Explaining Qualia: A Proposed Theoretical Framework for Addressing the Hard Problem of Consciousness

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Abstract: The enigma of consciousness, particularly the subjective and ineffable nature of qualia (our inner conscious experience), poses one of the most challenging puzzles in contemporary philosophy and cognitive science—the "hard problem". Grounded in interdisciplinary perspectives from philosophy of mind and neuroscience, this article introduces a novel theoretical framework aimed at elucidating the mysterious nature of qualia and providing a comprehensive explanation for the hard problem of consciousness. Emphasizing the intricate relationship between consciousness, identity, and subjective experience, and analyzing the brain's "atomic nature", the proposed model challenges reductionist perspectives that solely attribute consciousness to brain function. Here, the role of identity is integrated, emphasizing its centrality in comprehending conscious phenomena. Rejecting simplistic views equating brain states with mental states, the proposed framework also questions exclusive reliance on information integration theories. The suggested model contends that subjective experience transcends corresponding brain activity, introducing a dualistic perspective that involves non-physical information. The uniqueness of human consciousness is underscored, contrasting it with artificial intelligence, and highlighting it as vital for sustaining emotions, genuine comprehension, and engaging in complex behaviors. The paper advocates for a holistic perspective that recognizes the non-material dimension of consciousness, emphasizing its pivotal role in shaping human experience and behavior. This integrative approach seeks to contribute to both theoretical discourse and empirical investigations, fostering a deeper understanding of the nature of qualia and consciousness.

Keywords: consciousness; qualia; hard problem of consciousness; identity; subjective experience; awareness; Integrated Information Theory; Higher-Order Thought theory; Global Workspace theories; Reentry theory; cemi field theory

1. Introduction

Nowadays, neuroscience is generating a data deluge (Koch et al., 2016; Sejnowski et al., 2014). This is especially so in the context of studying consciousness, the ultimate neuroscience frontier (Seth, 2018). This factor has promoted the development of theories and models needed to both integrate this data and shape explanations of conscious experience (Tononi & Koch, 2015; Dehaene, 2014).

Significant progress has been made in developing a consistent framework. Today, prominent consciousness theories include Higher Order Theory, Global Workspace Theory, Integrated Information Theory, Re-entry Theory, and Cemi Field Theory of consciousness (Mashour et al., 2020). However, there are still many issues in addressing the ultimate frontier within this ultimate neuroscientific inquiry: the accounting of qualia, the inner subjective quality of experience (Chalmers, 1995).

According to Block (1995), phenomenal consciousness refers to the entirety of our subjective experiences, encompassing dynamic visual images, vibrant colors, auditory sensations, physical feelings, emotions, and thoughts, all centered within our bodies and intertwined with our responses. Access consciousness, on the other hand, describes the phenomenon wherein the contents of our minds become available for verbal communication, rational thought, and the regulation of our actions (Block, 1995).

Although theories differ in testability and explanatory target, they offer, in many cases, explanatory correlates in which neuronal processes are said to not merely relate to phenomenal properties but to actually account for them in some form (Lamme, 2006; Lau & Rosenthal, 2011). Here it is suggested, however, that this is on a surface level, since although these theories have been particularly good at covering aspects like access consciousness, at their core, they do not successfully explain why there is phenomenal consciousness or qualia in the first place (Nagel, 1974).

This persistent difficulty has resulted in many authors going to the extent of theorizing that there simply isn’t such a thing as phenomenal consciousness in the brain, that it is merely a misunderstanding of brain processes and a philosophical delusion we’ve unwillingly created (Dennett, 2017). But is it really so, and how has this affected consciousness science?

In this work, I explore the fundamental premise that subjective experience, or qualia, inherently necessitates being a particular entity. Building upon this foundation, I delve into the nature of that which forms a relation of identity, that is, what entity we can actually be, and under this framework I critically examine various theories of consciousness in their attempts to account for this substrate underlying subjective experience. Through conceptual frameworks, such as the atomic nature of the brain, I contend that this “being something” cannot be adequately explained or accounted for by current theories of consciousness. Building on these foundations, in the lasts sections of the article I discuss why the substrate of consciousness might be non-physical and I tied this to the function of subjective experience. Finally, I address the issue of probable models for unifying qualia at the brain level, which is a distinct topic from the identity problem.

2. Qualia are the real problem

In literature, the delineation of consciousness lacks clear demarcations among its various components, such as conscious experience, self-awareness or Dennett's (1992; 1996) concept of reflective thought related to language, implying cognitive functions.

Searle (2000), in contrast, associates consciousness with general attention, activation of the subject, and states of wakefulness and sleep. Moreover, the term "conscious decision" often alludes to the notions of intention or will. Consciousness is frequently linked with faculties like perception, understanding, and discerning the qualities of objects, involving processes such as perception and sensation.

Neuroscience extensively investigates the neurophysiological correlates of these phenomena. However, a profound question arises: how does subjective experience emerge from the intricacies of brain activity? This inquiry encapsulates the "hard problem of consciousness" (Chalmers, 1995), which grapples with the challenge of elucidating the connection between material entities and physical processes in the brain (neurons, neurotransmitters, etc.) and mental experiences or subjective sensations known as qualia (Blackmore, 2005).

Qualia represent the inner quality of experiences, encompassing sensations like the redness of an observed red object. While our descriptions of qualia may seem simplistic, Nikolinakos (2000) contends that they are complex phenomena. Judgments about qualia often falter because one cannot comprehend a quale until experiencing it.

Therefore, consciousness appears to involve various processes, with qualia being a crucial component. As humans, we assert ourselves as organisms with subjective conscious experiences, attributed to the brain. Despite attempts to dismiss qualia as conceptual errors, there is a scientific recognition of our subjective conscious experiences, encompassing various perceptions such as visual imagery, aromas, colors or tactile sensations.

The validity of attributing conscious experience to an information processing system, such as a computer, is acknowledged, raising questions about the possibility of such systems exhibiting phenomenological manifestations (Chalmers, 1995). The absence of a factor explaining why certain brain functions or modes of information processing are associated with subjective experience remains a key challenge in neurocognitive theories of consciousness (Block, 2002). Thus, a valid inquiry persists into understanding the determinants of subjective experience in a system (Searle, 1992).

I suggest that two emerging perspectives concerning the hard problem of consciousness are gaining traction, both sharing a common objective: to circumvent the challenge rather than directly addressing it. One stance advocates for panpsychism, asserting that subjective consciousness is an inherent property of the universe, existing in all things (Goff, 2019; Nagasawa, 2020). This position, however, overlooks the necessity of explaining why certain entities might be conscious while others might not, and it does so without the need for a comprehensive explanation of subjective experience (Seth, 2021); it assumes that all systems inherently possess this property, evading the issue of a more selective consciousness present in certain systems but not others (Chalmers, 1996).

Conversely, another viewpoint contends that the hard problem is a linguistic fiction, predicting its dissolution as our understanding of brain function advances (Seth, 2016; Dennett, 2018). This perspective fails to acknowledge the genuine complexity of the hard problem since even with the most detailed explanations of brain functioning, an explanatory gap remains (Levine, 1983).

Drawing an analogy between qualia and the self or ego shows us the distinction between neuronal processes and the actual experience (Strawson, 2017). While the processing of phenomena like the color red may result from brain activity, just like for the constitution of a perceived self, the subjective experience, the "redness of red," or a perceived sensation of a self, although a supposedly result of brain activity, is nonetheless present as a sensation and remains inadequately explained (Koch, 2019).

The expectation that the hard problem will diminish or “evaporate” as knowledge about the brain accumulates, as Seth (2016; 2021) suggests, is hindered by a conceptual gap, partly stemming from what I termed the "atomic nature of the brain," which will be discussed later on. This fundamental property of brain function, although somewhat acknowledged, has not been thoroughly discussed in the context of the problem of consciousness.

Therefore, two critical aspects emerge in addressing qualia: the need for an essential explanatory factor and an exploration of the properties of entities capable of sustaining them. This article aims to contribute to this discourse by eschewing presumptive conditions and seeking to elucidate the factor that explains subjective experience in a given system, along with identifying the appropriate entities for sustaining qualia.

3. Starting point

3.1.Explaining subjective experience: The thought experiment.

Understanding qualia and subjective conscious experience necessitates an examination of the entity at the core of these phenomena. Moment by moment, as individuals engage with the world, perceiving, hearing, smelling, and sensing physical stimuli, they inherently adopt a point of view rooted in their identity. This perspective prompts reflection on what it would mean to experience the world from the standpoint of something else, a question originally posed by Nagel (1974) in the context of contemplating what it's like to be a bat. However, the logical consequence of this question lies in the realization that to experience something specific, one must inherently be something.

For the rich diversity of qualia manifesting in human conscious experience, the fundamental prerequisite is being human. While seemingly straightforward, this fact holds immense significance in explaining conscious experience, yet it tends to be systematically overlooked or wrongly addressed in theoretical developments.

For example, Seth (2021) talks about “being you”, implying that as long as there is something that is like to be you, or any kind of sentient living organism, there is consciousness in a phenomenological sense. However, this position encounters a critical problem: the notion of “you” is something very generic and inherently vague. Humans, after all, are complex beings composed of a collection of multiple processes and entities, and so a question raises: which one of these elements and processes in particular is my consciousness? Here we arrive at a more fundamental issue: can we be anything? That is, is being a neuron, for example, as possible as being any other type of cell?

The concept of being something implies a distinct identity, and in the realm of conscious experience, this identity is positioned in relation to everything external to it. Everything falling within one's identity can be subjectively experienced, while what lies beyond that identity cannot. This raises the complex task of defining the identity of human beings, a matter that will be explored further.

While common discourse often identifies brain activity as the substrate of consciousness, establishing an identity relationship with it, such a monistic view by itself falls short in explaining why entities like brain activity are intricately associated with subjective experiences, such as the perception of the redness of red, and why others would not be linked to inner subjectivity.

But before this issue is even addressed, we will see that we are met with an equally intriguing puzzle: that we can't be multiple things at the same time. This is why the notion of “being you” makes no solid foundation to start addressing the nature of consciousness from a phenomenological point of view. Instead, we need to recognize that we need to be, in a direct sense of identity, something rather specific, not just a generic “you”, for there to be consciousness. We are our consciousness, which is something specific, in that it exists in the world, and that the fundamental nature of this something that we are is its oneness, meaning, that it consists of just one thing, as we will analyze.

Here, the notions of identity, being something particular, and the inherent positioning within that identity (considering one's point of view) become pivotal in comprehending the connection between alleged physical substrates and subjective experiences.

I propose that consciousness defies reduction to fundamental entities like integrated information, neural activity, or even electromagnetic (EM) fields, emphasizing the necessity to acknowledge a foundational fact rather than merely describing a secondary physical entity. Attempting to explain consciousness solely through reference to phenomena such as neurons or EM fields raises the persistent question of why these phenomena are associated with subjective experiences.

Let’s consider then a thought experiment involving the study of subjective conscious experience, qualia, by observing a person's brain as they perceive the redness of a red box. While we can identify specific neural processes associated with this experience, an external observer does not directly perceive the red color. However, if the observer were to merge with the person, adopting their identity, only then would the subjective perception of red, as experienced by the subject, manifest for the external observer. The crucial distinction lies in the property of being, always from an identity perspective. To experience qualia then, one must inherently be something.

It is insufficient to equate one thing with another, such as asserting that the brain is synonymous with conscious experience. Instead, reference must be made to an identity, which is us entirely, comprising specific neural activity, for instance. This identity allows for the manifestation of a world from the standpoint of being, not from an external viewpoint. The act of positioning an identity implies the potential existence of neural activity outside of our identity space, which does not give rise to subjective experiences but may still exhibit qualia within its own identity.

Mary's classic thought experiment, where knowledge about light and brain processing fails to explain a missing component (Jackson, 1982), is not necessarily at first glance an indication that consciousness transcends a strictly material scope. Instead, it underscores the oversight of the property of being. Qualia, far from being intrinsic properties of things, are properties of being. Therefore, not every substance in the universe necessarily possesses qualia intrinsically; rather, qualia represent the element of being something specific, inherently linked to a particular identity, such as us as conscious subjects.

But let’s take this mental experiment a bit further to clarify these points and address more issues. The assertion "I am my brain" necessitates a critical examination of the identity implied by the pronoun "I" and its purported equivalence to the brain. This inquiry raises the question: What constitutes this "I" or identity? Specifically, with what aspects of the brain does one identify? Is it with the occipital and temporal lobes that process the color red when perceiving such a stimulus, or perhaps with the Wernicke and Broca areas that facilitate the comprehension and articulation for speech of the color red? These are distinct regions within our central nervous system, prompting the question of which one truly represents the self, or more broadly, which one defines our human identity.

Neuroscience has consistently demonstrated that the brain lacks a central hub where all information from various processing areas is consolidated, akin to a command center; there is no singular "ego" or "self" residing within the brain (Northoff, 2013; Damasio, 1999). Moreover, as it will be elaborated later, the brain operates in an "atomic" fashion—divided into interconnected parts that function primarily in temporal sequences. Neuronal activity propagates changes in adjacent neurons or groups of neurons, but the processing of sensory information, such as the color red in the occipital and temporal lobes, does not directly transfer to the language areas of the brain. Each region processes information relatively autonomously (Tononi & Koch, 2015).

So, consider a scenario involving a teacher and a class. The teacher is explaining various brain functions to the students and uses an analogy to make the concept more accessible. He posits that one student, John, represents the brain area responsible for processing semantic meaning, while another student, Peter, represents the area responsible for processing color. The teacher then poses a question: How can John understand what Peter sees, such as the color red, if Peter lacks any subjective understanding of what "red" is? Although Peter might attempt to communicate with John and describe the color, John's role is limited to processing semantics, not visual information. John has never experienced color and, therefore, has no inner knowledge of what it entails. Peter can "activate" John, signaling him to think about the word "red" or "blue" based on the color Peter perceives, perhaps by using different hand signals. However, John still does not genuinely understand the notion of color; he simply responds mechanically to Peter's signals.

This analogy parallels the functioning of the brain. While Wernicke's area and the color perception area may influence one another, they process distinct types of information, and each "doesn't know" what the other processes (Northoff, 2013). Furthermore, the brain operates in a language composed of chemical products and molecules, which are not subjective experiences. This raises critical questions: How does the brain really "know" what redness is? How does it truly experience reward or comprehend the nature of smells? This is reminiscent of Searle’s (1980) Chinese Room thought experiment, as we will discuss in the penultimate chapter. From a strict physicalist perspective, the brain does not possess this knowledge due to its inherently "atomic" nature, where different areas process information independently (Tononi & Koch, 2015).

A perceptive student suggests to the teacher that a third entity—consciousness—might be capable of bridging the gap between John and Peter, thereby capturing and integrating their respective processes. The teacher responds by adopting the role of consciousness in this analogy, stating, "If I am that consciousness, and if this consciousness is equivalent to the brain, a part of it, or a brain process, then I must ask: with whom do I identify? With John or Peter?" Since John and Peter are distinct individuals who process different types of information—semantic meaning and color, respectively—it would be illogical to claim that consciousness could simultaneously be both John and Peter.

This highlights the central problem with equating subjective experience to brain states or processes. Each brain region processes a unique aspect of experience and is not aware of the others. There is no central hub in the brain that can integrate all of these aspects into a coherent subjective experience. Consequently, consciousness cannot be multiple parts at once, or even different functions of the brain working concurrently, because it is logically impossible to be both A and B simultaneously (Northoff, 2013; Tononi & Koch, 2015), as consciousness represents the property of being.

Therefore, the exploration of qualia and subjective conscious experience necessitates a fundamental shift in perspective. Consciousness cannot be reduced to the sum of its parts, such as neural activity or brain processes. Rather, it is an intrinsic property of being something specific—an identity that experiences the world from a unique standpoint. This identity is not a mere byproduct of brain function, but a foundational element that underpins the manifestation of subjective experiences. As we delve deeper into understanding the nature of consciousness, we must acknowledge that the essence of being—the "I" that experiences—cannot be fully explained by dissecting the brain's components.

3.2.Explaining subjective experience: Calling for identity is not enough

As a corollary, the adequacy of identity, understood as "the equivalence of things,", is insufficient without prior consideration of the property of being and its logical consequences, such as being unable to be different entities at the same time.

The assertion that identity theories on consciousness reduce to equating one entity with another, such as equating brain states to mental states, implies that a brain state is not merely the cause but the mental state itself. However, these theories fail to address the positioning problem of identity within this specified context of subjective experience.

Like in the experiment mentioned before, we need to position ourselves in a relation of identity with something, allegedly, the brain processes; this is a step further of just calling mental states the same as brain states, it talks about an entity being something. Consciousness in this case implies being a brain.

However, here we start to see an issue that has not being addressed properly in consciousness science in relation to identity, that we can’t be different entities at the same time, making the issue of the brain as the ultimate substrate of consciousness somewhat more problematic.

Recent attention in consciousness studies has shifted towards information integration or unification, emphasizing that our subjective experience is a holistic phenomenon. While strides have been made in understanding the unified nature of experience, as seen in the cemi field theory of consciousness (McFadden, 2020), this aspect is not pivotal to the discussion of qualia. I suggest that the central concern lies in identifying with a singular entity, something that is just one thing. Although consciousness may extend spatially, forming integrated entities beyond awareness, the point of identity is established within a specific space. Qualia may exist beyond this defined space, influencing what is considered conscious or not (this will be elaborated later in the last section).

Consider a hypothetical scenario where our consciousness occupies a brain space that dynamically integrates with other spaces, each possessing its own reality and consciousness. Due to our identification with a specific space, we remain unaware of the others. This lack of awareness does not negate consciousness in those spaces; it is simply unperceived by us due to our identity with a different space. Merely positing something as the basis or substrate of qualia is insufficient; it is imperative to inhabit that identity. This necessitates discussing a specific identity aligned with something in a unitary manner, as will be expounded upon.

In conclusion, the crux lies in our need to embody qualia. Qualia constitutes the existential aspect of reality. Our essential nature is qualia; it transcends being a mere byproduct of brain activity. The pivotal issue is not merely identifying qualia with brain activity or not but acknowledging that it is us, our identity, that embodies qualia. This discussion emphasizes the necessity of framing ourselves within a sense of identity with an entity, whether it be brain activity or another element.

Consequently, qualia might signify our embodiment of brain activity, not merely the brain states themselves. This underscores the importance of recognizing ourselves as the essence of qualia. It follows that there could be various brain states or neuronal activities related to qualia and subjective experience, yet we may remain unconscious of them. Merely equating brain states with mental states falls short; there must be a profound sense of identity with the cerebral aspect linked to the mental aspect, as an example, signifying that we are that entity.

In essence, the quale represents the activity not only as a sense of identity but also in relation to one's identity—a crucial distinction.

3.3.Explaining subjective experience: The atomic nature of brain function and the theoretical nature of the substrate of consciousness

In order to further explore the concept of being in relation to identity, we need to inquire into the nature of the substrate underlying consciousness, given the problems we have raised before that steam from the issue of identity.

Analogously, akin to observing a domino structure cascading in a sequence, I posit that group neuronal activities could serve as analogous units, each akin to a domino, contributing to conscious phenomena. The perceptible global sound and ensuing structure echo conscious experiences.

This global effect, however, is imbued with meaning by an observing agent – us. From the dominos' perspective, the global phenomenon remains unknown. At the neural level, lacking a singular concrete entity, myriad entities exist without a global viewpoint (i.e., millions of neurons, their components and biochemical interactions). This apparent contradiction could be likely reconciled through an additional structure mirroring the global phenomenon, allowing for identification and making sense of the whole.

Augmenting this framework involves incorporating a reflective mirroring of reality's qualities within an interconnected system, thereby constituting the basis for human conscious experience. Nevertheless, a formidable impediment surfaces in the form of the atomic nature of the brain.

As mentioned, a frequently overlooked yet critical challenge in bridging the gap between neuronal functioning and subjective experience lies in the atomic nature of the brain—an unexplored facet complicating our understanding of consciousness.

The "atomic nature of the brain" as I use it here refers to the idea that the brain's functioning is composed of many independent, discrete elements (such as neurons and their components) that do not inherently communicate in a unified manner.

While discussions of nerve impulses and neuronal electrical signaling often invoke a conceptual unity akin to a propagating wave, the reality is more intricate. Neural activity encompasses a succession of diverse events involving various components.

The ostensibly singular "electric impulse" is, in fact, the movement of ions following electrochemical gradients, influencing neuronal membrane configurations, neurotransmitter release, and internal changes within neurons. Notably, neurons, far from being unified, consist of distinct parts undergoing electrical changes, interlinked through neurotransmitter release in the synaptic space. This intricate interplay involves physically separated neurons, forming a complex structure of multiple independent components with mutual influence.

This complexity contrasts sharply with the integrated nature of subjective conscious experience. When perceiving a red square, for instance, sensory modalities seamlessly integrate shape, color, and location. However, the challenge arises in consolidating a unified subjective experience from a multitude of disparate neuronal events and components—an impediment rooted in the atomic conception of the brain.

The integration of various elements into a coherent perception, as seen in visualizing an image comprised of distinct points, might suggest a sense-making process for an entity, like a subject watching the dominos fall, and making sense of the phenomenon as a whole.

However, the operational dynamics of the brain diverge from such perceptual models due to the inherent atomic nature of its functioning. Unlike the coherent transmission of information, neuronal activity involves independent elements, where one group's actions induce changes in another through alterations in electrical potentials via ion movement. This lacks a communicative transmission akin to sending a letter, preventing the direct conveyance of coded information, such as the color red, between neuronal groups.

Additionally, as mentioned before, the brain lacks a central hub where all information from various processing areas could be made sense of, akin to a command center; there is no singular "ego" or "self" residing within the brain (Northoff, 2013; Damasio, 1999).

In this context, subjective experience seems confined to the activation of specific neuronal groups, with no inherent capability for higher-order awareness between distinct groups. Each neuronal group, although mutually influenced, functions independently, suggesting that the inner subjective quality of experiences as such could be better understood as intrinsic to neuronal activation itself rather than attributed to inter-group communication. The atomic nature of the brain underscores this independence, challenging the notion of a unified experience at the brain level across disparate neuronal entities.

So, a fundamental question arises: how can a unitary entity that could pass “the test of identification” (i.e., being just one thing), as previously discussed, emerge amidst the intricate complexity of the brain? The challenge is reconciling the necessity for a singular unity in conscious experience with the brain's inherently decentralized and independently functioning structure.

While brain activity is often invoked in discussions, it serves better as a tool for argumentation rather than actually representing a unitary entity. The brain comprises multiple structures and discrete entities, and neuronal activity brings about changes in these structures. It is crucial to recognize that brain activity, in itself, does not act as the cause; rather, it is the material structures underneath that serve as the causal agents. We need to reconceptualize the brain in scientific discourse to view it from a collection of a multitude of entities. In this way we can more easily understand why statements like "I am my brain" are meaningless.

Distinguishing between the elucidation of brain functions and processes and the subjective experience of perceptions is paramount. While information integration occurs at the brain level, it does not inherently imply subjective experience. Identity, as an abstraction, aligns with the whole, while physical identity pertains to an individual element.

Consciousness transcends a mere outcome of information integration within the brain. Although such integration involves simultaneous activities facilitated by biological connections, it does not presuppose a conscious observing entity or a singular entity. The integration of information at the brain level primarily pertains to the generation of patterns leading to specific behavioral responses, a theme to be explored in the following sections.

Crucially, identifying ourselves with something (critical for explaining qualia, as we mentioned), in this case, with the brain, is impeded by its simultaneous multifaceted nature. Subjective consciousness, in contrast, represents an integrated, unified dimension—a homogeneous field of experience. When we say that we are qualia, it means we are one thing. When contemplating merging with and identifying with something, the essence lies in a unitary entity, necessitating a sameness that aligns with the singularity inherent in identity; we cannot, in terms of identity, be more than one thing simultaneously, hence the problem or reducing subjective consciousness to the brain.

4. Logically, not everything can be qualia: the issue of the unitary nature of the substrate of qualia, and the problems with current theories of consciousness through the lens of the atomic nature of the brain

The Higher Order Thought (HOT) theory asserts that consciousness arises when there is awareness or a disposition towards awareness of a mental state. Contrary to the atomic nature of the brain, HOT contends that consciousness emerges from the brain's ability to perceive its own mental states, rather than external stimuli. Some supporting evidence comes from studies associating the dorsolateral prefrontal cortex (DLPFC) with metacognition, suggesting that consciousness is tied to the brain's self-awareness processes (Fleming et al., 2010; Rounis et al., 2010). However, the feasibility of perceiving one's mental states at the brain level is questionable, given the absence of intrinsic perception.

The issue lies in the fact that, at the level of the brain, there is no specific location or network where all sensory information and experiences are perceived holistically. The brain functions in such a way that each area operates independently, without full comprehension of the other areas' activities. Integration occurs in a temporal manner rather than spatially (Northoff, 2013). Furthermore, as previously discussed, the atomic nature of the brain imposes limitations on "internal perception." This is because different processing nuclei within the brain do not "transmit" their subjective qualities to one another (Tononi & Koch, 2015).

Given the decentralized structure and functioning of the brain, the notion that the brain can perceive its own mental states as a unified whole becomes problematic. There is no central "self" or "ego" within the brain to perform this task. Each brain region processes information independently, without a global viewpoint that integrates these processes into a coherent subjective experience. Therefore, the idea that the brain can be aware of its own mental states in the holistic manner required by HOT theory is incompatible with the atomic nature of the brain (Northoff, 2013).

Moreover, HOT theory presupposes that higher-order states can somehow confer consciousness on lower-order states. However, this presumption fails to address the fundamental issue of how discrete, independent brain regions could collectively generate a unified conscious experience. The atomic nature of the brain suggests that such integration is not feasible, as each region's activities are self-contained and do not contribute to a unified experience.

Additional concerns include the role of thinking in object consciousness, the alignment of HOT with access consciousness, the mechanism by which one mental state about another renders the first conscious, and the challenge of attributing a function to consciousness (Fleming et al., 2010; Rounis et al., 2010).

In contrast, the Integrated Information Theory (IIT) posits that consciousness partly involves the generation of information by the current state about previous states, emphasizing the integration of information. The theory introduces the measure Φ as an indicator of the level of consciousness, with its value determining the quantity of consciousness. Additionally, IIT asserts that the quality of consciousness, or content, is defined by the 'information geometry' associated with a specific Φ (Tononi, 2008).

However, again, the atomic nature of the brain implies that such integration is superficial and does not involve a genuine merging of distinct neuronal activities into a single conscious experience.

As mentioned before, the color processing in the occipital lobe does not inherently transfer its "knowledge" of color to the language-processing areas in a way that would create a unified experience of "red" that includes both visual and linguistic aspects. Instead, each area remains siloed in its function, undermining the premise that consciousness can emerge from the mere integration of information, which, in the case of IIT, is only temporal integration, not spatial (Tononi & Koch, 2015).

Moreover, IIT's heavy reliance on the mathematical measure of Φ as an indicator of consciousness does not account for the qualitative, subjective nature of experience. The atomic nature of the brain suggests that while different regions may contribute to the processing of sensory data and cognitive functions, these processes do not culminate in a unified subjective experience. Rather, they remain discrete, with no overarching entity to integrate them into a singular conscious experience. Therefore, IIT's concept of integrated information as the basis for consciousness is insufficient to explain the complexity of subjective experience as it disregards the decentralized and autonomous functioning of the brain (Northoff, 2013).

Global Workspace Theories, on the other hand, contributing to the discourse on consciousness, propose that cognitive and perceptual content is globally accessible. These theories, inspired by "blackboard" architectures, involve distinct competition and broadcast phases, highlighting their association with integrative processes such as attention, decision-making, and action selection. Baars (1997) presents a cognitive theory of consciousness that accommodates the sequential nature of this phenomenon.

According to Dehaene et al. (2003) and Dehaene and Changeux (2011), consciousness entails the activation of extensive cerebral networks. To reach consciousness, information must be represented by neural firing in early sensory areas (competition), surpass a threshold of duration and intensity for access to a distributed network (global workspace activation), and engage in a reverberant state through recurrent processing (broadcast).

Frassle et al. (2014) propose that consciousness relies on broadcasting winning content into a global workspace, facilitating flexible cognition and behavior. However, they question whether Global Workspace Theory (GWT) predominantly addresses access consciousness rather than phenomenal consciousness.

However, this theory also falls short when confronted with the atomic nature of the brain. GWT assumes that information can be globally broadcast across the brain, leading to a unified conscious experience. Yet, the brain's structure is not conducive to such global broadcasting. The absence of a central hub where all information is integrated and made accessible contradicts the very premise of GWT (Northoff, 2013).

In reality, the brain operates more like a collection of independent agents, each processing specific types of information without a central command center to integrate these processes into a coherent whole. The atomic nature of the brain suggests that what

GWT describes as global broadcasting is more likely a series of independent events occurring in parallel, with no singular entity experiencing these events as a unified consciousness. As a result, GWT also fails to explain how a decentralized system like the brain could produce the unified subjective experience that characterizes consciousness (Tononi & Koch, 2015).

Moreover, GWT's emphasis on the global accessibility of information explains how information might be made available for cognitive processing but does not explain how this availability translates into the rich, qualitative experience of consciousness.

Conversely, recurrent/reentrant processing theories emphasize the necessity of top-down connectivity for conscious awareness, proposing that widespread recurrent processing is crucial for the reportability of conscious contents. Lamme (2010) demonstrates that disruptions in top-down processing impede conscious perception, while Pascal-Leone and Walsh (2001) underscore the role of reentry in facilitating synaptic plasticity.

However, like the other theories, this approach is undermined by the atomic nature of the brain. Recurrent processing assumes that there is a mechanism for integrating information across different regions of the brain, but the brain's decentralized structure makes such integration unlikely.

Consequently, recurrent processing theories do not adequately account for the brain's fragmented, autonomous nature, which is incompatible with the idea of a unified conscious experience arising from reentrant processing.

Therefore, while all these theories provide valuable insights into how the brain shapes our unique conscious manifestations, we can see that all these processes elucidate how the brain supports conscious awareness, however, they do so without directly accounting for subjective experience, they simply delineate the brain activity associated with subjective consciousness or its support, lacking a more fundamental and necessary link between brain activity and the subjective quality of experience.

In contrast, the cemi field theory (McFadden, 2020) approaches the underlying nature of the substrate of our identity more closely, trying to reconcile the subjective experience with a tangible substrate in the physical world. Nevertheless, it encounters challenges, and I propose that it draws potentially misleading conclusions.

McFadden's argument prompts an examination of the main premise of IIT of consciousness, casting doubt on its validity. In concurrence with this perspective, as mentioned, I maintain that the brain seems ill-equipped to integrate information beyond temporal aspects. This inadequacy has repercussions for explaining the binding property of consciousness—the integrated and unified experience of perceiving various sensory inputs and cognitive processes as a coherent and singular conscious awareness. Such limitations, I argue, align with the constraints imposed by the brain's atomic nature.

As discussed, the brain is a composite structure with distinct elements, such as synapses and neuronal connections, which do not constitute a unified entity. Experts contend that in the brain, "information" integration is contingent on "communication" among disparate neuronal groups, giving rise to the basic premises of IIT of consciousness. However, this "communication" is actually discrete, involving localized changes in spatially separated elements. Consequently, "information" in the brain is integrated only temporarily, challenging both IIT and HOT theories due to the atomic nature of the brain, which also hinders direct perception by the brain of subjective neuronal processing.

Pal et al. (2020) challenge neuroscientific theories associating conscious states with the functional integration of cortical areas. Their experiments on rats, inducing wakefulness during continuous sevoflurane anesthesia, revealed a unique state combining wakefulness with anesthetic exposure. Electroencephalographic analysis demonstrated a decrease in higher gamma connectivity during sevoflurane anesthesia, but this connectivity did not recover during wakefulness induced by carbachol. Rats without restored wakefulness exhibited persistent reduction in gamma connectivity, despite significant changes in slow oscillation power and increased cortical complexity, akin to carbachol-induced wakefulness. This implies that the consciousness level can dissociate from cortical connectivity, challenging traditional views and prompting a reevaluation of connectivity's role in determining consciousness levels.

So, in contrast to prevailing theories, the cemi field theory posits that consciousness is rooted in electromagnetic fields generated by the brain, facilitating spatial integration of information (McFadden, 2020). In this framework, the EM field would become the identifier of subjective identity when interacting with the environment, like when watching someone seeing a red box, as it was portrayed earlier in the though experiment.

However, it's crucial to note that the EM field is an abstract representation of the influence exerted by electric charges and currents, comprising electric and magnetic components. While these fields interact and propagate as waves, including light and radio waves, they lack a tangible, material existence constituted by physical particles like atoms or molecules. Instead, the EM field is a property of the space surrounding moving electric charges, and there is no singular, concrete entity within it that corresponds to the sense of identity implicit in subjective consciousness (Halliday, Resnick, & Walker, 2014).

As stated before, we need to be one thing (of a sameness nature) in order to account for qualia in relation to ourselves. The "binding problem" addresses the challenge of understanding how our conscious mind rapidly integrates information across dimensions.

Consciousness plays a vital role in solving general intelligence problems, particularly sequential tasks relying on working memory. Tasks such as memory trace conditioning, multi-step calculations, goal-directed behavior, strategic planning, language comprehension, and creativity, require conscious binding, involving the integration of complex information in the brain. Researchers emphasize the need to comprehend how the brain achieves this integration, posing a fundamental challenge (Treisman, 1999; Carter et al., 2006; Dehaene & Cohen, 2007; Dehaene & Naccache, 2001; Fuster, 1991; Hagoort & Indefrey, 2014; Lieberman, 2009; Kaufman et al., 2010; Tononi & Edelman, 1998; Edelman & Tononi, 2008).

The “binding problem” however, is misleading, as it reflects a deeper challenge, that of the “the identity problem” previously discussed, stemming from the difficulty of establishing identity with inherently diverse elements.

The conflation of the binding problem with the unification of qualia adds to the confusion. The latter should be conceptualized as an issue that addresses how different qualia combine to form a continuum for optimal cognitive function, a concept more readily approached through models like working memory, as it will be explored in the final section of this paper. However, integrating each quale from diverse material elements in the brain presents a more profound and fundamental challenge, which is an identity problem. To solve it, we need to find an entity that can properly pass an identification test, that is, that can be characterized as being just one thing.

Considering a red square can illustrate the abstract separation of color and shape, prompting the idea of integration. Yet, this does not imply a specific mechanism joining color and shape; rather, the unity's form signifies the joint manifestation of both elements. In the case of a red square, this sense of integration is linked to the form itself, which would symbolize our sense of identity if we found the underlying substrate that sustains it.

A red square drawn on a piece of paper is unified by the underlying substrate that is one thing: the paper. Similarly, qualia are unified by the underlying substrate that needs to be one thing. Addressing how qualia of a red square then are associated with the sounds given by the words “red square”, is the true issue of the binding problem.

The identity problem, on the other hand, implies that we cannot merely equate one thing with another, mental sates with the brain, for example, and it also implies that we must consider an identity in relation to us, we need to be that one thing with which we are identifying.

In a similar yet different approach, McFadden (2020) underscores that consciousness involves integrated information, suggesting a need for a physical substrate capable of encoding such integration in the brain. Despite the common temporal integration observed in neuronal information processing and conventional computing, the author argues that true physical integration occurs in space, not time. The cemi field theory posits that consciousness is physically integrated and causally active information encoded in the brain's global electromagnetic field. This theory extends to propose that consciousness implements algorithms in space within the brain's EM field, offering an explanation for various aspects of consciousness.

While acknowledging that some integration occurs at the brain level, it's important to consider that qualia may not necessarily exist at the same level. Shifting from the material to the energetic aspect of the brain provides a conceptually straightforward transition, particularly in the context of seeking a suitable substrate for physically integrating complex information. This transition, however, only addresses the binding problem, offering a partial solution, prompting inquiry into why the magnetic field associated with this integration gives rise to qualia.

The core of this inquiry lies in the challenge of identity, and while the cemi field theory hints at a plausible substrate for tackling this identification dilemma, i.e., the EM field, I propose that this suggestion is inadequate to meet the needs of identification.

As outlined by McFadden (2020), EM fields are highly interconnected, forming a single EM field in space, with their strength diminishing over distance. The perturbation of the EM field from a single firing neuron has a limited reach, encompassing a relatively small number of neurons. Unlike material signals, EM field signals tend to act locally unless enhanced by synchronized chains.

Crucially, for algorithms in space to function, computational nodes must fire synchronously, ensuring simultaneous availability of inputs to all network components. This leads to the prediction that conscious information correlates with synchronously firing neurons.

However, as mentioned, EM fields serve as a conceptual portrayal of the impact generated by electric charges and currents, encompassing both electric and magnetic elements. These fields engage in wave-like interactions, manifesting as phenomena such as light and radio waves. Remarkably, they don't possess a palpable, material presence characterized by physical entities like atoms or molecules. Rather, the EM field is a characteristic of the space enveloping mobile electric charges, devoid of a distinct, tangible entity that could aligns with the notion of identity inherent in subjective consciousness (Halliday, Resnick, & Walker, 2014).

But one could argue that although they are not physical in the way that matter is, they do not have mass or occupy space in the same manner as tangible objects do and are better understood as physical properties of space itself, they are physical in the sense that they have real, measurable effects on objects and charges in their vicinity. They carry energy and momentum, they exert forces on charged particles, cause currents to flow, and influence the energy levels of atoms. Instruments like voltmeters and magnetometers can measure these fields (Halliday, Resnick, & Walker, 2014).

In that case, one could make the proposal that there is in fact something there, that is one thing, that we can identify with, and so EM fields could indeed be the substrate of qualia. However, this suggestion is not entirely convincing.

Consider the following analogy: Imagine a boat moving steadily through a calm lake. As it glides through the water, the boat generates ripples and waves that spread out from its path. These disturbances on the water's surface represent the electromagnetic field. The boat itself is like an electric charge or current, and its movement through the water creates changes in the surface, much like how a moving charge creates changes in the electromagnetic field.

The waves generated by the boat influence the surrounding objects on the water. A nearby leaf, for instance, will be set into motion as the ripples reach it. This influence is akin to how the electromagnetic field, the cumulative effect of the moving charge, interacts with other charges or currents nearby. Just as the water's surface changes in response to the boat's motion, the electromagnetic field is a dynamic entity that exerts forces and induces changes in its environment.

In principle, it could be argued that I cannot identify with this abstract succession of phenomena, with the pull and suction created by the passing boat on the leaf. These are different things interacting with each other, and the same goes for EM fields. These are not composed of physical substances like matter. Instead, they are regions of space where electric and magnetic forces can be observed and interact.

But even if there is in fact something there of a oneness nature, that we can identify with, there are further problems to this proposal. It is unlikely that the EM fields generated by neural activity are strong enough to influence neural processes significantly, given that brain tissue is a relatively poor conductor and that the fields are often very weak. Neurons operate on complex electrochemical signals, the notion that the EM fields interplay with the brain is inconsistent with known principles of neuroscience since they do not fit well with established knowledge about how neurons and synapses function and interact (Jones & Hunt, 2023).

This would not be a problem if we were to argue that consciousness is an epiphenomenon and has no casual power or agency over the brain. However, as I will argue in the next section, consciousness is the key element that allows the brain to make sense of world, therefore it needs to exert some sort of influence over the brain in a meaningful way.

Therefore, I depart from McFadden's proposal, suggesting that the EM field does not have a necessarily causal output to the brain. For consciousness to occur, it must previously be formed in terms of brain activity, which then shapes the EM field, implying that within this author's model, agency still resides primarily at the level of the brain.

According to McFadden (2020), the cemi field theory stands out from some other consciousness field theories by proposing that consciousness, embodied in the brain's EM field, has both inputs and outputs. This theory suggests that the brain's endogenous EM field, acting through a causal feedback loop, influences neural firing by affecting voltage-gated ion channels in neuronal membranes. Experimental support for this influence is found in evidence from transcranial magnetic stimulation (TMS), which generates EM fields comparable to the brain's endogenous fields. However, critics argue that this is not evidence that the EM fields have direct effects on brain function, rather, they are just disrupting the underlying movement of ions in neurons which are the real casual agents of neuronal signaling.

So, the need for an additional layer of causality under McFadden is here contested. As the EM field, generated by the brain, is argued to be the origin, for example, of any verbal report or reflection of conscious content, my assertion is that even if a re-entrant wave affecting the brain exists, any intentionality encoded in the EM field is already decoded in the brain, given that the EM field's information and structure depend on the preceding brain structure.

We must also take into account that no part of the brain can receive or decode the nature of EM field's information or corresponding firing neurons. Any meaningful representation of qualia or information in the EM field is not captured in any form by the brain to allow for meaningful connections that can progress to complex behavior and cognition, a fact driven by the atomic nature of the brain. As previously discussed, this is because different processing nuclei within the brain do not "transmit" their subjective qualities to one another.

This would not be a problem if the EM fields do oversee neuronal function in a meaningful way, and the brain just acted mechanically, but, as mentioned, the suggested EM fields' interplay with the brain is inconsistent with known principles of neuroscience; there is little evidence of any kind of meaningful relationship between the EM field and the underlying neurons to guide complex behavior and phenomena like semantic meaning (Jones & Hunt, 2023).

We must take into account that if the EM field is the substrate of subjective consciousness, it must have the flexibility to exert effects on the brain that are meaningful given the contents of consciousness, that it, an effect based on a subjective experience. This is because subjective consciousness is in fact important for complex behavior and adaptation to the environment, and not a mere epiphenomenon, as I will discuss in the next section. In that case we should expect the EM field to behave in a way that is meaningful given its subjective properties.

However, EM fields' behavior can be accounted for by the laws of physics and are not in any way reflective or influenced by something like subjective consciousness, making McFadden proposal even more unlikely. Thus, there is no solid argument for McFadden's model of the claim that the EM field's information re-enters the brain for conscious reflection and reporting of mental states.

According to McFadden (2020), in material-based neuronal models of consciousness, factors like synchrony are not inherently necessary or sufficient. Synchrony becomes crucial in EM field theories of consciousness, where it is deemed obligatory for information processing. However, I suggest that the absence of a causal role for EM renders this assumption somewhat moot.

The brain functions and could achieve higher-order states, including consciousness, without relying on the EM field; instead, the EM field would reflect brain function on another level. This distinction leads to the consideration of two types of consciousness: a cerebral one, causally linked, and a qualia-based one, with the EM field as a substrate, but without causal influence. But since a qualia-based consciousness does have a function, as I will explain in the following section, I think we must look for other candidates for the substrate of subjective experience.

Therefore, conscious subjective experience, referring to a sense of identity, must entail a single, unitary entity. No material reality in the brain, including a potential EM field generated by it, possesses the necessary properties for this. Consequently, considering the absence of a better candidate, the possibility is raised that consciousness represents a non-material reality with the property of being a single entity.

5. The possible underlying substrate of qualia in relation to the advantages and function of subjective experience

If we were to consider that there are no profound differences in the essential properties of the nervous system across living organisms, subjective experience must be invariably present across sentient life forms. While we can argue that various organisms share this subjective awareness, their modes of awareness are said to diverge, particularly in comprehending complex abstractions. Still, subjective consciousness, in itself, is devoid of any discernible intrinsic purpose from a purely materialistic standpoint, as we will address.

However, I propose that the function of consciousness lies in serving as the locus for intricate phenomena, necessitating its interconnection with the brain from evolution to uphold pivotal manifestations crucial to human existence and other complex living organisms.

Seth (2021) argues, for example, that the zombie argument, like many thought experiments that take aim at physicalism, are conceivability arguments, and these are intrinsically weak. Like many such arguments, it has a plausibility that is inversely related to the amount of knowledge one has. He points out that you can indeed imagine an A380 airplane flying backwards, for example, but is such a scenario really conceivable? In reality, the more you know about aerodynamics and aeronautical engineering, the less conceivable it becomes.

In a similar fashion it is trivial to imagine a philosophical zombie, one just pictures a version of oneself wandering around without having any conscious experiences. But can this really happen in the physical world? He argues that just as with the A380, the more one knows about the brain and its relation to conscious experiences and behavior, the less conceivable a zombie becomes (Seth, 2021).

However, in light of the rise of artificial intelligence, it is crucial to consider that computers are now capable of performing very intricate tasks without any apparent consciousness. This raises questions about whether complex human activities can occur without subjective experience. For instance, while modern AI can generate compelling poetry, it still lacks the conscious understanding or emotional experience that typically accompanies such creative work.

Articulating sentiments about a beautiful sunset or a captivating melody is important for complex behavior. Under a physicalist worldview, this would imply a neural basis responsible for the subjective quality of experience. Certain brain regions could be proposed to host the quality of beauty, yet the genuine aesthetic allure inherent in contemplating a sunset surpasses the confines of brain chemistry or neuron activity. Rather, it resides in the subjective realm of experience, an intangible facet of the mind.

Nevertheless, the brain, through a material process, can, in principle, articulate the perceived beauty, given the fact that we can say “this is beautiful”, using our speech centers.

From a strict physicalist perspective, the brain's ability to declare something beautiful implies at least a partial engagement in subjective experience. The challenge lies in elucidating how this occurs. For example, the cerebral cortex, responsible for processing color perception, would need to convey the subjective quality of color to another region, which, in turn, communicates with the language-processing cortex for articulation.

However, the brain cannot inherently "become aware of" a specific experience or possess direct knowledge of it, as we have mentioned—a consequence of the atomic nature of the brain previously discussed. Despite intuitions suggesting the perception of subjective experiences in the brain, this proves unattainable. Neuronal patterns in brain activity do not transmit the brain's perception of an object; instead, each pattern activates others independently. These intricate dynamic challenges the sole reliance on cerebral processes to explain mental phenomena, necessitating consideration of a conscious dimension beyond mere material attributions.

Here, a pivotal observation arises: engaging in direct discourse about a specific quale is unattainable; instead, our capacity is confined to contemplating various qualia. Describing the redness of something, for instance, proves incomplete, mirroring the nature of neuronal patterns associated with this color, which activate and interconnect with other patterns. I cannot say anything about the redness of red itself, nothing in my speech can transmit or describe this subjective quality of experience. However, the redness can be conceptually linked to other elements, akin to the associative activation of the neuronal pattern related to redness. For example, I can say that I am observing a red square on a screen.

The contentious need to postulate an identity with neuronal activity for explaining reflections on subjective experience intertwines with debates on the unity of consciousness related to the identity problem.

In this context, subjective experience and its contemplation indeed reflect the intrinsic workings and nature of the brain. This would suggest the possibility of tracing reflections on subjective experience in terms of brain activity, even if positioned at a different level or perspective regarding identity. While "qualia" may be associated with electrical activity or a potentially non-physical entity, the continued use of the same terms and reflection on subjective experience remains feasible, albeit from an alternative standpoint.

Therefore, even if subjective consciousness exists in a non-physical space, the brain's function is viewed as a shaping influence, placing individuals in a parallel world, subject to cerebral changes.

But the inherent limitation in articulating consciousness becomes evident when contemplating the intuitive notion that subjective experience necessitates a “capturing” of the subjective quality by the brain for a deeper understanding for reflective analysis. One thing is to merely say “this is a red square” and another to truly understand the redness and the shape of objects. Despite endeavors to establish parallels between subjective reflection and brain activity, the atomic nature of the brain precludes the direct transition from the subjective to the cerebral.

I suggest that the way out of this complex problem lies in recognizing that subjective experience encompasses non-physical information (or perhaps better understood as a non-physical dimension) profoundly influencing behavior and integral to human existence. This dimension would provide a substrate that is just “one thing”, that could allow us to surpass the issues with identification mentioned earlier, when considering a multitude of entities coexisting, like it is the case with the brain.

For example, while dopamine release and ensuing neuronal activity encode and shape the material aspects of the subjective experience of reward (Berridge & Robinson, 2003), this process operates on a distinct, likely non-physical, level. The key insight here is that the brain lacks awareness of the subjective sense of reward solely based on material phenomena like dopamine release and neuronal activity patterns.

The subjective quality of experience imparts crucial information extending beyond the material encoding in the brain, and the brain's ability to drive certain behaviors based on the feeling of reward or to deter actions associated with suffering can only rely on this non-physical aspect. Essentially, I suggest the brain utilizes a non-physical reality to inform living organisms and enhance their adaptability to the environment. This perspective underscores the limitations of entities such as Chalmers' zombies or artificial intelligence systems in integrating emotional information with sensory sensations to guide behavior (Chalmers, 1996).

Blindsight, an intriguing phenomenon illustrating the interplay of consciousness and physical processes, involves individuals with damage to the primary visual cortex exhibiting subconscious visual perception and performing actions without conscious awareness of visual information. The dorsal visual stream, responsible for processing spatial orientation and influencing motor actions, functions as a reflex without retained memory (Milner & Goodale, 1995). This phenomenon suggests that memory, while supporting the persistence of consciousness (qualia), is not the sole determinant. The existence of subjective consciousness marks the distinction between simple reflexes and more complex behaviors, such as abstract thinking.

I posit that memory contributes to sustaining the consciousness of a perceived object, but without integrated subjective consciousness, complex behaviors, understanding emotions, and connecting them with sensory perceptions become unattainable. The desire for reward and well-being, as well as the ability to discern why certain patterns are attractive, hinge on the presence of subjective consciousness. In essence, without qualia, organisms face limitations in engaging in intricate behaviors and comprehending the intricacies of emotions and sensations.

Attributing neuronal activity related to suffering or pain solely to the activation of neural patterns, without a profound comprehension of the subjective nature of pain, proves insufficient. The determinant for shaping behavior lies in the subjective quality of the experience of pain and suffering. Without this understanding, actions would be relegated to unconscious automatic impulses. Deliberate decisions of a person to endure pain and discomfort, as exemplified by running a marathon, are grounded in an awareness and understanding of the subjective quality associated with pain. In the absence of such understanding, the brain would prompt automatic withdrawal without a conscious acknowledgment of the reason.

Artificial intelligence, constrained by its programmed nature, lacks the intrinsic capacity to respond based on subjective qualities. While it can generate algorithmic responses aligned with programmed criteria, it does not possess genuine understanding or emotional experiences such as the appreciation of beauty, unlike human consciousness. Declarations about the beauty of an image generated by artificial intelligence are derived from training sets and lack an intrinsic comprehension or emotional depth (Searle, 1980).

The meaning of language, intricately processed by the brain, appears to find its true sense through subjective consciousness. Genuine understanding of language, for example, in distinguishing the correct word from similar alternatives in the act of remembering, relies on the discernment offered by subjective consciousness. It is within this dimension that we can authentically ascertain that the word surfacing in consciousness when remembering something aligns with our intended meaning, distinguishing it from other similar words that may also arise.

The current state of artificial intelligence in language processing aligns closely with the conceptual framework of the Chinese Room thought experiment (Searle, 1980). In this scenario, an individual lacking knowledge of Chinese follows instructions in the language without genuine comprehension, utilizing rulebooks to manipulate symbols and generate coherent responses. The paradox questions whether this person truly understands Chinese or mechanically follows rules without authentic comprehension, akin to the operation of computers in strong artificial intelligence, as argued by Searle.

I argue that the crucial observation from this though experiment, is that this extends to the brain, which, from a strict physicalist perspective, and given its atomic nature, works like the Chinese Room, lacking inherent and inner understanding of language and meaning. Genuine comprehension necessitates the involvement of subjective consciousness, posited here to have a non-physical nature.

Touching a wall from a subjective point of view, reveals a paradox where its assumed materiality clashes with the non-material essence of the subjective experience. While acknowledging the wall's physical existence, the act of sensing the touching unfolds in a dimension divorced from material reality. In the tangible world, the interaction involves subatomic interactions between electrons, creating an illusion of resistance in our subjective virtual reality. This phenomenon operates on a non-material plane, separate from the physiological processes of the brain and the physicality of the observed wall. The crux lies in realizing that conscious states, devoid of spatiotemporal attributes, defy the characteristics of material entities, suggesting consciousness is not merely identical or reducible to the material fabric of the brain and its functioning.

This immaterial plane, devoid of usual material attributes, can be regarded as one thing, a sameness that lacks spatial delimitations or locations, which adequately fits the requirements of the identity problem.

A second question arises concerning the influence of the immaterial plane, where subjective consciousness would reside, on brain activity, serving as a bridge between the non-physical and physical—a challenge reminiscent of ancient dualistic perspectives. Initially we could suggest that this conceptualization challenges the deterministic view of consciousness prevalent in scientific, particularly neuroscientific, circles, suggesting the potential for a more radical form of free will, for example.

Considering the non-physical dimension as inherently uncaused, non-spatial, and outside of time—though influenced by temporal encoding through brain processes—it raises the possibility that consciousness acts as a cause determining certain aspects of the concrete physical realm, including our brains. While external reality and brain-encoded content exert influence, the immaterial dimension of consciousness provides a space for a more radical form of free will.

In conclusion, I propose that consciousness is a non-physical entity intricately linked to the specific organism that shapes it, possibly through a mechanism wherein the brain serves as an intermediary. This perspective underscores the role of subjective consciousness in conferring true understanding, a quality surpassing the capabilities of purely mechanistic or algorithmic systems, such as those found in current artificial intelligence models.

6. **Unifying qualia**

The final relevant aspect of this theoretical framework is the process of unifying qualia, i.e., addressing the binding problem. While distinct from the identity problem, as we have mentioned, unification is integral, necessitating an exploration of the space and mechanisms in brain terms wherein diverse qualia converge concerning our identity. Here I suggest this convergence appears to transpire within working memory, a pivotal component for conscious awareness, wherein active elements inherently possess consciousness (Baars & Franklin, 2003).

The neural workspace, formed by the prefrontal cortex and connections to parietal areas, establishes a close interrelation among working memory, conscious perception, and cognitive control (Soto & Silvanto, 2014). Hassin et al. (2009) postulate that conscious awareness is contingent upon the central executive component of working memory, while the episodic buffer, a critical element of working memory, integrates information from diverse sources, contributing to a cohesive conscious experience (Baddeley, 2000). The significance of memory and executive processes in conscious awareness is emphasized by laws proposed by Ramachandran and Hirstein (1997), thereby reinforcing the role of working memory in qualia.

Blindsight underscores the influence of memory on conscious perception (Weiskrantz, 1990). Patients with blindsight exhibit the ability to execute actions without consciously perceiving pertinent information, suggesting a deficiency in memory retention within the dorsal visual stream (Milner & Goodale, 1995). This inability to adhere to qualia laws elucidates the absence of conscious awareness.

Crick and Koch (1992; 2003) identify specific neurons linked to qualia, projecting to the frontal lobes, aligning with the laws of qualia given the frontal lobes' involvement in decision-making and working memory (Gazzaniga et al., 2013). Frontal lobe activity corresponds to visual working memory encoding, involving regions such as the lateral prefrontal cortex (Todd et al., 2011). Activation of a broad fronto-parietal network during diverse working memory tasks reinforces the neural connection between conscious awareness and memory/executive function (Rottschy et al., 2012). Naci et al. (2014) discern a common neural code supporting analogous conscious experiences, emphasizing synchronized brain activity across frontal and parietal cortices, thereby underscoring the neural correlates supporting the indispensability of qualia laws for conscious experience.

However, the utilization of blindsight as evidence for the imperative role of memory in conscious awareness faces scrutiny (Weiskrantz, 2009). Skepticism arises regarding whether blindsight signifies degraded normal visual function and challenges the presumed segregation between dorsal and ventral visual streams (Himmelbach & Karnath, 2005; Schenk & McIntosh, 2010). Soto, Mäntylä, and Silvanto (2011) posit that working memory operations may not invariably demand awareness, as participants in experiments exhibit no awareness of engaging in certain tasks. The accuracy of working memory is influenced by both conscious and nonconscious distracters, indicating the adaptability of contents by unconscious processes (Soto & Silvanto, 2014). Studies demonstrate that working memory can operate on non-conscious information, as observers retain unseen visual cues and perform above chance levels during tests. High-level cognitive functions, such as arithmetic computations and reading, can occur over nonconscious information, suggesting a multifaceted nature of working memory with both conscious and unconscious components (Soto & Silvanto, 2014).

Contrary to conventional assumptions, cognitive processes traditionally thought to be under conscious control can operate implicitly and unconsciously (Schmidt et al., 2007). Experimental findings demonstrate that individuals can engage in controlled processing without conscious awareness, as evidenced by color identification tasks influenced by prior trial contingencies (Schmidt et al., 2007). Hassin et al. (2009) propose that working memory can operate implicitly, executing tasks without conscious intent and thereby expanding the reservoir of relevant information available for adaptive behavior. Research indicates that working memory tasks involving pattern extraction and application can occur unintentionally and outside conscious awareness (Hassin et al., 2009).

Marien et al. (2012) illustrate that subliminally activated goals, whether social, personal, or academic, can adversely affect executive function performance, underscoring the impact of unconscious goals on executive control. However, Hsieh and Colas (2012) find that while a moving object can attract attention subliminally, the dynamic trajectory and task-relevant predictive patterns may not be monitored in visual working memory.

This evidence challenges the notion that the memorization of certain information is a sufficient condition for conscious awareness. Working memory can retain content unconsciously, influencing behavior and cognitive processes, as observed in studies on implicit working memory processes and high-level cognitive tasks (Dutta et al., 2014). The dorsolateral and anterior prefrontal cortex play a role in working memory for both visible and non-conscious information, challenging conventional perspectives on conscious awareness and memory.

Although working memory contributes to conscious awareness, other processes also shape the subjective experience of qualia. Northoff (2003) posits that early activation of the ventromedial prefrontal cortex may be linked to the qualitative nature of qualia. Co-activation in this region, along with the hypothalamus, and deactivation in the ventrolateral prefrontal cortex and posterior cingulate cortex, may explain the sense of qualia presence and the experience of timelessness. The non-structural homogeneity of qualia, signifying unity and wholeness, may be associated with the multimodal nature of the ventromedial prefrontal cortex. The transparency of experience, the direct connection between sensations and the world, may involve reciprocal suppression between the ventromedial and ventrolateral prefrontal cortex.

In conclusion, the unification at the brain level of the contents of experience might necessitate working memory, this alone is not sufficient to sustain it, since not all its contents necessarily enter conscious awareness. However, I suggest that working memory is a valuable model for understanding the biding problem. The question persists regarding whether conscious awareness can exist independently of any form of working memory, warranting further exploration in this issue.

7. Conclusions

We've explored the intricate relationship between consciousness, identity, and subjective experience. An important theme discussed is the challenge posed by the atomic nature of the brain, emphasizing the complexity of bridging the gap between neuronal functioning and the unified nature of consciousness.

One key insight revolves around the concept of identity and its fundamental role in understanding qualia and conscious experience. Being something specific is crucial for the manifestation of qualia. The analogy of a domino effect illustrates neuronal activities giving rise to conscious phenomena, with the critical point being the perspective of the observer—its identity.

This discussion challenges reductionist views equating brain states with mental states, emphasizing the need for a more specific equivalence. I've criticized theories focusing on information integration in the brain, arguing that the identification of oneself with a single thing is crucial.

Here I contend that subjective experience cannot be directly equated with corresponding brain activity. The atomic nature of the brain poses challenges to the idea that consciousness arises solely from material processes. I propose a dualistic perspective, asserting that subjective consciousness involves non-physical information beyond the brain's material encoding.

Artificial intelligence, lacking subjective qualities and genuine understanding, contrasts starkly with human consciousness. The experience of touching a wall illustrates the distinction between physical interactions and subjective virtual reality. Conscious states challenge the reductionist view that consciousness is identical to matter.

The interaction between the immaterial and physical prompts a reconsideration of the deterministic view of consciousness, hinting at a more radical free will.

I advocate for a holistic perspective on consciousness, acknowledging its non-material dimension and its crucial role in shaping human experience and behavior. The conclusions underscore the need to move beyond simplistic notions of brain function and delve into the intricacies of identity, unity, and subjective experience.

8. References

Baars, B. J. (1997). *In the theater of consciousness: The workspace of the mind*. Oxford University Press, USA. https://doi.org/10.1093/acprof:oso/9780195102659.001.1

Baars, Bernard J., & Franklin, Stan. (2003). How conscious experience and working memory interact. *Trends in Cognitive Sciences, 7*(4), 166-172. https://doi.org/10.1016/s1364-6613(03)00056-1

Baddeley, A. (2000). The episodic buffer: A new component of working memory? *Trends in Cognitive Sciences*, *4*(11), 417-423. https://doi.org/10.1016/s1364-6613(00)01538-2

Berridge, K. C., & Robinson, T. E. (2003). Parsing reward. *Trends in neurosciences*, *26*(9), 507-513. https://doi.org/10.1016/S0166-2236(03)00233-9

Blackmore, S. (2017). *Consciousness: A very short introduction*. Oxford University Press. https://doi.org/10.1093/actrade/9780192805850.001.0001

Block, N. (1995). On a Confusion about a Function of Consciousness. *Behavioral and Brain Sciences*, 18(2), 227-287. https://doi.org/10.1017/s0140525x00038188

Block, N. (2002). *Concepts of consciousness*. MIT Press.

Carter, R. M., O'Doherty, J. P., Seymour, B., Koch, C., & Dolan, R. J. (2006). Contingency awareness in human aversive conditioning involves the middle frontal gyrus. *Neuroimage*, *29*(3), 1007-1012. https://doi.org/10.1016/j.neuroimage.2005.09.011

Chalmers, D. J. (1995). Facing up to the Problem of Consciousness. *Journal of Consciousness Studies, 2*, 200-219

Chalmers, D. J. (1996). *The Conscious Mind: In Search of a Fundamental Theory*. Oxford: Oxford University Press.

Crick, F. & Koch, C. (1992). The problem of consciousness, *Scientific American, 267*, 152–159. https://doi.org/10.1038/scientificamerican0992-152

Crick, F. & Koch, C. (2003). A framework for consciousness, *Nature*, *6*(2), 119–126. https://doi.org/10.1038/nn0203-119

Damasio, A. (1999). *The feeling of what happens: Body and emotion in the making of consciousness*. Harcourt Brace.

Dehaene, S. (2014). *Consciousness and the brain: Deciphering how the brain codes our thoughts.* Viking.

Dehaene, S., & Changeux, J. P. (2011). Experimental and theoretical approaches to conscious processing. *Neuron*, *70*(2), 200-227. https://doi.org/10.1016/j.neuron.2011.03.018

Dehaene, S., & Cohen, L. (2007). Cultural recycling of cortical maps. *Neuron*, *56*(2), 384-398. https://doi.org/10.1016/j.neuron.2007.10.004

Dehaene, S., & Naccache, L. (2001). Towards a cognitive neuroscience of consciousness: basic evidence and a workspace framework. *Cognition*, *79*(1-2), 1-37. https://doi.org/10.1016/s0010-0277(00)00123-2

Dehaene, S., Sergent, C., & Changeux, J. P. (2003). A neuronal network model linking subjective reports and objective physiological data during conscious perception. *Proceedings of the National Academy of Sciences*, *100*(14), 8520-8525. https://doi.org/10.1073/pnas.1332574100

Dennett, D. C. (1992). The self as a center of narrative gravity. In F. S. Kessel, P. M. Cole, D. L. Johnson, & M. D. Hakel (Eds.), *Self and consciousness: Multiple perspectives* (pp. 103-115). Psychology Press.

Dennett, D. C. (1996). *Tipos de mentes.* Madrid: Debate.

Dennett, D. C. (2017). *From bacteria to Bach and back: The evolution of minds.* W. W. Norton & Company.

Dutta, Agneish, Shah, Kushal, Silvanto, Juha, & Soto, David. (2014). Neural basis of non-conscious visual working memory. *NeuroImage, 91,* 336-343. https://doi.org/10.1016/j.neuroimage.2014.01.016

Edelman, G. M., & Tononi, G. (2008). *A universe of consciousness: How matter becomes imagination*. Basic books.

Gazzaniga, M., Ivry, R., & Mangun, G. (2013). *Cognitive neuroscience: The biology of the mind* (Fourth ed.). New York, N.Y.: W. W. Norton & Company.

Goff, P. (2019). *Galileo's error: Foundations for a new science of consciousness*. Vintage.

Hagoort, P., & Indefrey, P. (2014). The neurobiology of language beyond single words. *Annual review of neuroscience*, *37*, 347-362. https://doi.org/10.1146/annurev-neuro-071013-013847

Halliday, D., Resnick, R., & Walker, J. (2014). *Fundamentals of physics* (10th ed.). Wiley.

Hassin, Ran R., Bargh, John A., Engell, Andrew D., & McCulloch, Kathleen C. (2009). Implicit working memory. *Consciousness and Cognition, 18*(3), 665-678. https://doi.org/10.1016/j.concog.2009.04.003

Himmelbach, M & Karnath, H. O. (2005). Dorsal and ventral stream interaction: contributions from optic ataxia. *Journal of cognitive Neuroscience, 17*(4), 632-40. https://doi.org/10.1162/0898929053467514

Hsieh, Po-Jang, & Colas, Jaron T. (2012). Awareness Is Necessary for Extracting Patterns in Working Memory but Not for Directing Spatial Attention. *Journal of Experimental Psychology: Human Perception and Performance, 38*(5), 1085-1090. https://doi.org/10.1037/a0028345

Jackson, F. (1982). Epiphenomenal Qualia. *Philosophical Quarterly, 32*, 127–36. https://doi.org/10.2307/2960077

Jones, M. W., & Hunt, T. (2023). Electromagnetic-field theories of qualia: can they improve upon standard neuroscience?. *Frontiers in Psychology, 14,* 1015967.

Kaufman, J. C., & Sternberg, R. J. (Eds.). (2010). *The Cambridge handbook of creativity*. Cambridge University Press. https://doi.org/10.1017/cbo9780511763205

Koch, C., Massimini, M., Boly, M., & Tononi, G. (2016). Neural correlates of consciousness: Progress and problems. *Nature Reviews Neuroscience, 17*(5), 307-321. https://doi.org/10.1038/nrn.2016.22

Koch, C. (2019). *The Feeling of Life Itself: Why Consciousness Is Widespread but Can't Be Computed*. MIT Press.

Lamme, V. A. F. (2006). Towards a true neural stance on consciousness. *Trends in Cognitive Sciences, 10*(11), 494-501. https://doi.org/10.1016/j.tics.2006.09.001

Lau, H., & Rosenthal, D. (2011). Empirical support for higher-order theories of conscious awareness. *Trends in Cognitive Sciences, 15*(8), 365-373. https://doi.org/10.1016/j.tics.2011.05.009

Levine, J. (1983). Materialism and qualia: The explanatory gap. *Pacific Philosophical Quarterly, 64*(4), 354-361.

Lieberman, M. D. (2009). What zombies can't do: A social cognitive neuroscience approach to the irreducibility of reflective consciousness. In J. Evans & K. Frankish (Eds.), *In Two Minds: Dual Processes and Beyond* (pp. 199-218). Oxford. https://doi.org/10.1093/acprof:oso/9780199230167.003.0013

Marien, H., Custers, R., Hassin, R., Aarts, H., & Smith, Eliot R. (2012). Unconscious Goal Activation and the Hijacking of the Executive Function. *Journal of Personality and Social Psychology, 103*(3), 399-415. https://doi.org/10.1037/a0028955

Mashour, G. A., Roelfsema, P., Changeux, J. P., & Dehaene, S. (2020). Conscious processing and the global neuronal workspace hypothesis. *Neuron, 105*(5), 776-798. https://doi.org/10.1016/j.neuron.2020.01.026

McFadden, J. (2020). Integrating information in the brain's EM field: the cemi field theory of consciousness. *Neuroscience of consciousness*, *2020*(1), niaa016. https://doi.org/10.1093/nc/niaa016

Milner, A.D. & Goodale, M. A. (1995). *The Visual Brain In Action.* Oxford: Oxford University Press.

Naci, L. M., Cusack, R., Owen, A., & Anello, M. (2014). A common neural code for similar conscious experiences in different individuals. *Proceedings of the National Academy of Sciences of the United States of America, 111*(39), 14277-14282. https://doi.org/10.1073/pnas.1407007111

Nagasawa, Y. (2020). *Panpsychism: Contemporary Perspectives*. Oxford University Press.

Nagel, T. (1974). What is it like to be a bat? *Philosophical Review*, *83*, 435–50. https://doi.org/10.2307/2183914

Nikolinakos, D. (2000). Dennett on qualia: the case of pain, smell and taste. *Philosophical Psychology*, *13*(4), 505-522. https://doi.org/10.1080/09515080020007634

Northoff, G. (2003). Qualia and ventral prefrontal cortical function: 'Neurophenomenological' hypothesis. *Journal of Consciousness Studies*, *10*(8), 14-48.

Northoff, G. (2013). *Unlocking the brain. Vol 1: Coding*. Oxford University Press.

Pal, D., Li, D., Dean, J. G., Brito, M. A., Liu, T., Fryzel, A. M., ... & Mashour, G. A. (2020). Level of consciousness is dissociable from electroencephalographic measures of cortical connectivity, slow oscillations, and complexity. *Journal of Neuroscience*, *40*(3), 605-618. https://doi.org/10.1523/jneurosci.1910-19.2019

Ramachandran, V.S & Hirstein, W. (1997). Three Laws of Qualia: What Neurology Tells Us about the Biological Functions of Consciousness, Qualia and the Self. *Journal of Consciousness Studies, 4,* 429-458.

Rottschy, Langner, Dogan, Reetz, Laird, Schulz, . . . Eickhoff. (2012). Modelling neural correlates of working memory: A coordinate-based meta-analysis. *NeuroImage*, *60*(1), 830-846. https://doi.org/10.1016/j.neuroimage.2011.11.050

Schenk, T & McIntosh, R. D. (2010). Do we have independent visual streams for perception and action? *Cognitive Neuroscience*, *1*, 52–63. https://doi.org/10.1080/17588920903388950

Schmidt, James R., Crump, Matthew J.C., Cheesman, Jim, & Besner, Derek. (2007). Contingency learning without awareness: Evidence for implicit control. *Consciousness and Cognition,* *16*(2), 421-435. https://doi.org/10.1016/j.concog.2006.06.010

Searle, J. R. (1980). Minds, Brains, and Programs. *Behavioral and Brain Sciences, 3*(3), 417-424). https://doi.org/10.1017/s0140525x00005756

Searle, J. R. (1992). *The rediscovery of the mind*. MIT Press.

Searle, R. J. (2000). *El misterio de la conciencia*. Barcelona: Ediciones Paidós.

Sejnowski, T. J., Churchland, P. S., & Movshon, J. A. (2014). Putting big data to good use in neuroscience. *Nature Neuroscience, 17*(11), 1440-1441. https://doi.org/10.1038/nn.3839

Seth, A. (2016, November 2). *The real problem*. Aeon. https://aeon.co/essays/the-hard-problem-of-consciousness-is-a-distraction-from-the-real-one

Seth, A. (2018). Consciousness: The last 50 years (and the next). *Brain and Neuroscience Advances, 2*. https://doi.org/10.1177/2398212818816019

Seth, A. (2021). *Being you: A new science of consciousness*. Penguin.

Soto, David, & Silvanto, Juha. (2014). Reappraising the relationship between working memory and conscious awareness. *Trends in Cognitive Sciences*, *18*(10), 520-525. https://doi.org/10.1016/j.tics.2014.06.005

Soto, Mäntylä, & Silvanto. (2011). Working memory without consciousness. *Current Biology*, *21*(22), R912-R913. https://doi.org/10.1016/j.cub.2011.09.049

Strawson, G. (2017). *The Subject of Experience*. Oxford University Press.

Todd, J. Jay, Han, Suk Won, Harrison, Stephenie, & Marois, René. (2011). The neural correlates of visual working memory encoding: A time-resolved fMRI study. *Neuropsychologia*, *49*(6), 1527-1536. https://doi.org/10.1016/j.neuropsychologia.2011.01.040

Tononi, G., & Edelman, G. M. (1998). Consciousness and complexity. *science*, *282*(5395), 1846-1851. https://doi.org/10.1126/science.282.5395.1846

Tononi, G., & Koch, C. (2015). Consciousness: Here, there and everywhere? *Philosophical Transactions of the Royal Society B: Biological Sciences*, *370*(1668), 20140167. https://doi.org/10.1098/rstb.2014.0167

Treisman, A. (1999). Solutions to the binding problem: progress through controversy and convergence. *Neuron*, *24*(1), 105-125. https://doi.org/10.1016/s0896-6273(00)80826-0

Weiskrantz, L. (1990). *Blindsight: A Case Study and Implications*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198521921.001.0001

Weiskrantz, L. (2009). Is blindsight just degraded normal vision? *Experimental Brain Research*, *192*(3), 413-416. doi:10.1007/s00221-008-1388-7

I want to clarify that there is no new data associated with this article. As the sole author of this work, I affirm my dedication to fostering open and accountable research practices. While no specific datasets are associated with this paper, I encourage readers to contact me for any additional information or clarifications.