



Idealist Panpsychism and Spacetime Structure

ABSTRACT: *This paper presents a novel argument against one theoretically attractive form of panpsychism. I argue that ‘idealist panpsychism’ is false because it cannot account for spacetime’s structure. Idealist panpsychists posit that fundamental reality is purely experiential. Moreover, they posit that consciousness at the fundamental level metaphysically grounds and explains both the facts of physics and the facts of human consciousness. I argue that if idealist panpsychism is true, human consciousness and consciousness at the fundamental level will have the same metrical structure. However, as I demonstrate, human consciousness does not exhibit the same metrical structure as spacetime. Consequently, the idealist panpsychist faces an explanatory gap between the fundamental consciousness she posits and spacetime. Idealist panpsychism is incompatible with the existence of such an explanatory gap. Thus, idealist panpsychists must either close this explanatory gap (which I argue they lack the resources to do), or idealist panpsychism is false.*

KEYWORDS: panpsychism, spacetime, explanatory gap, grounding, idealism, philosophy of mind, metaphysics

Introduction

Panpsychism is the metaphysical thesis that consciousness is fundamental and everywhere. According to panpsychists, consciousness is not only a property of humans, animals, and other complex beings, but moreover, there is something that it is like to be a fundamental physical entity, such as a quark, an electron, or spacetime. Panpsychists argue that human consciousness is grounded in and fully explainable by consciousness at the fundamental level.

Panpsychism appeals primarily to those who find physicalism unsatisfactory. By redefining the physical world as conscious, panpsychism aspires to explain human consciousness better than physicalism does. At the same time, panpsychism aims to match (or approach) physicalism in

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ontological simplicity. Taking this motivation all the way entails a particularly attractive form of panpsychism that I call idealist panpsychism (my terminology here is inspired by Chalmers 2020). Idealist panpsychism is my focus in this article.

Idealist panpsychism is the thesis that fundamental reality is purely conscious and that everything reduces (metaphysically and epistemically) to the fundamental consciousness. Like other forms of panpsychism, idealist panpsychism is explanatorily potent: it promises to explain human consciousness fully in virtue of a fundamental consciousness. However, what makes idealist panpsychism particularly attractive is that—unlike other forms of panpsychism—it equals physicalism in ontological simplicity. Idealist panpsychism is the ontologically simplest form of panpsychism: it posits nothing but consciousness as fundamental.

Due to the above virtues, idealist panpsychism is rising in popularity. Philosophers who defend or are sympathetic to idealist panpsychism include Chalmers (1996, 2015, 2020), Strawson (2006a, 2006b, 2015, 2020), Goff (2017, 2019), Kastrop (2018), and Roelofs (2019), among others. I will argue that idealist panpsychism is false because there is an underdiscussed explanatory gap between the fundamental consciousness it posits and spacetime. If idealist panpsychists cannot close this explanatory gap, idealist panpsychism is false.

I use the term ‘consciousness’ to refer exclusively to phenomenal consciousness. I understand ‘experiences’ to be states of phenomenal consciousness. Moreover, I assume that experiences are essentially characterized by their phenomenal characters: by *what it is like* to have them.

I understand ‘grounding’ metaphysically, as a relation of directed determination between the more fundamental facts (as grounds) and the less fundamental facts (as groundees). I will assume that groundees are nothing over and above their grounds and also that grounding backs metaphysical explanations. I take the fundamental facts to be ungrounded. I take the derivative facts to be grounded either in other derivative facts or in the fundamental facts.

I will use italicized capital letters to designate entities and brackets to designate facts. In my usage, if *P* stands for Plato, [*P*] stands for the facts about Plato. For convenience, when discussing grounding, I will sometimes frame the discussion in terms of entities. This should be read as shorthand for the facts those entities are involved in.

I use the term ‘explanatory gap’ to refer to a lack of an intelligible connection between a ground and a groundee. In the philosophy of mind literature, the relevant notion of intelligible connection is typically characterized as a priori entailment between truths (see Chalmers and Jackson 2001). In this usage (that I am adopting here), for any ground [*P*] and groundee [*Q*], there is an explanatory gap obtaining between [*P*] and [*Q*] iff the [*P*]-truths do not a priori entail the [*Q*]-truths.

In section 1, I will define idealist panpsychism and outline its main problems. In section 2, I will present my argument against idealist panpsychism. Finally, in section 3, I will respond to objections to the argument.

I. Idealist Panpsychism and its Discontents

I.1. What is Idealist Panpsychism?

Idealist panpsychism is the thesis that fundamental reality is purely experiential and that everything reduces (epistemically and metaphysically) to fundamental experiences. In the current technical jargon, idealist panpsychism is pure, Russellian, and constitutive.

First, idealist panpsychism is *pure* because it posits that fundamental reality is purely experiential. Thus, according to idealist panpsychists, there is nothing more to fundamental reality than consciousness.

Second, idealist panpsychism is *Russellian* because, inspired by Russell (1927), it posits epistemic structural realism about physics (see Goff 2021: 313). Epistemic structural realism is the view that physics accurately describes the structure of fundamental reality, but not the intrinsic natures of the entities instantiating that structure. According to Russellian panpsychists, these intrinsic natures are the phenomenal characters of the fundamental experiences. If so, physics can accurately describe the structure of the fundamental experiences although it is silent about their phenomenal characters. Goff captures Russellian panpsychism's core commitments particularly well:

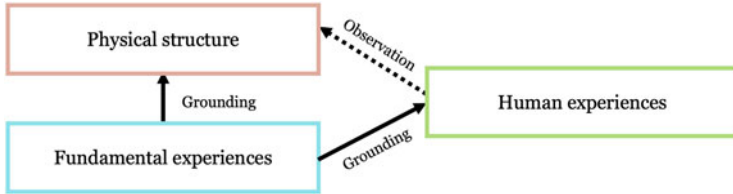
The entire story of physics is the story of what consciousness does. Of course, when you're doing physics, you don't know that's what you're studying. But that's just because physics is only concerned about causal dynamics and abstracts away from the nature of the things underlying those dynamical structures. Doing physics is like playing chess when you don't know what the pieces are made of. (2021: 292)

Physical entities are standardly understood as purely structural entities. Russellian panpsychists aspire to redefine these entities as both phenomenal and structural. The novel fundamental entities posited by Russellian panpsychists are, simply put, experiences with a physical structure. To avoid confusion, I will refer to Russellian panpsychism's novel entities simply as *fundamental experiences*. Moreover, I will use the adjective 'physical' to refer to the purely structural aspects of these entities.

Given Russellian panpsychism, physical structure is never fundamental. Instead, physical structure is always grounded in the fundamental experiences. The fundamental experiences are metaphysically and explanatorily prior to physical structure: they determine and metaphysically explain physics, but not vice versa.

Third, idealist panpsychism is *constitutive*: it posits that human (and all nonfundamental) experiences are grounded in the fundamental experiences. The fundamental experiences determine and metaphysically explain the derivative experiences.

Idealist panpsychism, as defined above, is the metaphysically simplest form of panpsychism because it posits only experiences as fundamental. Moreover, it is an explanatorily powerful form of panpsychism because the fundamental experiences reductively explain both physics and higher-order experiences. Idealist panpsychism's core commitments can be illustrated as follows:



Idealist panpsychism is at the intersection of idealism and panpsychism (see Chalmers [2020] for an in-depth analysis of the relation between panpsychism and idealism). Thus, it counts as a form of both idealism and panpsychism. Like all versions of idealism, it is a thesis of mental monism. Like all versions of panpsychism, it posits an objective reality that is metaphysically prior to and independent of human and other derivative experiences. I frame the discussion in panpsychist terms mostly due to panpsychism's recent rise in popularity and to avoid some of the misconceptions surrounding idealism.

1.2. The Combination and Missing Entities Problems

The idealist panpsychist framework involves three essential elements: (i) fundamental experiences, (ii) derivative experiences, and (iii) physical structure. The fundamental experiences ground both the derivative experiences and physical structure. In this context I take grounding to entail a form of metaphysical and epistemic reduction.

Metaphysically, the fundamental experiences fully ground all derivative experiences and all physical structure. The derivative experiences and physical structure are nothing over and above the fundamental experiences. Given this, idealist panpsychism contains two metaphysical seams at its core:

MACROEXPERIENCE SEAM: The fundamental experiences ground all derivative experiences.

PHYSICS SEAM: The fundamental experiences ground all physical structure.

Epistemically, the fundamental experiences should, in principle, fully explain the obtaining of the derivative experiential facts and the physical facts. For an ideal reasoner, there should be no explanatory gap between (a) the facts of the fundamental experiences and (b) the facts of derivative experience and physical structure.

The idealist panpsychist's metaphysical and epistemic commitments go hand in hand. Thus, her metaphysical commitments can be challenged if the epistemic commitments are shown to fail. Perhaps the best way to do so is by demonstrating the existence of explanatory gaps at MACROEXPERIENCE SEAM or PHYSICS SEAM, as follows:

MACROEXPERIENCE GAP: There is an explanatory gap between the fundamental and derivative experiences.

PHYSICS GAP: There is an explanatory gap between the fundamental experiences and physical structure.

MACROEXPERIENCE GAP targets MACROEXPERIENCE SEAM, while PHYSICS GAP targets PHYSICS SEAM. In the relevant literature MACROEXPERIENCE GAP is typically explored as an aspect of *the combination problem*. The combination problem is a well-known problem for panpsychism. Roughly, it is the problem of explaining how the fundamental experiences ground derivative experiences such as human experiences. The combination problem, as expressed in MACROEXPERIENCE GAP, entails that idealist panpsychism fails to explain human experiences fully. If so, there might be no reason to prefer idealist panpsychism over physicalism.

In contrast to MACROEXPERIENCE GAP, PHYSICS GAP has received little attention in the literature so far. PHYSICS GAP expresses what I have called *the missing entities problem* in Aleksiev (2021). This is the problem of explaining how the fundamental experiences ground physical structure. In essence, the missing entities problem is the mirror image of the hard problem of consciousness: it is the hard problem in reverse for the idealist panpsychist.

To solve the missing entities problem, the idealist panpsychist must demonstrate that there are no explanatory gaps between the fundamental experiences and physical structure. Otherwise, some physical entities would lack a metaphysical explanation and, thus, appear to go ‘missing’ from our account of reality. In Aleksiev (2021), I mentioned spacetime, the quantum wave function, and timeless quantum gravitational entities as examples of entities that might go ‘missing’ in this sense.

Given current physics, spacetime structure is perhaps the best candidate for a structure that might be real. Aleksiev (2021), Chalmers (2020: 361–62, 365), Goff (2017: 181–86), and Strawson (2020: 330) acknowledge that accounting for spacetime might be challenging for idealist panpsychists. Nevertheless, so far, there has been no detailed investigation of spacetime as a problem for idealist panpsychism. In this essay I set out to change that.

The combination problem and the missing entities problem are distinct yet interconnected. In principle, it is possible to solve one without solving the other. Yet, such a solution would be useless. Any solution to the combination problem must be guided by the missing entities problem. And vice versa, any solution to the missing entities problem must be guided by one to the combination problem. Idealist panpsychism must solve both problems to be a viable theory of consciousness. Yet, although the missing entities problem strikes at the very core of idealist panpsychism, so far, the combination problem has received most of the attention. Idealist panpsychists have yet to give a rigorous account of how spacetime could be essentially experiential.

2. The Spacetime Argument

2.1. The Spacetime Gap and Argument

The general theory of relativity (GTR) is our current best theory of space and time. It unites space and time into a single geometric manifold: spacetime. In what follows, I will presuppose epistemic structural realism about spacetime: the view that all or some spacetime structure is real. Idealist panpsychists are epistemic structural realists about physics. Thus, given the empirical successes of GTR, this assumption should be acceptable to idealist panpsychists. In what follows, for brevity, I will simply use ‘structural realism’ in place of ‘epistemic structural realism’.

Spacetime, according to GTR, has a metrical structure. In geometry, a metric is a structure that determines distances. Geometry allows for many possible metrics, for many possible ways to understand distance. In ordinary life, by ‘distance’, we typically have in mind Euclidean distance. This is the distance we deal with when we normally measure something or apply the Pythagorean theorem. The spacetime metric is another kind of metrical structure. The spacetime analog of the Euclidean distance is a quantity called the *spacetime interval*.

The spacetime interval is different from the Euclidean distance, just like the spacetime metric and the Euclidean metric are different. For any two points, the Euclidean distance of ordinary life is always a *positive quantity*. In contrast, the interval between two spacetime points can be *positive, negative, or null*. This is why, in contrast to the Euclidean and other metrics commonly used in ordinary life, the spacetime metric is formally defined as a pseudometric. (A metric is a function that maps pairs of distinct points to positive quantities. In contrast, a pseudometric violates this constraint; its range is not limited to positive quantities.)

Spacetime’s metrical structure is ubiquitous. It describes all regions of spacetime and at all scales. Moreover, spacetime intervals are *invariant*: they are the same for all observers in all frames of reference. For every spacetime point, there are other spacetime points at positive, negative, or null spacetime intervals from it, and these ratios are invariant. Finally, the spacetime metric describes spacetime’s *causal structure*; it describes whether two spacetime events are causally connected or disconnected. Thus, the spacetime metric is the part of GTR essential to its empirical success.

Given the previous, spacetime’s metrical structure is an obvious candidate for a real physical structure (for a thorough defense see Dorato 2000). Throughout this essay, I will refer to it as follows:

METRIC: The spacetime metrical structure.

My argument against idealist panpsychism is based upon the observation that METRIC is unlike any structure found in human experience. I take this observation plus the claim (that I will defend) that our experiences and their experiential grounds have the same metrical structure to entail the following explanatory gap:

SPACETIME GAP: There is an explanatory gap between spacetime’s experiential ground and the spacetime metric facts.

SPACETIME GAP gives rise to an argument against idealist panpsychism that I call *the spacetime argument*:

- P₁: *No Gap*: If idealist panpsychism and spacetime structural realism are true, SPACETIME GAP is false.
- P₂: *Human Experience*: No human experience has METRIC.
- P₃: *Same Metric*: If spacetime's experiential ground has METRIC everywhere, then human experiences also have METRIC.
- C₁: Spacetime's experiential ground does not have METRIC everywhere [from P₂ and P₃].
- P₄: *Gap*: If spacetime's experiential ground does not have METRIC everywhere, then SPACETIME GAP is true.
- C₂: SPACETIME GAP is true [from C₁ and P₄].
- P₅: *Structural Realism*: Spacetime structural realism is true.
- C₃: Idealist panpsychism is false [from P₁, C₁, and P₅].

The spacetime argument proceeds in three parts. The first part establishes C₁ via P₂ and P₃, which are the key premises of the argument. Once C₁ is established, the argument proceeds straightforwardly. It establishes C₂ (from C₁ and P₄) in the second part and C₃ (from P₁, C₁, and P₅) in the final part. In essence, the argument is a *reductio ad absurdum* of idealist panpsychism due to its commitment that 'physics is the story of what consciousness does' (Goff 2021: 292) plus structural realism about spacetime.

By 'spacetime's experiential ground', I mean the full and fundamental ground of spacetime in an idealist panpsychist ontology. Thus, spacetime's experiential ground includes both the intrinsic natures of the fundamental experiences postulated to ground spacetime and their relations. I am neutral on whether spacetime's experiential ground is identical to all or some of the fundamental experiences. If it equals all the fundamental experiences (which is plausible given that spacetime is everywhere), then the problem for idealist panpsychism is obvious. If it equals only some of the fundamental experiences, then the rest of the fundamental experiences do not ground spacetime and thus cannot help close SPACETIME GAP. Consequently, there will be an explanatory gap between the totality of fundamental experiences and spacetime's structure in either case.

Throughout this article, I will typically assume that spacetime's experiential ground is phenomenally unified (or simply 'unified'). A collection of experiences is unified iff its members constitute a *single* experience (see Bayne and Chalmers [2003] for a defense). Nothing essential hangs on the unity assumption. It is easier to speak of single experiences instead of collections of experiences. Moreover, and more importantly, phenomenal unity benefits the idealist panpsychist. As will become clearer later, the best candidates for experiences instantiating distances are unified. (In section 2.2.3 I investigate one case where spacetime's experiential ground is not unified: Roelofs's [2014] causal proximity proposal; also, in section 3.2, objection (i) deals with disunified experiences.)

In this article, I focus solely on the case of a flat spacetime in a vacuum—that is, the spacetime of the special theory of relativity (STR)—as a simple form of spacetime. This

is because accounting for the STR spacetime is already challenging enough, especially given the lack of previous discussion on the problem. Thus, I believe accounting for the STR spacetime would already significantly increase idealist panpsychism's plausibility. Nevertheless, it is worth noting that if panpsychists manage to account for STR spacetime, they must also account for GTR spacetime in all its glory.

The spacetime argument challenges the idealist panpsychist to explain *how* a purely experiential fundamental ontology could instantiate METRIC. The argument should be viewed as a contemporary extension of an old idea—one that goes back to at least Descartes—that there is an essential difference between consciousness and the physical world. The spacetime argument extends this idea to spacetime and deploys it against idealist panpsychism.

P2: Human Experience and *P3: Same Metric* are controversial and do most of the work in the argument. Thus, I will dedicate the rest of this section to their defense. I believe the case for the other premises has already been made. *P1: No Gap* follows from the conjunction of idealist panpsychism and structural realism about spacetime. *P4: Gap* is likewise uncontroversial and follows from the fact that METRIC permeates spacetime and, in turn, should permeate spacetime's experiential ground. Finally, I already justified *P5: Structural Realism* in this section (but will consider its potential falsity in section 3).

2.2. Premise 2: Human Experience

2.2.1. *The Mark of the Metric*

P2, Human Experience states: No human experience has METRIC. I will defend *P2* by exploring three aspects of human phenomenology: (i) spatial and temporal phenomenology, (ii) phenomenal similarities, and (iii) causal proximity. My defense of *P2* will be inductive and based on a sample of representative human experiences.

What would it take for some experience to have METRIC and thus contradict *P2*? To ground a flat Minkowski spacetime (in a vacuum), an experience would have to instantiate a structure that is accurately described by the spacetime interval equation (I am adopting the [+ , - , - , -] convention here):

$$(\Delta s)^2 = c^2(\Delta t)^2 - (\Delta x)^2 - (\Delta y)^2 - (\Delta z)^2$$

In the above equation, $(\Delta s)^2$ represents the spacetime interval, that is, the spacetime invariant analogous to the Euclidean distance. The equation gives many important clues regarding what to look for in experience when searching for METRIC. For example, for any experience *E*, the equation tells us that *E* must be four-dimensional (with each dimension corresponding to a unique coordinate among *x*, *y*, *z*, and *t*). Moreover, the equation indicates that the time dimension (described by the coordinate *t*) has a special role in *E*'s structure. Also, *E* must have an aspect playing the role of the speed of light (corresponding to the constant *c*), serving as a fundamental limit to causal interactions.

Beyond the above features, there is one feature that stands out as perhaps the most explicit mark of the presence of METRIC:

MARK: For every point P , there are other points at *positive, negative, and null* distances from P .

In what follows, I will use MARK as my informal guide to whether any human experience contradicts P_2 . To do so, I will test whether different aspects of experiential structure satisfy MARK. In my usage, an experience E satisfies MARK iff MARK is true of E and accurately describes E 's structure. Before proceeding, a few methodological points are in order.

First, I assume that introspection reveals the structure of human experiences. Idealist panpsychists agree that experiences are essentially defined by their phenomenal characters: by *what it is like* to have them (for examples, see Goff [2017: 5], Roelofs [2019: 143], and Strawson [2006a: 16; 2015: 169]). Moreover, idealist panpsychists typically agree that introspection fully reveals the phenomenal characters of experiences. By definition, experiential structure is the structure of phenomenal character. Thus, it should be acceptable to idealist panpsychists that introspection reveals the full structure of human experiences.

The above claim does not entail that we are acquainted with *everything* about human experience. It only entails that we are acquainted with some aspects of experiential essence, namely, with the phenomenal characters of *our* experiences. If idealist panpsychism is true, our experiences are grounded in more fundamental experiences. There might be a lot to the natures of these fundamental experiences that introspection does not reveal. This point will become important later in defending P_3 , and I will return to it.

Second, in line with the above, I will use ordinary life intuitions as a good approximation of experiential structure. This is reasonable given the idealist panpsychist's commitment to knowledge of experiential essences. After all, if we are acquainted with experiential essences, it is unreasonable to think intuitions from ordinary life are severely misleading about experiential structure.

Third, when adequate, I will also assume that experiences might be phenomenally unified not only at one time but across time. Time plays a special role in the spacetime metric and might help the idealist panpsychist find an experience that satisfies MARK.

Fourth and last, there is no reason to assume that negative spacetime intervals must feel negative (and likewise for positive and null spacetime intervals). Instead, what matters for P_2 is whether any experience has a structure that is accurately described by the interval equation. As stated, I will use MARK as my informal guide to testing this. If an experiential structure satisfies MARK, this is evidence that the interval equation accurately describes that structure. If so, the corresponding experience might have METRIC. Otherwise, if the structure fails to satisfy MARK and is best described in some other way, this is evidence that the corresponding experience does not have METRIC. Thus, the following analysis will focus on various aspects of experiential structure and on the most natural ways to describe them.

2.2.2. *Spatial and Temporal Phenomenology*

Spacetime unifies space and time into a manifold with a metrical structure. Thus, spatial and temporal phenomenology are obvious candidates for testing whether experiences satisfy MARK. My analysis begins with visual experiences as a

paradigmatic example of experiences with spatial phenomenology. Then, I explore temporal phenomenology and the potential connections between spatial and temporal phenomenology.

All visual experiences, whether simple or complex, have a spatial phenomenology. Moreover, all visual experiences seem describable in terms of points at various distances from one another. For example, the experience of seeing a polka-dot pattern is naturally describable in terms of the dots being at certain distances from each other. This suggests that visual experiences might have a metrical structure.

What might be the metrical structure of visual experience? In ordinary life, we normally conceptualize perceived distances as positive quantities. After all, the Euclidean metric is the go-to metric in ordinary life and is purely positive. Moreover, and more generally, the very concept of a metric is formally defined as a positive quantity, arguably due to the needs and intuitions of ordinary life (in contrast, as explained above, the spacetime metric is formally a pseudometric). This suggests that our ordinary understanding of visual phenomenology is radically at odds with spacetime's metrical structure.

Although the historical consensus was that visual space is Euclidean, growing empirical data shattered this consensus in the twentieth century. Studies have shown that visual geometry is not purely Euclidean (or is entirely non-Euclidean; see Wagner [2006] for an overview). Nevertheless, the key insight from ordinary life relevant to my argument remains unchanged: No empirical study (to the best of my knowledge) has shown that visual space has anything but a positive metric. If so, both ordinary life intuitions and the empirical data agree that visual experience does not satisfy MARK.

Next, on to temporal phenomenology. As in the case of spatial phenomenology, we naturally describe temporal phenomenology using positive quantities. For illustration, consider the following example of a visual experience evolving over time:

EXAMPLE I: You see a red ball R moving away from a static blue square B in a straight line. At t_1 , R is one meter away from B , while one second later, at t_2 , R is two meters away from B .

The most natural way to describe the time interval between t_1 and t_2 in EXAMPLE I is by using a positive quantity (one second, in the example). For any experience evolving over time, we can simply calculate the time interval between any earlier state t_1 and any later state t_2 by subtracting $t_2 - t_1$. This simple function applies to any temporal experience, seems to describe temporal separation fully, and always returns a positive quantity. If so, MARK is not an accurate description of temporal phenomenology.

Although spatial and temporal phenomenology fail to satisfy MARK individually, perhaps they satisfy MARK collectively: by forming an integrated spatiotemporal phenomenology. However, even if there is such a phenomenology, EXAMPLE I lacks any corresponding metrical structure. All change in EXAMPLE I seems fully describable with positive quantities either within the time slices (using spatial distances) or between the time slices (using time intervals). However, there seems to be no sensible way to speak of the spatiotemporal distance between, for example, B at t_1 and R at t_2 based purely on their spatiotemporal phenomenology.

Similar considerations generalize to all unimodal experiences (i.e., experiences from one modality): sensory experiences, pains, pleasures, emotions, desires, wills, or thoughts. But what about multimodal experiences, namely, experiences that have phenomenal aspects from different modalities? For illustration, consider the following multimodal experience:

EXAMPLE II: You see the moon in the night sky while listening to Beethoven's *Moonlight Sonata* and think, 'Beethoven is a great composer'.

EXAMPLE II exhibits a complex phenomenology. It involves a visual experience (seeing the moon), an auditory experience (hearing the *Moonlight Sonata*), and a cognitive experience (thinking 'Beethoven is a great composer'). Moreover, EXAMPLE II exhibits a temporal phenomenology: its aspects evolve together over time.

Nevertheless, I find no indication that EXAMPLE II's complexity helps satisfy MARK. First, I doubt EXAMPLE II has a *global* metrical structure connecting its parts. After all, it seems absurd to ask about the distance between any visual, auditory, or cognitive experience. Second, the temporal phenomenology of EXAMPLE II—like any other temporal phenomenology—seems fully describable using only positive quantities. Finally, the spatial phenomenology exhibited by some of EXAMPLE II's aspects (e.g., its visual aspects) does not seem integrated with its temporal phenomenology in a spatiotemporal metrical structure. I can see neither a way nor a need to describe spatiotemporal intervals between its many aspects. These results seem to generalize to all multimodal experiences.

2.2.3. *Phenomenal Similarities*

The structure of phenomenal similarities is another and more subtle kind of experiential structure that is commonly associated with distances. Simply put, phenomenal similarities are similarities in phenomenal character. They are standardly taken to obtain between qualities of the same modality (here and elsewhere, I use 'qualities' to refer to phenomenal qualities). Thus, my analysis of them will focus only on unimodal experiences.

Phenomenal similarities typically have multiple dimensions. For example, in the case of color, the different color qualia are related based on their degree of hue, saturation, and lightness. Moreover, and most important for our purposes, phenomenal similarity relations seem metrical. For illustration, consider the following visual experience.

EXAMPLE III: You see a red (*R*), a green (*G*), and a pink (*P*) colored chip arranged in a line as illustrated below.



We could find distances in EXAMPLE III in at least two ways. One, we could say that *R* is closer to *G* while further away from *P* in terms of (phenomenal) spatial separation.

However, we could also say that *R* is closer to *P* and further away from *G* in terms of phenomenal similarity. After all, *R*'s redness is more similar to *P*'s pinkness than to *G*'s greenness.

Quality-space models are formal models of phenomenal similarities. In quality-space models, each quality from a phenomenal modality is mapped to a specific point in a multidimensional space with a metrical structure. Thus, if a phenomenal similarity relation satisfies MARK, the corresponding quality-space model should show this.

To the best of my knowledge, all well-established quality-space models feature a *positive* metrical structure. Moreover, in principle, guided by introspection and ordinary life intuitions, it seems unnatural to model phenomenal similarities in any other way. As Lee (2021) points out, all quality-space models are expected to satisfy the following three main desiderata:

First, points in the model should stand in one-to-one correspondence with qualities in the target quality-space. Second, points that are more distant in the model should represent qualities that are less phenomenally similar to each other. Third, points should have distance zero just in case the qualities represented by those points are phenomenally identical. (2021: 275)

Lee's second desideratum is naturally satisfied by positive quantities. Moreover, his third desideratum excludes null distances between distinct qualities because a null phenomenal similarity just means the qualities under consideration are identical. All of this indicates that phenomenal similarities in unimodal experiences are essentially positive quantities but not negative or null quantities. If that is the case, they cannot satisfy MARK.

2.2.4. *Causal Proximity*

The final kind of experiential structure I will examine is causal proximity. Causal proximity has been proposed by Roelofs (2014) as a way experiences might be connected in a metrical structure. Causal proximity is worth considering because geometry and causation are intertwined in spacetime physics. METRIC models the causal structure of spacetime: it models the degree of causal proximity between any two spacetime events. If so, perhaps, METRIC also corresponds to the causal structure of our experiences.

Roelofs defines causal proximity between experiences as 'their tendency to affect each other in direct, sensitive ways' (2014: 97). Causal proximity relations are global; they cut across all phenomenal modalities. Roelofs's proposal focuses on attentional proximity, 'the propensity of experiences to transfer attention to each other' (2014: 95), as a form of causal proximity. As he puts it: 'the conscious field is a sort of attentional terrain, through which attention moves. It moves quickly and easily over short "distances", and with more difficulty over long ones' (2014: 95).

I am sympathetic to the idea that attentional proximity—as a form of causal proximity—might instantiate a metrical structure between experiences. Nevertheless, I cannot see how any form of causal proximity among experiences

could satisfy MARK. Roelofs defines causal proximity as the propensity of experiences to affect each other causally. On his account, as I understand it, any experience E can be a part of a phenomenal field iff (a) E has the tendency to influence at least one experience in the field causally or (b) at least one experience in the field has the tendency to influence E causally. Simply put, E can be a part of a phenomenal field iff E is causally connected with other experiences in that field.

The above indicates that causal proximity is always a positive quantity. It connects only experiences that *are* causally connected (and arguably, all human experiences are causally connected, i.e., have some tendency to influence one another causally). Whether the tendency to interact is weak, strong, or something in between, the resulting quantity is most naturally described as positive. If that is the case, even in principle, experiences cannot be at negative or null causal proximities. In contrast, the spacetime metric models both causally connected and causally disconnected events and thus requires negative and null quantities.

2.2.5. Results

I investigated whether human experiences satisfy MARK in virtue of their spatial phenomenology, temporal phenomenology, phenomenal similarities, and causal proximity. I found no evidence that any of these structures satisfy MARK. In all the cases I considered, there were better ways to describe the structures under consideration accurately without evoking MARK. This result indicates that all the experiences having these structures lack METRIC. I take this to be strong evidence that P_2 is true.

Consciousness has been described as a ‘field’ (Bayne and Chalmers 2003; Dainton 2000) or as a ‘space’ or a ‘manifold’ (Dainton 2000: 93–95). These descriptions show a common intuition that consciousness has a geometrical structure. My analysis does not negate that general claim. However, it denies that human consciousness has METRIC.

My defense of P_2 was informal and nonexhaustive. Nevertheless, given the lack of previous research on the topic and the current lack of formal phenomenology, I believe this defense is sufficient to justify P_2 and start a discussion. The onus is on idealist panpsychists to try to undermine P_2 .

Given what I argued, idealist panpsychists could try to undermine P_2 either by (a) giving up on introspection as a guide to experiential essence or (b) finding an experiential structure best described by the spacetime interval equation. Option (a) is unfavorable and might even be a nonstarter. After all, idealist panpsychism is standardly motivated by introspection. Thus, at the very least, endorsing (a) would require a radically different motivation for idealist panpsychism than currently available. If so, idealist panpsychists are left with option (b) as their only choice.

2.3. Premise 3: Same Metric

P_3 , *Same Metric* states: If spacetime’s experiential ground has METRIC everywhere, then human experiences also have METRIC. I base P_3 on two claims, as follows.

First, P_3 assumes that human experiences and spacetime share a common ground. This should be uncontroversial, given idealist panpsychism. After all, spacetime is

ubiquitous. Thus, it is reasonable to assume that spacetime's experiential ground is likewise ubiquitous and at least a partial ground of everything nonfundamental. If that is the case, then spacetime's experiential ground is at least a partial ground of human consciousness.

Second, P_3 assumes that human experiences would inherit METRIC from their fundamental ground if the latter has METRIC everywhere. This is controversial. I anticipate that many idealist panpsychists will be inclined to reject this inheritance, given that they already reject the following thesis:

FULL INHERITANCE: Human experiences inherit all the essential properties of the fundamental experiences that ground them.

Idealist panpsychists reject FULL INHERITANCE because they do not identify human experiences with the fundamental experiences. Instead, they think our experiences are grounded in the fundamental experiences. Thus, our experiences are nothing over and above the fundamental experiences, yet *distinct* from them.

Roelofs (2019: 4) offers the most rigorous idealist panpsychist account of how our experiences arise from their grounds. He argues that human experiences are *blends* of the fundamental experiences: they arise because human subjects lack the powers of discrimination needed to recognize the fundamental experiences. Thus, Roelofs postulates that our experiences are radically confused versions of the fundamental experiences.

It seems idealist panpsychists can reject P_3 if they accept Roelofs's radical confusion thesis. If radical confusion is true, our experiences might differ greatly from their grounds. If so, why think P_3 is true? This is an important question. As I will argue, although FULL INHERITANCE is false, there is a limit to how different our experiences can be from their grounds. Rejecting P_3 would violate this limit.

First, as Roelofs acknowledges, blends always resemble their ingredients. As he puts it: 'Every ingredient in a phenomenal blend makes the resultant quality resemble that ingredient a bit more' (2019: 138). Thus, the more ingredients of a certain kind are in a blend, the more that blend will be like those ingredients.

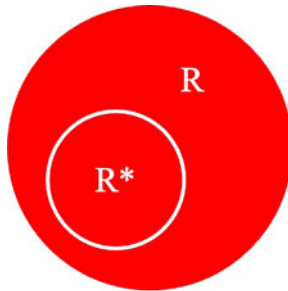
Now, recollect that METRIC is *everywhere*. It is the metric by which all events in spacetime are structured. Moreover, it is reasonable to assume that all phenomenal ingredients are in spacetime. This entails that METRIC applies to all phenomenal ingredients. If so, any plurality of phenomenal ingredients will carry METRIC when entering a blend. Thus, it seems that METRIC should be present in all phenomenal blends, no matter how radically confused they may be.

The above point generalizes beyond the case of radical confusion. Remember that grounding in idealist panpsychism is *reductive*: groundees are nothing over and above their grounds. It is highly plausible that the following principle holds in all cases of reductive grounding:

EVERYWHERE: For any two entities P and Q such that $[P]$ reductively grounds $[Q]$, if P has a property Π that is ubiquitous in P , then Q will also have Π .

Intuitively, EVERYWHERE states that if the facts about an entity P reductively ground the facts about another entity Q and P has some ubiquitous property, Q will also have that property. A property I is ubiquitous for an entity iff I applies to all parts of that entity. To see EVERYWHERE in action, consider the following two examples.

EXAMPLE IV: An entity R is red everywhere. Moreover, there is another entity R^* corresponding to some subset of R as illustrated below (the white line around R^* is only a visual aid):



In EXAMPLE IV, the part R^* is red, just like the rest of the object R . The best explanation of this fact—suggested by EVERYWHERE—is that redness is a ubiquitous property of R . EXAMPLE IV generalizes to all cases of reductive grounding where the ground is wholly monochromatic.

EXAMPLE V: A Lego person L lives in a 3-D Euclidean universe. L has a part L^* identical to some (either spatially contiguous or noncontiguous) subset of their head.

In EXAMPLE V, the part L^* will have the same metrical structure as the Lego person L . Since L lives in a 3-D Euclidean universe, both they and L^* will abide by the rules of Euclidean geometry and thus will be structured by the Euclidean metric. The best explanation of this fact—suggested by EVERYWHERE—is that the Euclidean metric is a ubiquitous property of L . EXAMPLE V generalizes to all cases of reductive grounding where a specific metric wholly structures the ground.

Together, EXAMPLE IV and EXAMPLE V show that EVERYWHERE is highly plausible. If true, EVERYWHERE entails the following principle for idealist panpsychism:

PARTIAL INHERITANCE: Human experiences inherit the ubiquitous properties of their grounds.

Given PARTIAL INHERITANCE, an argument for P_3 emerges. As I already established, spacetime's experiential ground has METRIC everywhere. Moreover, it grounds our experience. Therefore, given PARTIAL INHERITANCE, human experiences must inherit METRIC from their ground. Thus, P_3 is true.

Rejecting P_3 is highly unfavorable for the idealist panpsychist. First, given EVERYWHERE, rejecting P_3 would entail that human experiences are radically different

from other groundees. Second, if the idealist panpsychist rejects P_3 by claiming that introspection is unreliable, this threatens to undermine the motivation for idealist panpsychism (as I already discussed in section 2.2.5). Finally, and perhaps most important, rejecting P_3 makes the combination problem even harder to solve.

Assume that P_3 is false. In that case, P_3 's negation is true. P_3 's negation states that spacetime's experiential ground has METRIC everywhere; yet human experiences lack it. But this entails an explanatory gap between the fundamental experiences and our experiences. To close this gap, idealist panpsychists would likely have to posit a combinatorial mechanism explaining the disappearance of METRIC from human consciousness. No such mechanism can be found in the current literature. Moreover, as I will argue in section 3.4, I am doubtful that such a mechanism can be reductive and thus compatible with idealist panpsychism.

3. Objections and Replies

3.1. The Scope of the Objections

I consider P_1 : *No Gap* and P_4 : *Gap* uncontroversial and acceptable by all idealist panpsychists. However, there are important objections to some of the general assumptions of the argument and the other premises. In the rest of this section, I will reply to what I think are the most pressing of these objections.

3.2. General Objections

I will consider two general objections. The first targets the phenomenal unity assumption underlying the spacetime argument. The second asks about the consequences of giving up on idealist panpsychism.

Objection (i): What if spacetime is not grounded in a single, unified experience but instead in a network of disunified experiences?

Phenomenally disunified (or simply 'disunified') experiences are experiences that do not constitute a single phenomenal state. Such experiences might belong to the same subject or even to distinct subjects.

First, what if the disunified experiences belong to a single subject? There is only one proposal in the current literature for a relation between such experiences: Roelofs's (2014) causal proximity (see section 2.2.4). I already rejected this proposal and argued it cannot account for METRIC. Second, what if the disunified experiences belong to distinct subjects? Talk of distances between the experiences of distinct subjects seems absurd. Consider a scenario where two subjects, Alice and Bob, experience a red patch. I see no meaningful way to describe the distance between Alice's red experience and Bob's red experience. Given the above, the onus is on the idealist panpsychist to explain how phenomenally disunified experiences might instantiate METRIC.

Objection (ii): What if panpsychists give up idealism and embrace impure panpsychism?

Indeed, the falsity of idealist panpsychism does not entail the falsity of panpsychism in general. Perhaps the easiest way panpsychists can resist my

argument is by abandoning idealism: by introducing some spacetime facts in their fundamental ontology. The result would be a form of impure panpsychism. Nevertheless, this move has a price.

Impure panpsychism posits two kinds of fundamental entities (experiences and physical structure) instead of just one. Similarly, dualism posits two kinds of fundamental entities: mental and physical. Thus, impure panpsychism cannot match physicalism in simplicity; instead, it seems to match dualism in complexity. It is standardly assumed that panpsychism is preferable over dualism because it is ontologically simpler. However, given the above, this argument no longer works for impure panpsychism. Thus, the dialectic for panpsychism must change. Impure panpsychism might keep its explanatory edge over physicalism; however, what gives it an edge over dualism?

In a nutshell: my argument pushes panpsychists to either (a) become nonidealists (in which case, they must demonstrate why impure panpsychism is preferable to both physicalism and dualism), or (b) they must try to develop idealist panpsychism by explaining how it accounts for spacetime and, in general, for the physical facts. In either case, the current focus of the debate on panpsychism has to change.

3.3. Objections to Premise 2: Human Experience

P2: Human Experience states: No human experience has METRIC. I will consider *one* objection to *P2*.

Objection (i): What if human experiences have more structure than introspection can reveal?

One way to express this objection is in terms of the overflow thesis, influentially defended by Block (2007, 2011). The overflow thesis states that we have experiences whose information we cannot introspectively access. As a slogan: ‘Phenomenology overflows accessibility’ (Block 2007: 487).

A proponent of the overflow thesis might try to argue that METRIC hides in aspects of experience that are overflowing and, thus, are inaccessible to introspection. However, as I will show, such an argument would require significantly altering the standard overflow thesis and, in turn, would undermine its empirical motivations.

Rejecting *P2* based on phenomenal overflow seems to require experiences whose information are *necessarily* inaccessible: experiences that are always overflowing given the current structure of human brains. As far as I can see, this is the only way METRIC could remain hidden from introspection (assuming that introspection is a good guide to experiential essence, as idealist panpsychists do). However, this requirement is overly strong.

Phenomenal overflow is motivated by empirical studies. The key studies used to motivate it involve experiences whose information, in other conditions, are perfectly accessible (see Block [2007: 487–89] for an overview of these studies). As Block (2011: 567) stresses, the overflow thesis does not entail that there is necessarily inaccessible information in experience. I agree that necessarily inaccessible experiences are conceivable; however, there currently is no evidence for their existence. Instead, all the evidence points the other way. Given what was said above, the onus is on my opponent to provide evidence for necessarily

inaccessible information in experiences. Otherwise, their strategy has no bite and amounts to mere speculation.

A second way to express objection (ii) is in terms of microexperiential structure. Lee (2019) argues that human experiences might be grounded in some more fundamental (and nonintrospectable) microexperiential structure. However, that thesis is fully compatible with P_2 . P_2 is limited to human experiences and is not concerned with their potential grounds. Moreover, given my defense of P_3 , any such microstructure would likely lack METRIC and, thus, is no obstacle to my argument.

3.4. Objections to Premise 3: Same Metric

P_3 : *Same Metric* states: If spacetime's experiential ground has METRIC everywhere, then human experiences also have METRIC. I will consider *three* objections to P_3 .

Objection (i): If cosmopsychism is true, the fundamental consciousness would be highly complex; thus, there is no reason to expect it will resemble human consciousness.

Cosmopsychism is a form of panpsychism where fundamental reality is *one* ubiquitous consciousness. By 'cosmopsychism' I refer to idealist cosmopsychism (i.e., pure, Russellian, constitutive cosmopsychism) because that is the version most relevant to my argument. Philosophers sympathetic to cosmopsychism include Chalmers (2015, 2020), Goff (2017, 2021), and Strawson (2020). According to cosmopsychists, our experiences are grounded in the cosmic consciousness. If cosmopsychism is true, the cosmic consciousness would be incredibly complex. Nevertheless, I cannot see how cosmopsychism offers anything new against the argument for P_3 .

Assume that a cosmic consciousness grounds spacetime. Given structural realism about spacetime, the cosmic consciousness will have METRIC *everywhere*. In other words, METRIC will be a ubiquitous property of the cosmic consciousness. Given the thesis EVERYWHERE (defended in section 2.3), groundees inherit the ubiquitous properties of their ground. Thus, human experiences will inherit METRIC from the cosmic consciousness. Otherwise, if human experiences lack METRIC, so will the cosmic consciousness, at least in some of its parts. If that is the case, P_3 is secure.

Objection (ii): What if our consciousness is a 'thinned out' version of the fundamental consciousness?

Goff (2021) raises this objection against the missing entities problem as formulated in my 'Missing Entities: Has Panpsychism Lost the Physical World?' (2021). 'Thinning out' is a crucial aspect of Goff's (forthcoming) novel proposal for a 'hybrid' form of cosmopsychism. According to hybrid cosmopsychism, human consciousness is constituted by qualities formerly belonging to the cosmic consciousness that get transferred to us by thinning laws. Simply put, our consciousness is what happens when you 'take out a lot of detail' (Goff 2021: 311) from the cosmic consciousness. Thus, Goff suggests, the fundamental consciousness might produce our consciousness yet have a very different structure.

A hybrid cosmopsychist has the resources to reject P_3 . However, this does not undermine my argument. After all, hybrid cosmopsychism is not a form of idealist panpsychism. Its fundamental ontology includes thinning laws in addition to experiences and, thus, is not purely experiential.

Moreover, I doubt that an idealist form of thinning—namely, thinning not mediated by laws—could undermine P_3 (See Goff [2017: 238–41] for a form of thinning not mediated by laws). To see why, first, remember that idealist panpsychism involves a reductive form of grounding: it posits that the groundees are nothing over and above their grounds. Second, consider again the thesis EVERYWHERE from section 2.3. Given EVERYWHERE, a reductive form of thinning could *transfer but not change* ubiquitous properties. In that case, our experiences would still inherit METRIC from their ground.

I already argued that EVERYWHERE is highly plausible. I will now illustrate why every form of thinning that violates EVERYWHERE must be nonreductive. Imagine a form of thinning where all negative intervals get transformed into their absolute values in human experience. Such a transformation seems arbitrary. There seems to be nothing in the intrinsic natures of negative intervals that would ‘push’ them to change into their absolute values as opposed to null intervals, imaginary numbers, their squares, or something else. Moreover, the transformation would produce an explanatory gap between the negative intervals in the ground and the positive intervals it generates. After all, the negative intervals in the ground would not a priori entail the positive intervals in our experience.

The above suggests that the transformation would be neither metaphysically nor epistemically reductive. It seems easy to implement as a law (corresponding to the absolute value function) but impossible to implement otherwise. This generalizes to all forms of thinning that violate EVERYWHERE. If so, such transformations are incompatible with idealist panpsychism because they violate its requirements for reduction.

Objection (iii): What if human experiences are grounded in a region of spacetime where all the points are separated by positive intervals?

I agree that it is conceivable that human experiences are grounded in spacetime regions where all points are at positive intervals (i.e., timelike). This suggestion might explain why we find only positive quantities in our experience. Moreover, it seems compatible with EVERYWHERE. Although the timelike intervals grounding our experiences would have METRIC, we should not expect them to ‘know’ of any points at null or negative intervals from them.

It is worth noting that it is a matter of convention which intervals are positive and which negative. Thus, objection (iii) can be made, *mutatis mutandis*, by appeal to negative intervals (i.e., spacelike). Below, I will focus only on the positive case, but my response is—*mutatis mutandis*—applicable to both cases.

Although promising, the suggestion in objection (iii) needs further justification to be considered plausible. In particular: why should we expect that human experiences are grounded exclusively in timelike intervals? A full response to this objection is well beyond the scope of this paper. It would

require outlining, analyzing, and evaluating all the ways in which human experiences might be grounded in spacetime. Nevertheless, as a preliminary remark, it is worth noting that in timelike intervals, the points are necessarily separated by time but not space. However, it is reasonable to assume that our experiences reduce to brain processes that evolve across both space and time. If that is the case, it seems better to identify them with spacetime regions whose points are separated not only by timelike intervals but also spacelike (necessarily separated by space, but not time) and null (necessarily separated by both space and time) intervals.

Perhaps, the idealist panpsychist could adequately develop objection (iii). My main goal here is to initiate a discussion and shift the focus of the current debate. An adequately developed objection (iii) would be a welcome addition to the literature and the kind of topic that should be the focus of future debates.

3.5. Objections to Premise 5: Structural Realism

P₅: Structural Realism states: Spacetime structural realism is true. I consider one objection to *P₅*.

Objection (i): What if spacetime structural realism is false?

Given the empirical successes of GTR and assuming structural realism is true, it is highly unlikely that *P₅* is false. After all, structural realists are typically committed to the preservation of structure through theory change (see Worrall 1989). Thus, even if GTR ends up being replaced by some better theory, structural realists might still consider METRIC to be real.

Nevertheless, putting the above aside, rejecting *P₅* does not save the idealist panpsychist. Even if it turns out that METRIC is not real, idealist panpsychists still must account for the rest of physical structure. Thus, rejecting *P₅* is insufficient to save idealist panpsychists from the missing entities problem. Moreover, accounting for the other current candidates for real physical structure is even more daunting than accounting for spacetime.

Our current best theory of matter is quantum mechanics (QM). According to one influential metaphysical reading of QM, reality is fundamentally a 3×10^{80} dimensional quantum state (this view is called ‘wave-function monism’; see Ney and Albert 2013). Alternatively, beyond QM, other proposals for fundamental physical structures come from quantum gravity or string theories. All these proposals involve perplexing structures that are even more detached from everyday experience than spacetime’s structure.

In short, rejecting structural realism about spacetime amounts to a case of ‘out of the frying pan and into the fire’ for the idealist panpsychist. It helps the idealist panpsychist only if she accounts for the other exotic structures posited by current physics. At present, idealist panpsychists have not provided any account of these structures. Moreover, given that these structures are more exotic than spacetime’s structure, it is hard to see how idealist panpsychists could account for them if they cannot even account for spacetime (see Chalmers [2020: 362], Goff [2022], and Aleksiev [2021] for related concerns).

4. Conclusion

Idealist panpsychists are obliged to solve both the combination problem and the missing entities problem. In this article, I focused on spacetime as the most pressing aspect of the missing entities problem. I demonstrated that idealist panpsychists face major and potentially insurmountable challenges in accounting for spacetime structure. The two problems also pull in opposite directions. In that case, it might be impossible for idealist panpsychists to solve both.

Solving the combination problem makes the missing entities problem harder (if not impossible) to solve. Any viable solution to the combination problem will involve closing MACROEXPERIENCE GAP (see section 1.2). However, as demonstrated in my defense of P_3 (section 2.3), that will likely involve positing a ground that does not have METRIC everywhere. Consequently, the idealist panpsychist opens up SPACETIME GAP (as an aspect of the missing entities problem).

Solving the missing entities problem makes the combination problem harder (if not impossible) to solve. This is particularly clear in the spacetime case but generalizes to other physical structures. Idealist panpsychists can straightforwardly account for spacetime by positing a structurally isomorphic fundamental consciousness. This move closes SPACETIME GAP. However, it opens MACROEXPERIENCE GAP and the combination problem.

Therefore, idealist panpsychists might lack the resources to solve both the combination problem and the missing entities problem. At present, there is no clear way out of this no-win situation for the idealist panpsychist. The onus is on the idealist panpsychist to account for spacetime without making it impossible to solve the combination problem. Otherwise, it is reasonable to conclude that idealist panpsychism is false.

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