim that phenomenal states supervene on representational states. Standard versions of the view would imply that Swampman is a zombie since he does not have any representational states. See Dretske (1995), Armstrong (1999), Tye (2000), Lycan (2001), Byrne and Hilbert (2003), and Hill (2009) for defenses of this view.

experiences suddenly ‘pop’ into existence, or do they somehow gradually ‘fade’ into existence? All of these awkward questions may be avoided if one says that Swampman is already a phenomenal duplicate of you when he comes into existence at 5 pm.

If it is right to think that Swampman is both a physical and a phenomenal duplicate of you at 5 pm, then the psycho-physical laws can’t make phenomenal properties at a time sensitive to facts about Swampman’s *past* brain states, since Swampman has no past brain states! Swampman’s phenomenology at 5 pm is entirely fixed given his intrinsic physical state at 5 pm.

One could also conceivably try to deny (\*) by saying that the psycho-physical laws correlate phenomenal properties at a time with *future* brain states. However, this would have bizarre implications for a ‘time-reversed’ variant of the Swampman case. Suppose I were to pop *out* of existence right after 5 pm. Surely my conscious experiences at exactly 5 pm wouldn’t be any different because of this! Moreover, similar kinds of awkward questions arise (e.g. would my conscious experiences be any different at 4 pm?).

It is certainly possible to be a Phenomenal Internalist that denies (\*). For example, it is possible to be a Dualist who believes that phenomenal properties are intrinsic to a time, yet they are correlated with extrinsic features of the environment via psycho-physical laws. However, anyone who denies (\*) is committed to thinking that brains in vats or Swampmen are not conscious in the same ways that we are. Such views face several awkward questions. How much of the external environment needs to be changed for brains in vats to be conscious? How much time does it take for Swampman to become conscious? One of the central motivations for Phenomenal Internalism has always been that duplicate brains in vats and Swampmen are conscious in the same ways that we are. Because of this, there is strong pressure for Phenomenal Internalists to accept (\*). Moreover, we have already seen that Phenomenal Internalists who are either Physicalists or Russellian Monists must adopt (\*) anyway. Moving forward, I will therefore be assuming that Phenomenal Internalists should endorse (\*).

### 3. Extrinsic Rates of Change

Let us now briefly turn to the philosophy of physics. There is a classic debate in the philosophy of physics about whether certain rates of change, like velocity, are intrinsic. The debate goes all the way back to Zeno’s ‘Arrow Paradox’. Consider an arrow in flight. At any particular point in time, Zeno suggests that the arrow is motionless, because it cannot move in an instant. However, how can the arrow ever move if at every point in time it is motionless? The standard response to this paradox is the so-called ‘at-at’ theory of motion defended by Bertrand Russell, that ‘motion consists merely in the occupation [by the same body] of different places at different times’ (1937, p. 473). This is also the standard view that is assumed in physics textbooks, where velocity is simply identified with the derivative of position. On this reductive view of velocity, the velocity

facts are grounded in the position facts. As a consequence, the velocity of an object at a time is not an *intrinsic* property of the object at that time. Rather, it is grounded in certain facts about the position of the object at distinct times.

There are two main considerations in favor of the reductionist at-at view of velocity. First, since the at-at view reduces velocity facts to facts that everyone already has to accept, considerations of parsimony strongly favor the at-at view over anti-reductionist views. Second, Lange (2005) has argued that standard anti-reductionist views have a hard time explaining why there is a necessary connection between facts about the derivative of position and facts about unreduced, intrinsic velocity. However, on reductionist at-at views, there is no mystery as to why these two quantities are necessarily correlated.

While it is fair to call the at-at view the orthodox view, there has been some push back. Tooley (1988) and Carroll (2002) have argued that we should take instantaneous velocity to be an intrinsic property of an object that is not reduced to its position at different times. Perhaps the main argument given by non-reductionists is that rates of change like velocity could not play their causal role in determining the future evolution of the world if the standard reductionist account were true.<sup>8</sup>

While this debate has often centered around velocity, it should be stressed that the debate is far more general. Even in classical physics, there are other important quantities for which the very same debate can be had. The kinetic energy of a physical system, for example, is partly a function of the velocities of its components. So, if the velocity of any object at a time is extrinsic, the total *energy* of any physical system at a time will also be extrinsic. Similarly, the debate can also be run about accelerations, which are (unlike velocities) independent of one's reference frame. Beyond classical mechanics, rates of change appear in Maxwell's equations (with respect to the changing electric and magnetic fields) and in Schrödinger's equation (both explicitly in the time-derivative of the wave function and implicitly in terms of the energy for the Hamiltonian). Anywhere physics uses derivatives, there is a corresponding physical rate of change. Just as we can wonder whether the velocity facts are intrinsic or extrinsic to a physical system at a time, we can wonder whether these other physical rates of change are intrinsic or extrinsic to a physical system at a time. The very same considerations in favor of reducing velocity will also be considerations in favor of reducing these other derivative-like quantities.

Having stressed the generality of this debate, for the remainder of the paper I will be following the philosophical literature by focusing on the case of velocity, for simplicity's sake.

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<sup>8</sup> See Easwaran (2014) for a recent defense of the reductionist view from this objection. For more discussion of the at-at view, see Arntzenius (2000) and Builes and Teitel (2020).

#### 4. The Conflict

We have seen that a natural view in the philosophy of mind is that phenomenal properties at a time are *intrinsic*, while a natural view in the philosophy of physics is that rates of change are *extrinsic*. I will argue that both of these views cannot be true.

In order to show this, I will need the following important fact about the at-at theory of rates of change. According to the at-at theory, extremely different causal processes can be intrinsically identical at a time. For example, a sharply accelerating arrow at time  $t$  might be an *intrinsic duplicate* of an arrow that is simply falling directly to the ground at time  $t$ . The time-slice of the moving arrow at time  $t$  could be an intrinsic duplicate of the falling arrow because it might be that the *only* differences between them are facts about their velocities and accelerations, which are extrinsic features of the arrow-time-slices. More generally, any physical system whose parts are rapidly colliding, falling, or shattering at time  $t$ , may be an intrinsic duplicate of a physical system whose parts are all at *rest* at time  $t$ , given that the only differences between the two systems at time  $t$  are their rates of change.

Given this fact, we can now present the tension between Phenomenal Internalism and extrinsic theories of rates of change. I will first motivate the tension in the form of a thought experiment, and then I will proceed to give the main argument. Suppose that rates of change really are extrinsic. Consider the following fanciful case, which is parallel to the case of the duplicate fast-moving arrow and falling arrow:

Frozen Twin: Suppose I am undergoing a very painful procedure, and so I am in pain at time  $t$ . Now, consider a time-slice physical duplicate of me at time  $t$  that is ‘frozen’. That is, consider a physical duplicate of me that is completely immobilized, forever. Perhaps their mouth is currently open since I was screaming at time  $t$ , there are tears coming out of their eyes (but are currently not moving), etc. It is as if someone made a duplicate of me at time  $t$  and hit ‘pause’, forever.

If all rates of change are extrinsic, Phenomenal Internalism predicts that my frozen twin will be experiencing pain, forever. This is because, if all rates of change are extrinsic, my intrinsic physical properties at time  $t$  are the very same intrinsic physical properties of my frozen duplicate at any given time. Therefore, by Phenomenal Internalism (and (\*)), it follows that, if I’m in pain at  $t$ , my frozen duplicate is in pain forever. However, one can easily avoid this implausible verdict if rates of change (like velocity) are intrinsic. If they are intrinsic, then it’s false that my intrinsic properties at time  $t$  are the same intrinsic properties of my frozen twin at any time. Among my intrinsic properties at time  $t$  are, for example, the velocities of my parts. My frozen twin certainly lacks these properties. The velocity of their parts is zero.

The claim that my frozen twin will be eternally in pain strikes me as extremely implausible. However, we can do more than just lean on intuition here. For my frozen twin, there is no causation

going on, no cognitive functioning, no mental computation, no complicated behavioral dispositions, no nothing. However, these are *exactly* the kinds of facts that plausible philosophies of mind think are (at least given the psycho-physical laws) correlated with phenomenal properties. Plausible philosophies of mind entail that conscious experiences are associated with certain essentially *dynamic* states of the brain. So, everyone should think that my frozen twin is not eternally in pain. So, Phenomenal Internalism and the extrinsic theory of rates of change predict the wrong result.

While Frozen Twin is clearly a fanciful case, the same essential point can be made with other scenarios. Instead of taking a duplicate of me at time  $t$  and setting the rates of change of all the parts of the duplicate to zero, one can instead take a duplicate of me at time  $t$  and mess with the rates of change of my parts in however ways one wants. As a consequence, by varying the rates of change arbitrarily, one is varying the underlying causal processes arbitrarily. The crucial point is that both intuition and plausible philosophies of mind imply that phenomenal properties at a time are sensitive to facts about underlying physical causal processes at that time, which correspond to different rates of change at that time. The sensitivity between phenomenal properties at a time and underlying physical causal processes at that time cannot be accommodated by the conjunction of Phenomenal Internalism and extrinsic theories of rates of change. So, one of these views has to go.<sup>9</sup>

## 5. A Unified Resolution

I have argued that there is a tension between a plausible view in the philosophy of mind and a plausible view in the philosophy of physics. When faced with a tension like this, one may of course simply deny whichever view one finds least plausible. For many philosophers, especially those with a Physicalist bent, I suspect that it will be easier to reject Phenomenal Internalism than it is to reject extrinsic theories of rates of change. However, instead of simply rejecting Phenomenal Internalism, I will instead be arguing that this tension may be leveraged as a positive argument in *favor* of a particular panpsychist version of Phenomenal Internalism.

The tension I have described raises an explanatory question: why should there be any interesting connection between fundamental physical rates of change and consciousness in the first place? Prima facie, these two things seem to have nothing to do with each other. Ideally, we should want a theory that explains why this connection holds. In a speculative spirit, I will conclude by sketching a principled view which answers this question in a satisfying way. The view is a synthesis of a view argued for by Lange (2005) on the philosophy of physics side and a view

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<sup>9</sup> In fact, given that all phenomenal properties are sensitive to underlying physical causal processes, so long as Phenomenal Internalism and (\*) is true of *some* phenomenal properties, then one cannot believe that all rates of change are extrinsic.

argued for by Mørch (2014, 2018, forthcoming-a, forthcoming-b) on the philosophy of mind side. It is a view that endorses Phenomenal Internalism and rejects extrinsic theories of rates of change.

The main reason for endorsing at-at theories of velocity (and other extrinsic rates of change more generally) is to avoid ‘velocity primitivism’. In the context of classical physics, velocity primitivism is the view that instantaneous velocity at a time is a metaphysically fundamental property, like mass and charge. Moreover, since velocity is a primitive, fundamental property it is merely *nominally* connected to the derivative of an object’s position at that time. The standard objection to velocity primitivism is that it posits extra fundamental properties and fundamental laws about such properties in a way that can be easily dispensed with by endorsing the at-at theory. Lange also objects to the contingent connection between velocity and position. Intuitively, velocity is *essentially* something to do with an object’s trajectory.

In response to these objections, Lange argues in favor of a *dispositional* view of velocity and other rates of change. On Lange’s view, what it is for an object to have a velocity  $v$  at time  $t$  just is for it to be disposed to take a certain trajectory whose time-derivative at  $t$  is  $v$ . On this view, velocity isn’t merely *nominally* correlated with an object’s trajectory, so no extra fundamental laws need to be posited. Lange’s view therefore manages to reject extrinsic theories of rates of change without incurring the usual costs. Moreover, similar dispositional accounts can be given for other rates of change throughout physics.

A natural follow-up question to such a view is to ask what the categorical grounds of such intrinsic dispositions are. Here, the philosophy of mind comes in. Russellian Panpsychism, defended by Chalmers (2015), Strawson (2006), Goff (2017), Russell (1927), and many others, is the view that (at least some of) the categorical properties of fundamental physical entities are phenomenal. The *Phenomenal Powers* view, defended in different ways by Mørch (2014, 2018, 2019-b, forthcoming-a, forthcoming-b) and Langsam (2011), is the view that it is a priori knowable that categorical phenomenal properties ground certain physical dispositions in virtue of their intrinsic phenomenal character (as opposed to in virtue of entering into contingent regularities or being governed by external laws).<sup>10</sup>

The Phenomenal Powers view is, of course, a very controversial view. However, it is a view that panpsychists should take very seriously. Since panpsychists already have independent reason to posit fundamental phenomenal properties at the most basic level of reality, they all face an important choice point. Are these basic phenomenal properties *powerful* (i.e. do they partly explain why physical systems are disposed to behave in the way they do) or are they completely *powerless* (i.e. do they play no explanatory role in explaining why physical systems are disposed to behave in the way they do)?

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<sup>10</sup>Goff (2017, forthcoming) has also argued that ‘consciousness +’ properties – properties which have both phenomenal and non-phenomenal aspects – ground certain corresponding dispositions.

While a full defense of the Phenomenal Powers view is far beyond the scope of this paper, it is easy to motivate the view by reflecting on our own phenomenological experiences. It is natural to think, for example, that *pain* makes subjects who experience it try to avoid it simply in virtue of how it feels. *Pleasure* might make subjects who experience it try to pursue it simply in virtue of how good it feels. Someone who feels *tired* or *exhausted* might be disposed to stay in bed simply in virtue of how tired they feel. It is difficult to conceive of pain making a subject try to pursue it, or pleasure making a subject try to avoid it. However, these connections between these experiences and their effects are certainly defeasible. Of course, in our own case, human subjects endure pain for all sorts of reasons. Someone might endure short-term pain in order to avoid more pain in the future (e.g. cleaning a wound), or in order to experience a greater pleasure (e.g. masochism), etc.<sup>11</sup> However, in the *absence* of any interfering causes like these, it seems that pain always makes subjects at least try to avoid it. Similarly, throwing a ball at a window might cause the window to break, but only in the *absence* of any interfering causes. Of course, the wind might blow the ball away before it hits the window, or the window might be shattered by a rock before the ball gets to it, etc.

Another argument for the Phenomenal Powers View is an evolutionary argument (Mørch 2018). It is an empirical fact that evolution has correlated pain with harmful stimuli (such as bodily damage) and pleasure with beneficial stimuli (such as nourishing food). Many of the main views in the metaphysics of consciousness, according to which there is no *a priori* connection between conscious experiences like pains and pleasures and their associated effects, seem to make these correlations a mere coincidence. However, the Phenomenal Powers View explains these connections particularly well. For example, the reason why evolution correlated painful experiences with harmful stimuli is that (*ceteris paribus*) pain will make organisms try to avoid harmful stimuli.

Synthesizing Lange's view with the Phenomenal Powers version of Russellian Panpsychism results in a view according to which physical rates of change at a time, like velocity, are intrinsic dispositions at a time which are (at least partly) grounded in the categorical, phenomenal natures of things. Whether one accepts this view will of course ultimately turn on a wide variety of different considerations in metaphysics and the philosophy of mind that I will not be addressing

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<sup>11</sup> Another common objection to the claim that pain essentially disposes one to avoidance behavior is the phenomenon of pain asymbolia. Those who have pain asymbolia may experience pain without the corresponding feeling of unpleasantness, so they are not motivated to avoid the pain. For this objection to go through, it would have to be maintained that pain experiences for those who have pain asymbolia have the *very same* phenomenal character (i.e. feel the same) as ordinary experiences of pain. However, this is doubtful. It is natural to think that the *unpleasantness* of pain is part of the phenomenal character of ordinary experiences of pain. On this view, what the phenomenon of pain asymbolia shows is that ordinary phenomenology of pain has two components, a sensory component and an affective component. For those who have pain asymbolia, these two components come apart, and they only experience the sensory component without the affective component. For much more on this, see Grahek (2007) and Mørch (2019-b).

here. My goal here is only to motivate the view as an especially attractive resolution to the tension we have been facing.

Not only does the view give a principled resolution to the tension above, but it also *explains why* phenomenal properties are connected to ‘dynamic’ physical properties (like rates of change) as opposed to merely ‘static’ ones in the first place. On Dualist views, according to which there are fundamental psycho-physical laws connecting physical properties to phenomenal properties, it is mere coincidence that phenomenal properties are connected to dynamic physical properties. Presumably the fundamental psycho-physical laws could just as well have connected phenomenal properties to purely static physical properties. Even on many physicalist views, while there are metaphysically necessary connections between physical and phenomenal properties, there is no *a priori* connection between physical and phenomenal properties.<sup>12</sup> That is, even on many physicalist views, there are many *epistemic* possibilities (possibilities that cannot be ruled out by ideal rational reflection) with the very same underlying physical properties being associated with phenomenal properties in all sorts of different ways (e.g. zombie worlds and inverted spectrum worlds). Presumably one such epistemic possibility is that empirical findings imply that phenomenal properties reduce to wholly ‘static’ physical properties. Even if they in fact don’t reduce to such properties, on this view there is no satisfying explanation to be had as to why they don’t.

In sum, the advantages of combining Lange’s view about rates of change with a Phenomenal Powers version of Panpsychism are as follows. First, the view allows us to hold on to the powerful intuitions in favor of Phenomenal Internalism. After all, Russellian Panpsychism is committed to Phenomenal Internalism insofar as it says that the intrinsic categorical nature of fundamental physical properties at a time are phenomenal properties at a time. Second, the view allows us to hold on to the main motivations in favor of extrinsic theories of rates of change. In particular, the view does not make the connection between intrinsic velocity and the derivative of position a mystery: to have an intrinsic velocity *just is* to be disposed to take a certain trajectory that has the correct corresponding derivative of position. Moreover, the view does not violate considerations of parsimony by *adding* extra unnecessary fundamental properties in the form of primitive velocity. Rather, the view simply makes a claim about the *nature* of the underlying intrinsic categorical nature of matter (namely, that it grounds a corresponding disposition). Third, the view allows us to explain why phenomenal properties are correlated with dynamic physical properties. Whereas Dualist views and popular Physicalist views make this correlation a mere coincidence, the Phenomenal Powers view *entails* that phenomenal properties will be correlated with dynamic physical properties.<sup>13</sup>

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<sup>12</sup> Such views are classified as ‘type-B’ physicalism as opposed to ‘type-A’ physicalism, in the terminology of Chalmers (2003).

<sup>13</sup> It is also worth noting that some ‘neutral monist’ views which collapse the distinction between phenomenal properties and dynamic physical properties will also yield these explanatory advantages (e.g. see Silberstein et al. (2018)).

The Phenomenal Internalist has the resources to adopt a simple and elegant solution to the tension we have been facing. Fundamental rates of change at a time hold in virtue of how things are disposed to behave at that time, and how things are disposed to behave at a time hold (at least in part) in virtue of what it's like to be those things at that time.<sup>14</sup>

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