CRÍTICA. Revista Hispanoamericana de Filosofía. Vol. 57, No. 171 (diciembre 2025): 5–36

DOI: https://doi.org/10.22201/iifs.18704905e.2025.1748

EVALUATING PANPSYCHISM

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SUMMARY: In this article, I evaluate which version of panpsychism is best suited to address the challenges faced by a theory of consciousness. I first argue that a panpsychist theory is more likely to be successful if it meets two conditions: (1) it must be compatible with the Integrated Information Theory (IIT), and (2) it must provide at least a preliminary indication of how to solve the combination problem. I consider three main versions of panpsychism: constitutive panpsychism (micropanpsychism and cosmopanpsychism), emergent panpsychism (strong and weak), and panprotopsychism (panqualitivist and panexperientialist). I conclude that weak emergent panpsychism, together with the two variants of panprotopsychism (panqualitivism and panexperientialism), or a combination of these approaches, shows genuine potential for panpsychism to remain a coherent and viable position.

KEYWORDS: constitutive panpsychism, emergent panpsychism, panprotopsychism, integrated information theory, combination problem

RESUMEN: En este artículo evalúo qué versión del panpsiquismo es la más adecuada para abordar los desafíos que plantea una teoría de la conciencia. Sostengo en primer lugar que, para aumentar su probabilidad de éxito, la propuesta panpsiquista debe cumplir dos condiciones: (1) ser compatible con la Teoría de la Información Integrada (IIT) y (2) ofrecer al menos un indicio de solución al problema de la combinación. Considero tres versiones del panpsiquismo: el panpsiquismo constitutivo (micropanpsiquista y la cosmopanpsiquista), el panpsiquismo emergente (fuerte y débil) y el panprotopsiquismo (pancualitivista y panexperiencialista). Concluyo que el panpsiquismo emergente débil, junto con las dos variantes del panprotopsiquismo (pancualitivismo y panexperiencialismo), o una combinación entre ellas, presentan algún potencial real para que el panpsiquismo siga siendo una posición coherente y viable.

PALABRAS CLAVE: panpsiquismo constitutivo, panpsiquismo emergentista, panprotopsiquismo, teoría de la información integrada, problema de la combinación

1. *Introduction*

Traditionally, theories on phenomenal consciousness have been divided into two broad categories: dualist and materialist. While dualists believe that phenomenal consciousness constitutes an extra sub-

stance apart from the physical one, materialists argue that everything to be explained about consciousness belongs to the physical domain. For centuries, the debate revolved around the existence of consciousness as a substance outside of physical objects (Cartesian dualism), but contemporary dualists prefer to think that our brain states have non-physical properties (property dualism).[1]

The primary challenge for dualism is the absence of empirical support for a mental/physical dissociation—nothing in our scientific instruments even suggests the possibility of conjuring non-physical substances or properties. Moreover, there is no possibility of empirical confirmation without invoking an expansion of our current laws of physics—nobody has offered a convincing account of how the physical and the non-physical can interact without violating the laws of physics (Dennett 1991).

As it was, materialism became the leading position—phenomenal consciousness should be fully explained in terms of physical interactions in the brain. Physicalist theories of consciousness took the form of identity theories (conscious mental properties, states and processes are identical to physical ones), functionalist theories (conscious mental properties, states and processes are characterized by virtue of the functional role they play) and eliminativist theories (there are no conscious mental properties, states or processes whatsoever). Despite their differences, these approaches share a common assumption: if physicalism is the route, then science (mainly neuroscience and cognitive science) must be able to offer a convincing explanation of how and why processes in the brain give rise to conscious experiences. The search for the neural correlates of consciousness emerged as a promising way to explain what had hitherto resisted so much, but the initial boom gradually faded (see Chalmers 1995; Metzinger 2000; Koch 2019; Overgaard and Kirkeby-Hinrup 2021). Neuroscientists not only found specific methodological problems, but the general problems that hovered over materialism continued to lurk: how is it possible to quantify the phenomenal aspect of conscious experience?

While neuroscientists searched for the neural basis of consciousness, cognitive scientists moved away from the brain and devised computational, representational and cognitive models to account for

[1] Property dualism can take different forms, some closer to physicalism, such as non-reductive physicalism (Kim 2005), and some closer to substance dualism, such as emergentism (Chalmers 2006). In the former, there are two kinds of properties —mental and physical—but mental properties are dependent on or supervene upon physical properties. In the latter, mental properties emerge from physical properties when a system reaches a certain level of complexity.

consciousness. These approaches, however, faced the same intractable problems as neuroscience—the attempt to construct an objective, third-person account of subjective experience continues to appear fundamentally unworkable. In sum, conscious experience claims a place in nature, and to date, neuroscience and cognitive science have failed to provide either adequate tools or sufficiently persuasive explanations.

Faced with this growing feeling of dissatisfaction, many theorists have ventured to explore a third way: explaining phenomenal consciousness without appealing to additional substances (as dualists do) and without resorting to explanations in physical terms (as pure physicalists do). Two approaches have recently entered the scene: illusionism, which denies the reality of phenomenal consciousness, and panpsychism, which universalizes it.[2] On the one hand, Frankish's (2016) illusionism is a recent manifesto of what philosophers like Dennett (1991), Humphrey (2011) or Pereboom (2011) have been predicting for decades—there is nothing to explain because phenomenal consciousness is an illusion. On the other, there is a revived panpsychist trend defended by Goff (2019), Chalmers (2013) or Strawson (2006), who advocate that consciousness is embedded throughout the natural world—there is nothing to explain because phenomenal consciousness, like mass, energy or charge, is a fundamental property of physical reality. Illusionism disintegrates consciousness from the physical world, while panpsychism re-integrates it into the physical world.

This paper sets aside illusionism and focuses on panpsychism. My aim is twofold. First, I analyse some of the most discussed panpsychist versions available and map out their compatibility with the Integrated Information Theory (IIT)—one major empirical theory that implies some kind of panpsychism.[3] Second, I review the contributions of each panpsychist version to solving the combination problem, which is the main objection to panpsychism. My general

[2] Of course, these are not entirely new approaches; although currently enjoying renewed attention, they have faced criticism and rejection for decades.

[3] The choice to focus on IIT rather than other theories of consciousness is not arbitrary. While not all IIT theorists accept panpsychism as a logical consequence of the theory (see Negro 2024; Cea 2021), many prominent neuroscientists and philosophers working in this area—including Christof Koch, Giulio Tononi, Hedda Hassel Mørch, David Chalmers, Philip Goff, Adam Pautz, and Andreas Keller—have acknowledged or explicitly endorsed the panpsychist implications of IIT. This widespread recognition provides a strong rationale for selecting IIT as the theoretical framework in this paper, as opposed to other leading theories of consciousness that lack such metaphysical resonance.

DOI:https://doi.org/10.22201/iifs.18704905e.2025.1748 *Crítica*, vol. 57, no. 171 (diciembre 2025)

suggestion, therefore, is that a panpsychist theory of consciousness is more likely to be successful if it meets the following conditions:

1) It is aligned with—or at least empirically related to—IIT.

2) It offers a solution—or at least a promising approach—to the combination problem.

The paper is structured as follows. Section 2 presents panpsychism and its different versions. Section 3 introduces and develops the panpsychist implications of IIT. Subsection 3.1 considers the compatibility between the different versions of constitutive panpsychism and IIT, subsection 3.2 does the same with the different versions of emergent panpsychism, and subsection 3.3 with the various versions of panprotopsychism. Section 4 introduces the combination problem of panpsychism. Subsection 4.1 examines the solutions offered by the different versions of constitutive panpsychism, subsection 4.2 does the same with the different versions of emergent panpsychism, and subsection 4.3 addresses the various versions of panprotopsychism. Section 5 concludes.

2. *Panpsychism: Universalizing Consciousness*

Panpsychism is the view that consciousness is everywhere. Panpsychist motivation can be traced back to Galileo's exclusion of qualitative properties from scientific inquiry. According to Galileo, physical science deals with quantitative properties of matter (relational or structural properties) but not with its qualitative properties ('what-it-is-like' properties or qualia). In some sense, Galileo's displacement of qualitative properties originated the hard problem of consciousness, and Panpsychism aims to put these qualities back into the physical world again (Goff 2019, pp. 20–22).[4]

The recent revival of panpsychism is primarily due to its close connection with Russellian Monism. Indeed, Russellian Monism seems to put a voice to what Galileo had excluded from the scientific worldview—namely, the qualitative or intrinsic aspects of matter. Bertrand Russell himself illustrated the problem initiated by Galileo in *The Analysis of Matter*, where he wrote: "Physics, in itself, is exceedingly abstract, and reveals only certain mathematical characteristics of the material with which it deals. It does not tell us anything as to the intrinsic character of this material" (Russell 1927/1954, p. 10).

[4] For more on Galileo's philosophy, see Bolton 2022.

Russell's solution to this problem involves recognizing the following claims:

- Structuralism about physics
- Realism about quiddities
- Quidditism about consciousness

Broadly speaking, structuralism about physics holds that physics describes extrinsic properties of matter (structural and relational properties) while remaining silent about intrinsic properties (what matter is). Realism about quiddities refers to the fact that intrinsic properties are real properties of matter. And quidditism about consciousness suggests that these quiddities constitute the basis of consciousness. Russellian monism has functioned as a kind of philosophical wildcard, it has been adopted by a wide range of metaphysical positions, including physicalism (Stoljar 2001),[5] idealism (Bolender 2001), neutral monism (Nagel 1986),[6] or dualism (Chalmers 2010), but all of them agree in the three basic theses.

I focus here on the recent panpsychist renaissance deeply rooted in Russell's insights. In general terms, panpsychism can be seen as the view that at least some of the properties constituting the fundamental level of reality are mental or proto-mental in nature.

Contemporary panpsychism can adopt different forms:

- *Constitutive panpsychism* is the thesis that human consciousness is not fundamental but is grounded in a more fundamental and pervasive type of consciousness present throughout the natural world. Constitutive panpsychism can be construed at the micro-level (bottom-up), i.e., every particle is a conscious subject of some kind and, therefore, human consciousness is grounded in the micro-physical level (*constitutive micropsychism*), and at the macro-physical level (top-down), i.e., the universe considered as a whole is a conscious subject of some kind and, therefore, human consciousness is grounded in macro-physical level (*constitutive cosmopsychism*).[7]

[5] Russellian Monism is compatible with what Chalmers (2003) dubbed type-B physicalism. Roughly, whereas Type-A physicalism considers that there is an a priori entailment between completed physics and phenomenal facts, Type-B physicalism considers that the phenomenal supervenes on the physical but denies an a priori entailment from the latter to the former.

[6] According to neutral monism neutral properties are neither physical nor mental but underlie both physical and mental properties.

[7] The most commonly accepted constitutive view is micropsychism. Roelofs (2020), for example, defends some form of micropsychist panpsychism, while Shani and Keppler (2018) advocate a cosmopsychist variant.

– *Emergent panpsychism* asserts that phenomenal consciousness is not constituted by configurations of micro-conscious entities, but is causally generated by them (*weak emergent panpsychism*), or nomologically generated by them (*strong emergent panpsychism*).[8] According to the weak version, macro-consciousness emerges from micro-conscious properties when assembled under certain natural causal conditions. The strong version, on the other hand, says that although causally emergent from micro-phenomenal properties, macro-consciousness is governed by independent laws with new causal powers and appears as an ontologically distinct property.

– *Panprotopsychism* is the view that microphysical entities are fundamentally proto-conscious. When proto-conscious elements are adequately combined, consciousness arises. Quarks, for example, are proto-conscious, they are not conscious in the sense we humans and other animals are, but contain the precursors, the fundamental constituents that make up consciousness in larger systems. Panprotopsychism should be understood in terms of potentiality, i.e., as the view that everything is potentially conscious.[9] But what is it for a quark to be potentially conscious? If this question wants to be minimally coherent it has to be deeply considered. For example, one can consider quarks as subjects, although subjectivity seems, however, more a property of macroconscious entities than of microconscious ones. Another possibility is considering quarks as qualitative entities. This is usually labelled as panqualityism (Coleman 2012), the view that fundamental physical entities instantiate special properties (qualities) that jointly configure to yield macro-conscious experiences. Still, we can see the nature of proto-conscious entities as experiential. Experiential in

[8] Brüntrup (2016) defends a strong emergentist variant, whereas Seager (2016) and Mørch (2014) advocate for weak emergentist variants. It is important to differentiate the panpsychist version of emergentism, where macroconsciousness emerges from microconsciousness, from the classical emergentist positions, where it is consciousness per se what emerges. The panpsychist view assumes that consciousness is already present at the micro-level, whereas classical emergentism treats it as a novel property arising only at higher levels of complexity.

[9] It is important to note that, in order to avoid collapsing into pure physicalism, panprotopsychism must posit that proto-conscious properties are especially closely connected to conscious properties (Chalmers 2013, p. 9). One way to understand this is by considering proto-conscious entities as entities that contain only specific aspects of consciousness but not all. This is the way I will consider it here.

the sense that quarks are extrinsically material and intrinsically experiential (Rosenberg 2004; Coleman 2006).[10] Therefore, as panprotopsychism can be understood in terms of qualities or as experiential, we can consider *panqualityism* and *panexperientialism* as two different (although related) forms of panprotopsychism.

The main difference between the first two is that just as the constitutive version reduces macro-consciousness to aggregates of micro-consciousness, the emergent version is non-reductive—macro-consciousness is not reducible to aggregates of micro-consciousness. The third version, panprotopsychism, differs from constitutive panpsychism in that macro-consciousness is grounded not in micro-consciousness but in proto-conscious properties—entities that are not themselves experiential but serve as the basis for experience. These proto-conscious properties serve as the building blocks from which consciousness can arise, without implying that they are themselves conscious.

Just as the constitutive versions aim to be a variant of physicalism, the emergent ones could be considered a variant of dualism.[11] However, most contemporary versions of panpsychism explicitly reject traditional dualism. Like pure physicalists, panpsychists think that consciousness is not an additional component of the world; unlike them, they believe it is a fundamental property inherent to the physical world. Contemporary panpsychists claim to solve the problems of pure physicalism (the explanatory gap, the conceivability argument and the knowledge argument) and the problems of dualism (notably, the problem of mental causation) at once, but they claim to be, essentially, physicalists—there is only one stuff, the physical one.

If panpsychism is right, the hard problem of consciousness—why and how conscious experiences materialize from neural interactions—fades off. This is because panpsychism equates phenomenal properties with a type of intrinsic property that every particle that makes up the universe encloses. One option when something becomes inexplicable is to make it incommensurable, and panpsychism offers an

[10] For many, panexperientialism and panpsychism are considered synonyms (see Chalmers 2013, p. 247; Strawson 2015, p. 201). However, the notion of panexperientialism adopted here differs significantly, as it refers to a specific property of consciousness.

[11] In some sense, panpsychism navigates between dualism and physicalism; ultimately, adhering to one or the other will depend on whether we consider intrinsic properties as physical properties or as non-physical properties (for discussion, see Chalmers 2013).

elegant way to do so. With this in mind, let us now examine how the various versions of panpsychism align with Integrated Information Theory (IIT).[12]

3. *Panpsychism and the Integrated Information Theory (IIT)*

For many, panpsychism appears to be an unavoidable consequence of the IIT. IIT starts from the primacy of consciousness; the existence of consciousness is, for IIT defenders, indisputable. Broadly, IIT posits that phenomenal consciousness is the capacity of a system to integrate information—a system is conscious if and only if it retains a maximum of integrated information, qualified as Φ (Phi).

The theory is grounded in *five axiomatic properties*: (1) every experience exists for itself, (2) is the specific way it is, (3) is one, (4) is definite and (5) is structured. These axioms are considered self-evident features of any conscious experience. However, IIT does not present them in isolation—each axiom motivates a corresponding postulate, which specifies a causal property that any conscious physical system must exhibit. The *five basic postulates* (causal properties of the physical substrate) are (1) intrinsic existence, (2) information, (3) integration, (4) exclusion and (5) composition.[13] The aim is to bridge the gap between the subjective and the objective by identifying the physical substrates that correspond to the essential features of conscious experience.

Thus, everything begins by recognizing that consciousness exists and its substrate must possess cause-effect powers: its units must both take and make a difference (Albantakis et al. 2022, p. 4). From this the five axioms in terms of postulates of physical existence unfold. The axioms and their corresponding postulates are as follows:[14]

[12] Very recently, a significant number of prominent philosophers, cognitive scientists and neuroscientists have labelled IIT as a pseudoscientific theory as Pseudoscience (osf.io)). While I do not feel qualified to engage in this debate, it is important to acknowledge that some important aspects of the theory, such as its axiomatic foundations or the use of notions such as fundamental property, intrinsic existence or intrinsic causal power, are largely philosophical notions rather than scientific. Nonetheless, one thing remains clear: demonstrating compatibility with IIT would significantly strengthen the appeal of any panpsychist theory.

[13] For a critique of the axioms and postulates, see Bayne 2018.

[14] For a more comprehensive explanation, see Fallon 2018 or the entry https://iep.utm.edu/integrated-information-theory-of-consciousness/#SH1a. For a much more detailed account, see Albantakis et al. 2022. This is the most recent version of IIT, which focuses primarily on how from the essential properties of experience (axioms) we can infer the necessary and sufficient properties that its physical substrate must satisfy (postulates), ultimately expressing them in mathematical

Consciousness exists for itself (Postulate: intrinsic existence): Consciousness is real, undeniable and exists intrinsically from the subject's perspective. This axiom gives rise to a fundamental postulate of intrinsic existence. The existence of consciousness implies a system of mechanisms with a particular cause-effect power. IIT holds that existence is inseparable from causality: to exist is to make a difference to other things, and vice versa. Because consciousness exists intrinsically, its physical substrate must exert cause-effect power upon itself—not merely outwardly.

Consciousness is the specific way it is (Postulate: information): every experience is defined by its distinctness from other possible experiences. This axiom leads to the postulate of information: consciousness is inherently informative, as it conveys a distinct set of differences. According to IIT, this specificity arises from the system's internal cause-effect powers, whose combination forms its cause-effect structure. At any given moment, this structure occupies a particular state within a vast space of possible states. To instantiate a specific state is to make a particular difference within the system itself. The specified state thus constitutes the unique way in which the system makes a difference to itself.

Consciousness is one (Postulate: integration): the elements of an experience are interdependent. When we have a visual conscious state, we do not have isolated experiences of colours and shapes and then add them together. Rather, we experience them as a unified whole. This axiom leads to the postulate of integration: consciousness is irreducible to separate elements. Consciousness's integration into a unified experience implies that the system must be irreducible—that is, its parts must be interdependent. This, in turn, implies that every element must have the capacity to both influence and be influenced by the rest of the system.

Consciousness is definite (Postulate: exclusion): every experience has borders. Precisely because consciousness specifies certain contents, it necessarily excludes others. This axiom leads to the postulate of exclusion: the exclusivity of the borders of consciousness implies that the state of a conscious system must be definite. Only one set of mechanisms (a complex) can be conscious at a time, and this complex

terms. The aim is to account for subjective properties objectively—demonstrating that an objective science of the subjective is, in strictly physical terms, possible. This refined version of the theory also claims to address several important issues previously raised by critics (e.g., Bayne 2018).

must be the one with the maximum integrated information (Φmax). Among all overlapping systems of elements (e.g., groups of neurons), only the one with the highest value of integrated information (Φ) constitutes the subject of consciousness. Thus, only one system will have a maximally irreducible cause-effect structure; the others will exhibit smaller cause-effect structures. It is precisely this maximally irreducible structure that constitutes the conscious state.

Consciousness is structured (Postulate: Composition): each experience has structure, comprising parts and the relations among them. For example, when seeing a red triangle on a blue background, the experience contains elements (red, triangle, background, blue) that jointly generate a structured set of distinctions corresponding to the composite content. This axiom leads to the postulate of composition. The compositional nature of consciousness implies that the system's mechanistic elements must be capable of combining, and that their combinations must exhibit cause-effect power. A physical substrate of consciousness must, therefore, consist of composite mechanisms—that is, parts with specific causal roles—that together give rise to integrated informational structures.

So, according to IIT, when I have a phenomenal experience, such an experience is composed of essential phenomenal properties (the axioms), and these phenomenal properties are subsequently reformulated—via a mathematical framework—in physical terms (the postulates). This is how IIT translates subjective experiences into objective terms. IIT goes from phenomenology to physics. The following step is to define the sufficient and necessary conditions for a system to be conscious. Here is the formulation: *an experience is identical to a conceptual structure that is maximally irreducible intrinsically* (Tononi and Koch 2015, p. 9). More precisely, the grade of consciousness of a system corresponds to the amount of integrated information generated by the system itself, measured by Φ. If a system has $\Phi=0$, then its cause-effect power is fully reducible to its parts, and it does not exist intrinsically—there can be no consciousness. If it has $\Phi>0$, then the system cannot be reduced to its parts, and it will exist in and of itself—there will be consciousness. So, IIT's central claim is that a physical system is conscious if and only if it possesses a maximum of integrated information. In other words, to be conscious, a system must causally constrain its own immediate past and future states, and these constraints will depend on the causal interconnectivity between the system's parts.

Of course, this is far from an exhaustive analysis of the axioms, postulates, mathematical formulations and further claims of the theory, but I think it correctly outlines the IIT project. I will take the above for granted and focus on the aim of this paper: the panpsychist implications of IIT. Two questions immediately arise: does IIT really entail panpsychism? And if so, what kind of panpsychism is proclaimed? There is general agreement on an affirmative answer to the first question, but a lack of consensus regarding the second.

Regarding the first question (whether IIT entails panpsychism), the principal motivation for IIT to embrace a panpsychist metaphysics of consciousness lies in the generalizability of its axioms to every existent physical particle. The axioms inexorably indicate that, like mass, charge, or energy, consciousness is a fundamental property: wherever there is integrated information, there is consciousness. Just as integrated information is a fundamental quantity, consciousness is a fundamental property. So, if we take axioms to their ultimate consequences, we are compelled to accept that 'even a binary photodiode is not completely unconscious' (Tononi 2008, p. 236). In Koch's words: "Indeed, according to IIT, experience may not even be restricted to biological entities but might be extended to non-evolved physical systems previously assumed to be mindless, a pleasing and parsimonious conclusion about the makeup of the universe" (2019, p. 155). Regarding the second question (what kind of panpsychism is proclaimed by IIT), it would be useful to operationalize the conditions a panpsychist theory must satisfy in order to be consistent with IIT. One possible approach would be to align the different panpsychism versions with the five postulates and conditions that form the backbone of the theory and connect qualitative experience with quantitative measures. But this would be extremely laborious and time-consuming. Therefore, I will summarize the panpsychist motivation of IIT in the following two conditions:

(1) consciousness is a graded phenomenon.

(2) consciousness is limited by the quantitative measurement of Φ (exclusion).

First, IIT takes consciousness as a graded phenomenon: "consciousness is not an all or none property, but is graded: specifically, it increases in proportion to a system's repertoire of discriminable states" (Tononi 2008, p. 236). The greater the repertoire of discriminable states, the greater the consciousness of the system. Accordingly, for a system to be minimally conscious the only requirement is that it

possesses non-zero Φ. Between a photodiode, which generates a minimal amount of integrated information, and a human brain, which generates a substantial amount of integrated information, lies a wide range of systems with varying repertoires of discriminable states. Thus, the richness and complexity of a system's experiences increase gradually as the level of integrated information grows.

However, in the case of consciousness, gradation has an upper limit. This brings us to the second condition: consciousness is a graded phenomenon limited by a maximal value of Φ. This is an unavoidable consequence of the exclusion postulate, and a necessary condition for the coherence of IIT (see, however, Mørch 2018). The reason is that without upper limits conscious systems would overlap. The brain is composed of many subsystems (e.g., neurons, molecules or atoms) and it is part of other systems (e.g., the whole body, social groups or the whole universe), all of them with less Φ than the brain. In this case, IIT assumes that the maximal value of Φ is marked by the kind of phenomenal experiences generated by brains. This is because only one complex set of elements at a particular spatiotemporal grain with maximal Φ exists as a conscious entity at a given time. The exclusion postulate, therefore, rules out the possibility that a system composed of two individuals could constitute a superordinate conscious system; the Φ value of the combined system is lower than the Φ value of each individual considered separately (Tononi and Koch 2015, p. 13). These, then, are the crucial conditions that IIT posits for a system to be conscious. Let us examine the compatibility between IIT and the different versions of panpsychism.

3.1. Constitutive panpsychism and IIT

Consider constitutive panpsychism. The micro-psychist version, in which micro-consciousness (the minimal consciousness attributed to individual particles) gives rise to macro-consciousness (the typical consciousness typically associated with humans) is clearly consistent with the idea of consciousness as a graded phenomenon. Just as quarks are minimally integrated systems because they have some Φ, brains are maximally integrated systems with greater Φ, with a myriad of different values of Φ in between. The micro-psychist version seems also to meet the exclusion condition. Recall that the exclusion condition states that a system is conscious if its Φ is greater than the Φ of any of its parts, and greater than the Φ of any larger system of which such a system is part. For example, if there is more Φ in the cerebral cortex than in any of the neurons making it up and

in any encompassing system of which it is a part, then the cerebral cortex is conscious. The micro-psychist version satisfies this condition since claiming that macro-consciousness is grounded in the combination of micro-consciousnesses is not in conflict with the limitations marked by a maximal value of Φ. As we will see, the question of how micro-consciousnesses combine to form macro-consciousness raises the combination problem. For now, it is reasonable to conclude that the micro-psychist version of constitutive panpsychism is compatible with IIT.

Regarding the cosmopsychist version, where micro-consciousness (the tiny amount of consciousness of every single particle) originates from a kind of super-consciousness (the consciousness of the universe as a whole) and the macro-consciousness (the consciousness humans typically enjoy) is situated in-between, is also consistent with the idea of consciousness as a graded phenomenon (perhaps de-graded). Indeed, we can reverse the micro-conscious claim and conceive consciousness as a decrement in proportion to a system's repertoire of discriminable states—i.e., we can also go from the whole to the unit—leaving nothing in the way. Equally radical is the assertion that the universe itself is conscious that a quark is conscious.

However, the cosmopsychist version encounters significant difficulties with the exclusion condition. According to this principle, only the systems with maximal integrated information (Φ) are conscious; all subsystems and supersystems with lower Φ are excluded. But if the cosmos has more Φ than me, and I am part of the cosmos, then I cannot be conscious. Simply put, according to the exclusion condition, the universe and I cannot be conscious at the same time. Put differently, cosmopanpsychism suggests that the universe is conscious while brains are also conscious as its parts, but the IIT exclusion postulate states that only one level/system can be conscious at a time— the one with maximal Φ; therefore, we have two options, either the universe is conscious and I am not, or I am conscious and the universe is not. Assuming that I am conscious (I have maximal Φ), the universe cannot be, thus favouring the second option.[15] The cosmopsychist version is, therefore, incompatible with IIT.

[15] Koch (2019) is very explicit on this point stating that the "IIT exclusion postulate does not permit the simultaneous existence of both individual and group mind. Thus, the Anima Mundi or world soul is ruled out, as it requires that the mind of all sentient beings be extinguished in favour of the all-encompassing soul" (p. 165). Beyond this, the cosmopsychist version faces additional problems. First, cosmopsychism leads us to the idea of a super-mind or super-consciousness, which brings with it certain uncomfortable theistic implications. Second, although

3.2. Emergent panpsychism and IIT

What about the emergentist version of panpsychism? On this view, phenomenal consciousness is not constituted by configurations of micro-conscious entities but causally generated by—or emergent from—them (Mørch 2018). The emergentist version is, therefore, not graded: macro-consciousness does not arise from the accumulation of micro-consciousness, but it simply emerges spontaneously when certain conditions are met. In principle, this does not align with the gradual character postulated by IIT, but there is a way for compatibility. Let us first consider the strong version.

The strong version is, properly speaking, the genuine non-constitutive version. On this view, the properties and configurations of the micro-level components neither determine nor constitute the properties of the macro-level conscious whole; an additional factor is needed—perhaps a contingent psychophysical law that connects micro-consciousness with macro-consciousness. In this case, macro-consciousness appears as a novel fundamental property causally connected to but not reducible to the micro-subjective constituents.

However, this is not what IIT predicts. IIT does not posit any extra ingredients nor special laws in the advent of macro-consciousness. On the contrary, for IIT, consciousness is fundamental in its most basic form, a fundamental property possessed by all physical systems. As Tononi and Koch put it, "consciousness is a fundamental, observer-independent property that can be accounted for by the intrinsic cause–effect power of certain mechanisms in a state—how they give form to the space of possibilities in their past and their future" (2015). So, the strong emergentist version is at odds with the graded condition postulated by IIT. The kind of emergence that requires a nomological differentiation between the micro-conscious parts and the macro-conscious whole cannot be the kind of emergence that sustains a gradation in its configuration. Therefore, the strong emergentist version is incompatible with IIT.

When we turn to the weak emergentist version, the situation changes considerably. This version is in many respects no different from constitutive panpsychism, but a fundamental difference can be drawn. The difference is basically that the former requires a causal relation between micro-consciousness and macro-consciousness, while for the latter macro-consciousness is simply grounded in micro-consciousness. The difference between *grounding* and *causality*

cosmopsychism remains a theoretical possibility, it offers no theoretical advantage over micropsychism, which is, in principle, more parsimonious.

makes the point here. Here are some differences: just as *causality* diachronically relates entities of different types, *grounding* synchronically relates entities of the same type, or just as the grounding entity is more fundamental than the grounded, the causality has nothing to do with fundamentality.

Once here, let's put the weak emergentist version under the lens of IIT. Considering that subjects of experiences appear in systems with high enough Φ, the weak emergentist version predicts that macro-consciousness will (weakly) emerge when micro-conscious entities are causally combined. This is not only compatible with IIT's graded condition but also with the exclusion one: depending on the amount of integrated information generated by the system itself, macro-consciousness will emerge or not; i.e., from a system with high enough Φ a subject of experiences will causally emerge. The crucial point is that this version does not require extra laws for a set of micro-conscious systems to become macro-conscious; therefore, the system will become a subject of experiences only because there is some specific causal interaction between its components. Weak emergent panpsychism is, therefore, fully compatible with IIT since, unlike the strong version, it does not postulate any ontological leap for micro-conscious entities to become subjects of experiences.

3.3. Panprotopsychism and IIT

Finally, consider the panprotopsychist version. As noted above, panprotopsychism should be understood in terms of potentiality—everything is potentially conscious. The central idea is that—although there is nothing like being proto-phenomenally conscious in the sense of having subjectivity—when properly arranged, proto-phenomenal properties can become the seeds of subjective phenomenal properties. How to understand proto-consciousness is the main issue here. It has been suggested that panprotopsychism can be understood in terms of panexperientialism (Rosenberg 2004; Coleman 2006) or panqualityism (Coleman 2012), in the sense that elemental particles are experiential and have qualities that serve as the precursors of phenomenality. So, to be protoconscious, an entity needs to be experiential, in the sense of having cause-effect powers, and/or have qualitative properties, in the sense of having internal (as opposed to external) physical states. The question now is: how do these views align with the conditions required for compatibility with IIT?

Panqualityism is, in principle, consistent with the graded condition. IIT claims that consciousness comes in varying qualities: "the

quantity and quality of an experience are an intrinsic, fundamental property of a complex of mechanisms in a state—the property of informing or shaping the space of possibilities (past and future states) in a particular way, just as it is considered to be intrinsic to a mass to bend space-time around it" (Tononi and Koch 2015, p. 9). This seems compatible with the idea of panqualityism that proto-phenomenal properties need not be subjective but only qualitative (there is nothing it is like to possess a proto-phenomenal property). Gradation, therefore, might come in terms of qualities.[16]

The exclusion condition is also met. Panqualityism hypothesizes that when sufficiently isolated and embedded within the right kind of complex system, the qualitative (proto-phenomenal) character of a physical entity can give rise to phenomenality. This is compatible with the exclusion postulate, which states that a system is conscious only if it is not part of, and does not contain, a system with a higher degree of integrated information. In this respect, IIT and panqualityism coincide in that phenomenality appears as a macro-property of maximal Φ systems. However, panqualityism—as developed in Coleman's account—is framed in terms of Higher-Order Theories (HOT), which is one of the major rivals of IIT. We must, therefore, remain cautious and, pending further clarification, regard this compatibility as an open possibility.

The case of panexperientialism is similar. Panexperientialism is also an attenuated form of panpsychism (in particular, a form of panprotopsychism). The panexperientialist holds that everything has experience. Likewise, IIT claims that "even circuits as simple as a 'photodiode' made up of a sensor and a memory element can have a modicum of experience" (Tononi and Koch 2015, p. 11). According to this view, the accumulation of such extremely simple experiences can gradually give rise to experiences such as those we commonly experience.

The type of panpsychism defended by IIT does not imply that conscious experience is ubiquitous; rather, it holds that phenomenal properties do not exist beyond a subject of experience, but allows that everything is experiential and therefore a potential subject of experiences. In this respect, pan-experientialism is compatible with IIT, as both perspectives maintain that phenomenal experiences arise only when subjectively instantiated. Regarding the second condition,

[16] It is not clear to me if IIT considers entities with low Φ to be micro-subjects. So ultimately the question will depend on what aspect or aspects of consciousness IIT takes to be part of micro-consciousness.

it is easy to see that not only the experiences of photodiodes or quarks but also the experiences of social groups, galaxies or the entire universe possess lower values of Φ than those generated by the human brain.

To summarise the above, all the revised versions of panpsychism are, in principle, compatible with IIT, with the exception of the cosmopsychism and the strong emergent panpsychist versions. Cosmopsychism fails to meet the second condition (the exclusion condition), while strong emergent panpsychism does not satisfy the first condition (the graded condition). The present analysis suggests that IIT is construed in a way that allows for the potential compatibility of several panpsychist models. However, any panpsychist version to consider should ultimately be capable of addressing the most pressing challenge for panpsychism: the combination problem.

4. *Panpsychism and the Combination Problem*

In this section, I evaluate the capability of the various panpsychist versions to address the so-called combination problem. First articulated by James (1890), the combination problem concerns the challenge of explaining how micro-consciousness (the type of consciousness that panpsychists attribute to the intrinsic nature of all physical entities) combines to yield macro-consciousness (the kind of consciousness characteristic of human beings). James wrote: "Take a sentence of a dozen words, and take twelve men and tell to each one word. Then stand the men in a row or jam them in a bunch, and let each think of his word as intently as he will; nowhere will there be a consciousness of the whole sentence" (1890, p. 153).

The core issue is that individual, localized experiences—micro-experiences—do not obviously aggregate into a unified, macro-experience. The central question, then, is: how can micro-consciousness give rise to macro-consciousness? How is it possible that the kind of consciousness panpsychists regard as intrinsic to all physical entities can combine to produce the unified, structured, and meaningful consciousness that we actually experience?

Chalmers (2016) considers three different combination subproblems: the subject combination problem, or how micro-subjects combine to yield macro-subjects; the quality combination problem, or how micro-qualities combine to yield macro-qualities; and the structure combination problem or how micro-phenomenal structures combine to yield macro-phenomenal structures. The subproblem of the subject combination problem has also been expressed in terms of

the subject-summing problem (according to Roelofs (2020), the hard problem of the combination problem; according to Goff (2016), the heart of the combination problem; according to Chalmers (2016), an especially pressing aspect of the subject combination problem). In what follows, I will examine how the different versions of panpsychism attempt to resolve these subproblems.

4.1. Constitutive Panpsychism and the Combination Problem

Let us consider the micropanpsychist version. The micropanpsychist version deals mainly with the subject combination problem. Goff (2009), for example, states: "If panpsychism is true then physical ultimates are subjects of experience [. . .] there is something that it's like to be a physical ultimate" (p. 301). Since constitutive panpsychism posits subjectivity as a fundamental property of matter—on a par with mass, energy or charge—the question becomes: What is the relationship between the subjectivity of fundamental particles (ultimates) and the subjectivity of human subjects?

At this point, one can argue that the same arguments raised against physicalism can be applied to micropanpsychism. For example, the conceivability argument against physicalism holds that a physical world identical to ours but devoid of phenomenal experiences (understood as subjective experiences) is conceivable (and therefore metaphysically possible). If so, the physical world does not necessitate subjective phenomenality, and since grounding requires metaphysical necessitation, then subjective phenomenal facts are not grounded in physical facts. The same argument may also apply to micropanpsychism: a micro-conscious world (a world where all the particles are micro-conscious) without macro-conscious subjectivity is also conceivable (and therefore metaphysically possible), suggesting that subjective macro-conscious facts are not grounded in subjective micro-conscious facts.[17] The same applies to the other classical arguments against physicalism. The privacy of the content of subjects' experiences or their metaphysical insulation invokes an explanatory gap between micro-subjects and macro-subjects. Similarly, the conceivability of a panpsychist zombie, a creature whose most basic elements are conscious, but lacks an associated consciousness at the macro-subject level. Or the knowledge argument, that even knowing everything there is to know about my micro-phenomenal facts (imagine I know what it is like to be in every one of the particles that make up me), I may still be unable to know what is like to be me.

[17] For an extension of this argument see Goff 2009.

All these arguments appear to apply with the same force against micropanpsychism as they do against physicalism. If so, constitutive micropanpsychism might, therefore, be vulnerable to the same concerns that afflict physicalism. Whereas physicalism asserts that consciousness is merely brain activity and that physical reality is non-phenomenal, micropanpsychism maintains that consciousness is a fundamental feature of matter. Thus, although one can conceive of a world composed of micro-subjects without macro-subjects (and indeed, panpsychism entails the existence of such a world), the resulting explanatory challenge is of a different nature: a micro-phenomenal world does not need to account for the existence of phenomenality itself, but rather for how micro-phenomenality gives rise to macro-phenomenality—that is, how micro-subjects combine to form macro-subjects.

One way to put pressure on the idea of summing micro-subjects is by equating subjectivity with a specific point of view. A micro-subject is in this case a point of view connected with a particular experiential sphere. The integration of two different points of view will form a third point of view. But the combination of points of view encounters serious difficulties.

To illustrate, suppose that the specific point of view that appears when connecting different points of view is exactly your point of view. This would imply that your point of view is composed of many different points of view. But to avoid losing yourself, you must be very careful not to lose any of the points of view that make you up. This, however, is problematic. One reason is that your own point of view—the "what it is like" to be you—is a single, unified perspective. You do not experience yourself as a fragmented collection of many separate viewpoints; instead, your experience is phenomenologically coherent and singular. Another reason is that to preserve your identity as a singular subject, none of the component micro-points of view could be lost or overridden. Yet if you were required to "hold on" to many separate perspectives simultaneously, it would become unclear what your singular point of view really is or how it could remain phenomenologically coherent. Finally, there is no clear mechanism for such integration. There is no straightforward way to "add together" or integrate independent points of view to create a new, higher-level perspective. Unlike physical components that can be assembled into a unified whole, points of view are not additive or composable entities—they are subjective, self-contained, and resistant to combination.

One way to solve this is by arguing that when two points of view fuse to form a third, the original two disappear. The problem with this proposal is that, by eliminating the micro-subject components that fuse to form a macro-subject, the constitutive nature of micropsychism ceases to be genuinely combinatory. As we will see later, the elimination of the micro-components in the constitution of a high-level macro component is more a form of emergent panpsychism than a form of constitutive panpsychism.[18]

A final suggestion is that micro-subjects and macro-subjects are connected through a phenomenal bonding relationship (Goff 2016). This is not like the type of relations we usually have in mind (communicating, talking, or touching each other), but one that, in Goff's words, we lack a transparent conception of (p. 293). This, he argues, is because "[o]ur unfortunate epistemic situation does not afford us a transparent understanding of the (non-mathematico-causal) relations which conscious things bear to each other" (p. 291). These phenomenal bonding relations elude both introspective and perceptual access: introspectively, because introspection is limited to the subject itself; perceptually, because perception is directed outward.

Goff, however, recognizes that the phenomenal bonding approach 'leads to a kind of mysterianism' (2016, pp. 293–294).[19] Somewhat less mysterious is the proposal of Chalmers (2016), who suggests that the phenomenal bonding relation may be one of co-consciousness: "a relation such that whenever it relates to two phenomenal states, they are experienced jointly. When this relation holds among the states of distinct micro-subjects, those states will be experienced jointly by a new subject" (p. 202). Chalmers seems to suggest that an overlapping phenomenal signature of micro-subjects—most likely, in a transitive way—finally yields macro-subject experience. But he recognizes that this kind of relationship is also problematic for two reasons. First, this superposition of micro-subjects can yield trivial scenarios: what kind of consciousness stands from the phenomenal superposition of twenty quarks? Or, how many quarks are needed to yield a typical human phenomenal experience? Second, this kind of co-conscious relation seems to suggest the existence of a universal subject. Why should such integration stop at the level of human consciousness? Why not extend it all the way to a universal consciousness?

[18] For a more nuanced discussion of this issue see Coleman 2014.

[19] Roelofs (2020) argues that combining phenomenal bonding with experience-sharing mitigates (though does not solve) the subject-summing problem. For further criticism of the phenomenal bonding strategy see Siddharth 2021.

These questions remain unresolved. Neither Goff's nor Chalmers's proposal offers a fully convincing solution, and thus the combination problem continues to present a seemingly intractable challenge for constitutive micropanpsychism.

What about the cosmopsychist version? Cosmopsychism considers that elemental particles are not fundamental, but rather parts of a more fundamental entity—the conscious cosmos itself. In this view, there are no subjects to be added, but subjects to be extracted. In principle, the decomposition problem, as Chalmers (2016) calls it, has to deal with similar problems to the addition one, but in reverse: How does a single entity give rise to multiple dependent subjects? How does the universal macro-consciousness give rise to micro-conscious entities?

Goff (2020) takes this possibility seriously, referring to it as the problem of subject-subsuming-subjects. Once again, Goff appeals to our epistemic limitation—our perceptual and introspective inability to conceive of such scenarios. But this is not a compelling argument, as it merely establishes the cosmopsychist constitutive version as a theoretical possibility rather than as a robust explanatory model.

Shani and Keppler (2018) make a considerably stronger and sophisticated statement of cosmopsychism. They try to ground their view by appealing to stochastic electrodynamics—a controversial approach to quantum theory and fundamental physical reality. They argue that under this approach the combination problem simply dissolves because cosmic consciousness can be understood as a pure aperspectival subject. While this move sidesteps Coleman's perspectivist argument against constitutive panpsychism (which works for both micro and cosmopsychism), the price to pay is too high. These authors make a considerable effort to show how their account fits with the most basic level of physics and how this view resonates with aspects of Eastern philosophical traditions. However, the question of why the pure absolute cosmological consciousness should be aperspectival in the first place requires a more thorough consideration. If we take it as a starting hypothesis they should say something more about how an aperspectival creature (the cosmos) may be called subjective in a similar sense that we call humans and other creatures. And, if they take subjectivity in a different sense than we usually understand it (it cannot be otherwise), they should offer a more detailed explanation of the kind of subjectivity they have in mind. *At best*, these views show that cosmopsychism is perhaps closer to solving the combination problem than micropsychism, but they are far from solving it once and for all.

In sum, the subject-summing problem and the subject-subsumming-problem pose essentially the same conundrum. Both involve scenarios in which subjects are parts of further subjects, micropsychism because micro-subjects constitute macro-subjects, and cosmopsychism because sub-cosmic subjects are constituted as a partial aspect of the whole cosmic subject. But it is just as difficult to explain how to move from micro-perspectives to macro-perspectives as it is to move from the cosmic aperspectivist subject to high-level macro-subjects and from there to low-level micro-subjects.

4.2. Emergent Panpsychism and the Combination Problem

The combination problem arises if we endorse constitutive panpsychism, but not if we embrace emergent panpsychism, where macro-consciousness, rather than grounded in particular combinations of micro-conscious entities, emerges from them. In this case, the combination problem disappears because macro-consciousness is fundamental as such—there is no combination problem simply because no combination is required.

However, panpsychist emergentism must delineate adequate conditions for the emergence of macro-consciousness. Let us consider the two senses of emergence: strong (or radical) and weak (or conservative). Recall that whereas the strong version postulates that some additional natural law connects macro-consciousness and micro-consciousness (Brüntrup 2016), the weak one says that micro-consciousness is logically involved in macro-consciousness, although micro-consciousness alone does not amount to macro-consciousness (Seager 2016; Mørch 2014, 2018).

The strong emergent version clearly avoids the combination problem. There is nothing to be combined if macro-consciousness appears as a new ontological property. However, it faces problems analogous to dualism: if macro-consciousness follows rules independent of micro-consciousness, then strong emergent panpsychism will be closer to property dualism than to physicalism. Since one of the central aims of the contemporary panpsychist is to avoid any kind of dualism, the strong version cannot be considered a compelling panpsychist version. For this reason, there are not many philosophers defending strong emergent panpsychism.

There are, however, notable exceptions. Brüntrup (2016) sees no special difference between weak emergentism and constitutive micropsychism; the difference outlined above between causality and grounding (section 2) is for Brüntrup not enough difference at all.

Furthermore, Brüntrup argues that constitutive panpsychism necessitates some form of weak emergence (p. 65): the very composition of micro-conscious entities accounts for the emergence of macro-conscious phenomenal minds. In this case, macro-consciousness strongly supervenes on micro-consciousness. Thus, Brüntrup holds that the only way for emergent panpsychism to be viable is to adopt the strong version.

At this point, Brüntrup differentiates between strong and super-strong emergence. Whereas the former is intra-attributive and occurs within a unified categorical framework, the latter is inter-attributive and transcends categorical frameworks—it occurs when something emerges from nothing (p. 68). Brüntrup, then, denies the possibility of super-strong emergence since it would collapse into dualism and considers the possibility of strong emergence as the idoneous framework in which panpsychism unfolds.

The idea is that, against the weak emergence of constitutive micropsychism, phenomenal minds are something more than the constitutive summation of small phenomenal entities, and their causal powers are more than the constitutive summation of the causal powers of smaller entities (p. 69). From here new irreducible entities strongly emerge. The crucial point is that, according to Brüntrup, this view of strong emergence does not create new metaphysical entities. Therefore, as the superstrong possibility inexorably leads to dualism and the weak version collapses into constitutive micropsychism, the strong version gains prominence. While this position still requires substantial elaboration and broader agreement regarding its conceptual foundations, if it can indeed avoid positing new metaphysical entities, then the combination problem effectively disappears.

The weak version holds that micro-consciousness is causally involved in the formation of macro-consciousness, but an extra factor should be added. Unlike Brüntrup's account, there is a substantial difference between the constitutive versions, which focus on the grounding relationship, and the weak emergent version, which focuses on the causal relationship. Let us take this differentiation as relevant. In some way, this proposal is looking for a middle way between strong emergentism and the constitutive version of panpsychism. But the point is that, whatever the emergentist version we want to endorse, if macro-consciousness is not fully instantiated or grounded in micro-consciousness (as constitutive panpsychism holds), then there should be some natural causal process behind the

emergence of macro-consciousness that needs to be clarified. That is, macro-consciousness cannot arise without a specific cause or explanatory mechanism. So, which factor do we need to make this version coherent and solve the combination problem?

Recall that in addressing the combination problem for constitutive micropsychism, some researchers proposed the view that when micro-subjects fuse to form macro-subjects the former are, in the process, obliterated. According to Seager (2010, 2016), this factor might take the form of combinatorial infusion.[20] Roughly, when a variety of micro-conscious entities arrange themselves in particular laws of combinatorial infusion, they fuse to form a completely novel macro-conscious entity.[21] During the infusion process, micro-conscious entities cease to exist just at the moment the macro-conscious entity comes to be. A higher-level subject is, in Seager's words, "a novel state which in some way 'absorbs' or supersedes the mental states of the constituents" (Seager 2010, p. 179).[22] This point dissolves the combination problem since rather than combined to form macro-consciousness, the micro-conscious entities are infused.

But, at what cost? Let us see some potential objections to this approach.[23] The first is that, in order to achieve a sufficient distance from strong emergence, the infusion process should be mental or psychological (Seager 2016, p. 13). But does not this mean that, unlike other fundamental properties of matter (such as mass or charge), consciousness becomes the only fundamental property whose processes do not follow pure physical predictions? The second is that, although the infusion process manages to causally relate macro-subjects to micro-subjects, the macro-structure is hardly ex-

[20] See Mørch 2014 for a similar proposal.

[21] This might sound as if the action of special laws could lead to strong emergence, but Seager refers here to natural laws with no special causal powers.

[22] To illustrate the argument, Seager uses analogues with quantum mechanics and classical physics. The first stems from the notion of entanglement: "Entanglement can create states which, at least in some cases, result in new systems with properties distinct from those of their precursors and causal powers which are not purely mechanical or additive results of the causal powers of their components" (Seager, p. 12). The second stems from black holes: "[T]he physical entities which form a black hole can be said to fuse into a new entity which cannot be understood as a relational structure of its precursor entities. They have gone out of existence. The new system retains certain physical properties even as it throws away the particular characteristics of the precursor entities" (p. 13). This is the kind of emergence that Seager has in mind for conscious mental states.

[23] For very focused objections to this view see Chalmers 2016, for responses see Seager 2016.

plained by the constituents of the micro-structure. In other words, for the weakly structured micro-structure to transform in a highly structured macro-structure, the micro-structure must be lost, as its content is infused into a single, integrated experiential field. However, the micro-structure seems too disconnected, fragmented, or unstructured to yield a unified, richly structured macro-structure. Thus, even if micro-subjects infuse into one another, we must still ask: How do simple, primitive experiences give rise to a highly complex experience? How can combinatorial infusion account for the multidimensional and high-resolution features of macro-consciousness? Furthermore, if macro-experience results from a fusion process, why doesn't it average out or blur the richness of experience? And there is still a third problem, our ignorance about how the infusion process works. We have a reasonably clear idea of how some physical properties emerge from others in a way similar to that suggested by weak emergentism, but we do not have the slightest idea of the specific processes that produce the emergence of phenomenal properties. Seager's account lacks a detailed mechanism for how micro-experience contributes to the specific features of macro-experience.

In sum, although the weak emergent version has the strong advantage of intelligibly linking micro-subjects with macro-subjects, some important points remain unsolved.

4.3. Panprotopsychism and the Combination Problem

Finally, there is the combination problem for panprotopsychism. At first glance, panprotopsychism does not have to deal with the combination problem faced by constitutive panpsychism, since it holds that elementary particles are fundamental but not subjects in themselves—there are no subjects to be summed.

However, panprotopsychism must confront two problems of a different nature: (1) closing the gap between non-subjects and subjects, and (2) bridging the proto-phenomenal with the phenomenal. One way to account for the appearance of subjects from non-subjects is to adopt some sort of emergentism; similarly, one way to connect proto-phenomenal properties with phenomenal properties is to appeal to a version of constitutive micropanpsychism. However, following these paths rolls back to problems derived from other panpsychist versions. Panprotopsychists should follow alternative routes. The non-subject/subject gap closes if we understand proto-consciousness as qualitative or experiential but not as subjective, and bridging proto-phenomenal with phenomenal requires understanding proto-

DOI:https://doi.org/10.22201/iifs.18704905e.2025.1748 *Crítica*, vol. 57, no. 171 (diciembre 2025)

phenomenal as a narrow sense of qualitative or experiential whose accumulation constitutes macro-consciousness (i.e., qualitative phenomenal experiences). Let me therefore address these questions from the two options in which panprotopsychism can be characterized: panqualityism and panexperientialism.[24]

Recall that panqualityism is the view that microphysical ultimates instantiate protophenomenal qualities. Panqualityism emerges as an attempt to solve the combination problems that besiege the most standard panpsychist versions. Recall also that at the core of panpsychism lie three central commitments: structuralism about physics, realism about quiddities and quidditism about consciousness. Panqualityism adds the further claim that quiddities are qualities. Coleman introduces panqualityism as follows:

> The view I endorse—a form of panprotopsychism labeled 'panqualityism' by Chalmers—doesn't face the subject combination problem. On panqualityism the world is ultimately constituted of quality-instances, where we can usefully think of these as *unexperienced qualia*—properties just like the qualia we experience, only without anyone experiencing them. But since panqualityism does without the panpsychist's microsubjects, it must generate macrosubjectivity from scratch—this opens a new arena of combination problems specific to forms of panprotopsychism. (Coleman 2017)

The panqualityism version of panprotopsychism has important advantages over standard panpsychism; it eludes the quality problem since all qualities are fundamental—macro-qualities result from combining the fundamental ones—and it does not require facing the subject-summing problem since qualities do not require subjects for their existence. However, how micro-qualities can generate a vast array of macro-qualities (the palette-problem) and how and why macro-subjects appear call for explanation.[25]

On the one hand, the palette-problem concerns how the very limited kinds of micro-qualities instantiated by fundamental physical entities can give rise to the vast and diverse range of macro-qualities found in human experience. Indeed, if fundamental particles have only a small array of micro-phenomenal properties, how do we get

[24] In principle, panqualityism and panexperientialism are not mutually exclusive, both can be compatible ways to understand what a protoconscious entity might be.

[25] See Coleman (2017) and Chalmers (2016) for other potential problems of panqualityism.

the full spectrum of colours, sounds, emotions or cognitions characteristic of human experience? Roelofs (2014) appeals to the notions of "small-palette" and "phenomenal blending" to solve the palette problem.[26] He suggests that all phenomenal qualities are the result of blending a small number of micro-conscious qualities, where blending occurs when multiple micro-conscious qualities are experienced together (see also Coleman 2017). That is, when combined in the right relational structure, the multiple basic experiential qualities can give rise to new, distinct experiences that are not merely the sum of their parts. This process allows for a small set of fundamental experiences to generate a wide variety of complex conscious states. Coleman (2017), for example, suggests discarding the idea of discrete modalities and thinking of phenomenal qualities as a continuum, just as we think of the colours or flavours; that is, in the same way that orange experiences result from blending red and yellow experiences, or flavour experiences result from the blending of tastes and aromas provided by ingredients (see Roelofs 2014, p. 62).

On the other hand, although panqualityists elude the transition from micro-subjects to macro-subjects, they need to explain how and why macro-subjects appear. This problem is solved by adopting a deflationary view of subjects of experiences. Deflationary accounts reject the idea of subjects as metaphysically fundamental entities and conceive a subject as a structured set of experiential qualities or an organized field of experience. Coleman (2017), for example, explains subjectivity as a functional awareness, where awareness is a cognitive-functional process that lacks phenomenal content.[27] According to this functional understanding of subjectivity, a macro-subject is simply a complex informational organization of experiential qualities, and therefore, there is no deep metaphysical subject that needs to emerge or be fused. This view seems like a radical attempt to solve the combination problem but, pending further development, it appears to be a genuine possibility.

Finally, pan-experientialism is the view that everything possesses experience. Experience is, in this case, the fundamental feature of the world—it constitutes the very nature of proto-conscious entities. Like

[26] Others offer a solution in large-palette terms (Lewtas 2019). I do not explore this possibility because it raises fundamental problems; one micro-quality for each macro-quality complicates the quality combination problem considerably (for more details on this and further problems, see Chalmers 2016).

[27] Coleman's panqualityism leans on the Higher-Order Thought theories (HOT) to adopt a deflationary account of subjectivity, thus eluding the non-subject/subject gap.

panqualityism, panexperientialism denies that experience implies an experiencer, i.e., a subject of experience (Rosenberg 2004; Coleman 2006)[28] and, therefore, also requires an explanation of how subjects appear from non-subjects.

As with panqualityism, panexperientialism must also present in an intelligible way how micro-experiences constitute macro-experiences. Panexperientialism, therefore, confronts similar combination problems as panqualityism and, in my view, can offer similar solutions. Addressing the non-subject/subject gap also requires taking a deflationary view of subjects of experience. Again, one possible approach is taking subjectivity as a cognitive-functional process—a brain-based mechanism that represents internal and external states and generates a complex interaction between the system and its environment. This strategy may help to bypass the subject/non-subject problem. And again, to bridge micro-experiences with macro-experiences one might also follow the same strategy employed by panqualityism. In fact, one can begin to solve this problem by combining panexperientialism with panqualityism and arguing that micro-experiences are the expression of micro-qualities and therefore macro-experiences are the expression of macro-qualities. As panexperientialism leans on panqualityism, the assumptions of the former to solve the microquality/macroquality bridge might be transmitted to the latter to solve the microexperience/macroexperience bridge. It is by no means clear whether this proposal is ultimately coherent, but it represents an underexplored avenue that deserves serious consideration.

5. *Conclusion*

Let's take stock. There are different versions of panpsychism: constitutive, emergentist and panprotopsychist. The constitutive version admits two variants: micropsychist and cosmopsychist. Micropsychist is compatible with Integrated Information Theory, but it is deeply affected by the combination problem. The cosmopsychist not only lacks the tools necessary to definitely solve the combination problem but it is also incompatible with IIT.

If we move to the emergentist version, there are the weak and the strong emergent panpsychist variants. The strong variant has the

[28] For many, there cannot be experience without subjects of experience (Strawson 2006; Kind 2006). For the version of panexperientialism taken here to make sense, one needs to take a narrow sense of experience, which must be seen as the feature of consciousness that is present in everything and constitutes the potentiality to be phenomenally conscious.

great advantage of not having to address the combination problem, but it is fully incompatible with the core postulates of IIT. This variant has also other recalcitrant problems, especially the difficulty of avoiding dualist commitments. The weak variant, by contrast, is compatible with IIT and, while not offering a definitive solution, provides interesting approaches to the combination problem.

Finally, regarding versions of panprotopsychism, making sense of the proto-aspect involves a focus on qualities and experience. The first variant, panqualityism, is compatible with IIT and tries to solve the combination problem by adopting a deflationary view. A similar strategy is employed by the panexperientialist view. However, these views require a deep reconceptualization of what we understand by subjects of experience—a move that not everyone is willing to accept. Furthermore, once this reconceptualization is assumed, it becomes unclear whether the resulting position still qualifies as a genuinely panpsychist view.

In conclusion, if we want to take panpsychism seriously, we must set aside the constitutive versions and the strong emergentist variant of emergentist panpsychism and focus the efforts on the weak variant of the emergent panpsychist version or each one of the protopanpsychist variants, or perhaps in some kind of combination between them.

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Received: September 1, 2024; accepted: October 25, 2025.