**Continuity: An Ontological Proposal for the Mind-Body Problem**

**Abstract**

This paper gives significance to the concept of continuity in addressing the contemporary mind-body problem. Building upon philosophical definitions and insights from empirical brain science, the paper argues for "ontology of continuity" as a way to bridge between the mental and physical. To overcome the challenge of Kim’s causal overdetermination, the paper introduces a dual-neural process model, where subjective experiences and neural activities co-depend and influence each other in a quasi-parallel manner. This model seeks to reconcile idealism and physicalism, proposing that continuity serves as a fundamental ontological construct connecting the mental and physical realms.

Keywords: supervenience; continuity; panpsychism; overdetermination; physicalism

**1. Introduction**

This paper delves into the ontological nature of the mental and physical. What is ontology, then? It is generally known to be the study of being. Furthermore, there are “at least two parts to the overall philosophical project of ontology” (Hofweber, 2023, Section 3.1). The first one concerns “what there is, what exists, what the stuff of reality is made out of.” The second one involves “what the most general features and relations of these things are.” However, clarifying these two aspects is not an easy task. Hofweber also points out that “[o]ne of the troubles with ontology is that it not only isn’t clear what there is, it also isn’t so clear how to settle questions about what there is.” Should this lead us to abandon our inquiry? Certainly not.

According to Hofwber, the “larger discipline of ontology” involves the “study of ontological commitment, i.e. what we or others are committed to.” Since the mind-body problem is one of the mostly intensely debated topics today, it is worth investigating the relationships between the mental and physical by assuming their ontological validity. That is, we do not have to be led into believing that reality is illusory as argued by the ancient Greek philosopher Zeno.

In examining the mind-body problem, we face the fundamental question: what is the nature of the mental, and how does it relate to the physical? In seeking to answer this question, this paper emphasizes the significance of continuity in both mental and physical realms. Consequently, the paper proposes that continuity itself be regarded as an ontological construct that bridges the two. This conception can help unify our understanding of the mental and physical.

To achieve that aim, Section 2 provides key definitions regarding the mind-body problem. Building on these definitions, Section 3 provides an “ontology of continuity” thesis based on comparison between physicalism and idealism. Section 4 presents several features of our mind, supported by empirical studies. Finally, Section 5 presents a supervenience model that attempts to overcome the challenge of Kim’s causal overdetermination. The conclusion will summarize the paper’s major points and suggest that it offers a meaningful extension to the current debate surrounding the mind-body problem.

**2. Definitions**

Physicalists argue that the mental is ultimately physical. Specifically, they say that although “the world might contain many items that at first glance don’t seem physical – items of a biological, or psychological, or moral, or social or mathematical nature,” “at the end of the day such items are physical, or at least bear an important relation to the physical” (Stoljar, 2022, Section 0). The term “physical” sounds quite familiar and intuitive. It can refer to anything that can be perceived through our senses. But how should we exactly define it? According to Ney (2008), “many interpret physicalism as the doctrine that everything is physical, where to be *physical* is to be countenanced by physics” (p. 1035). However, Hempel (1980) notes that “the physicalistic claim that the language of physics can serve as a unitary language of science is inherently obscure” (p. 194). Why? Physics is constantly at a stage of evolving, as “it will no doubt undergo further changes” (p. 195). This means that physics as known today is yet incomplete, which in turn suggests that definition of physicalism rests upon an unstable foundation. Given the challenges of formulating precise definitions in the mind-body problem, this paper seeks to circumvent this issue by using conditional statements. For instance, instead of stating that “The physical is X,” this paper will use the following form: “If something is physical, it is X.” See below:

Definitions

(1) If something is physical, it has a spatiotemporal form but has no awareness.

(2) If something is spatiotemporal, it is necessarily spatially/temporally continuous.

(3) If something is continuous, it forms its own type of wholeness through connectivity.

(4) If something is spatial, it involves a simultaneous representation of connectivity.

(5) If something is temporal, it involves a successive representation of connectivity.

(6) If something is mental, it has awareness and perceives the spatiotemporal form of the physical.

(7) If something has awareness, it continuously retains its self-identity temporally, while it may or may not be focusing on an object.

(8) If something is perceived, awareness occurs to focus on the something, as its spatiotemporal form is externalized against the awareness by aligning with the continuous retention during the awareness.

(9) If something focuses on an object, it encounters the otherness of the object.

Panpsychists may have a different idea about (1). They hold “that everything is conscious, which many find counterintuitive” (Chalmers, 1996, p. 153). Nevertheless, Chalmers claims that “we ought to take the possibility of some sort of panpsychism seriously,” since “there seem to be no knockdown arguments against the view” (p. 299). However, for the purposes of discussion, although this paper entertains the idea that the universe as a whole may have a mental element (because it obviously gave birth to our consciousness), it will reject the idea that all physical matter has a certain form of consciousness on an individual level.

Regarding (2), we say that something spatiotemporal is necessarily continuous, for otherwise it can have no significance in the empirical world. If something is spatial, it necessarily occupies space. Everything that occupies space has an extension. Or even a segment within empty space is an extension within it. An extension is characterized by its internal connectivity. In addition, if something is temporal, it necessarily has an extension in temporal passage. Something that has no extension in temporal passage is atemporal. The physical fits this characterization, since it has no awareness.

(3) must be understood with caution. The “continuous” as defined therein differs from the notion of mathematical continuity. Also, it does not concern whether our space or time is seamlessly continuous or gappy. The core defining feature of continuity is that seemingly isolated features can combine to establish oneness. For instance, a melody is spatiotemporally continuous as its acoustic wave propagates physically through the air. The crests and troughs of the wave, though they are considered to be opposites, constitute one melodious sound. Additionally, two particles of a tangible object, despite their spatial separation, are still the components of the same object. The object’s continuity is shown through the numerous connectivities of such particles that constitute the object. However, these connectivities are static rather than dynamic. Thus, (4) notes that the “spatial” involves a simultaneous representation of connectivity.

Meanwhile, (5) states that the “temporal” involves a successive representation of connectivity. It has a dynamic element. Or it can be thought of as a flow. For example, the motion of an object in our eyes can be interpreted to be a collection of successive snapshots of the same object. Although these successive snapshots are distanced apart, they create an impression of oneness in a temporal dimension.

(6) defines mentality, which has two features: awareness and perception. First, as defined in (7), awareness is based on the continuous retention of self-identity. What does “retention” mean? This idea is well established in Husserl (1928/1991, pp. 25-29). For instance, by taking the “tone” (sound) as an instance of a “hylectic datum” (i.e., sensory datum), Husserl states: “It begins and ends; and after it has ended, its whole duration-unity, the unity of the whole process in which it begins and ends, ‘recedes’ into the ever more distant past. In this sinking back, I still ‘hold onto it,’ have it in a ‘*retention’*” (emphasis added, p. 25). During this retention, the subject having awareness “may or may not be focusing on an object” – i.e., may or may not be thinking/perceiving anything. Still, the subject experiences the flow of time, during which she maintains a sense of self.

In (8), note that “awareness occurs to focus on something.” In other words, the subject’s perception of the physical may be purely accidental regardless of her own intention. In this way, the spatiotemporal form of the physical externalizes itself against the awareness. This externalization can occur because the continuity of its spatiotemporal form is *mapped onto* (but not exactly on a one-on-one basis) the continuity of the subject’s awareness. However, how does the initial step of “focusing” on something occur? Or how does awareness come to “hold onto it,” as Husserl said? As defined in (9), this happens when the subject encounters the otherness of the object. This can involve two situations: (i) encountering the object externally (i.e., perception) and (ii) encountering it internally through thoughts. In any case, the object that the subject comes to focus on is other than the subject herself.

Based on the nine definitions, let us examine more closely the relationship between the mental and the physical.

**3. Mental vs. Physical**

Since physicalists believe that everything is physical, they would say that the universe can exist without the mental. After all, it is logically possible that there is a world where the physical exists but the mental does not exist at all. The material universe has existed since long before the human species, so that idea is acceptable. However, would it also be possible that in all the conceivable worlds from eternity to eternity, the physcial exists but the mental did not exist at all? This is another valid logical possibility. This position can be rephrased as follows.

Physicalists’ view:

From a vantage point outside all the conceivable worlds, it is possible that the physical exists without the mental having to exist in those worlds, because the ontology of the physical (whose essence is continuity) is self-sufficient.

However, their view raises one question. Per Definition (1), the physical has no awareness. That is, it has no first-person perspective. Thus, it lacks the self-sufficiency to exhibit its spatiotemporal continuity. So how could it be established in those worlds that the physical exists in its spatiotemporal form? Wouldn’t it be that its continuity exists only in its potentiality? In order to ensure the actual existence of the physical, idealists (who believe that the mental takes ontological precedence over the physical) might argue as follows.

Idealists’ view:

From a vantage point outside all the conceivable worlds, it is possible that the physical exists without the mental having to exist in those worlds, because the continuity of the physical is materialized by the mental that occupies the vantage point. The very fact that the physical can exist on its own is extant entirely because of a hypothetical being that stipulates it as such.

In other words, the supposed self-sufficiency of the physical rests upon the metaphysical existence of the mental. However, this mental must be something that far surpasses our mind. Our mind is finite and cannot capture the full continuity of the physical. Our perceptions do not fully represent the physical. For instance, our cognitive system must exclude lots of physical information available to observe a physical object. If it were to process every piece of information, this would create a huge load on our brain. It would be inefficient from an evolutionary viewpoint.

However, why would the continuity of the physical have to be perceived at all for the physical to exist? Also, even if there is no being that actually perceives its continuity, this does not matter because the laws of physics fully describe its “continuity” (again, this is not mathematical continuity). For instance, Meillassoux (2008) maintains that “the mathematizable properties of [an] object are exempt from the constraint of a [subject’s] relation [to the world], and that they are effectively in the object in the way in which I conceive them, whether I am in relation with this object or not” (p. 3). However, Žižek (2012) notes that “even in the sphere of pure conceptual reasoning, the succession of moves does not work as an atemporal chain of consequences” (p. 629). The laws of physics are expressed through mathematical equations, and they are meant to be understood and interpreted through some form of conceptual reasoning that progresses through time. If there is no mental being involved in such reasoning, why would the equations have to exist at all? Therefore, it is plausible that the universe might have to have at least some form of mental element far greater than ours (let us call this “higher mentality”) that sustains the ontology of the physical.

But doesn’t this sound too mystical? However, it may not be too far from the belief in the self-sufficiency of the physical. Specifically, its self-sufficiency can be interpreted to be equivalent to the actualization, by a higher mentality, of its potentiality to exist in its continuity. Whether or not they agree with this idea, physicalists must note that their stance is necessarily a *metaphysical* one. Whatever the case, we can argue that *continuity, as an ontological construct, connects between the physical and the mental*. Let us call this an “**ontology of continuity**” thesis. But before discussing this in the context of the mind-body problem, we will examine how our mind works based on empirical studies from brain science.

**4. Features of Our Mind**

Our mind is believed to exhibit the following characteristics.

Features:

(A) The conscious is an immediately present portion of the mind, which experiences “nowness,” during which awareness at the beginning of the nowness is continuously retained, along with the other intermediate occasions of awareness, up to awareness at the end of the nowness.

(B) The subconscious is a non-immediately present portion of the mind, which organizes/modifies/integrates information in the background.

(C) Perception and judgment, which are subjective experiences, occur on both conscious and subconscious levels by depending entirely on their corresponding neural activities at all times.[[1]](#footnote-1)

(D) In response to the subjective experiences, another neural activity takes place to encode and store their information in the memory.

(E) The mind is unlike artificial intelligence (AI), which continuously appears, from the viewpoint of the conscious, to process information under design rather than processing information in a genuinely continuous way.

Let us examine (A) more closely. According to Wang et al. (2015), it is understood that “temporal perception is implemented in a ‘time window’ of approximately 3 s which we experience as ‘present’” (p. 405). However, 3 s is so long that we cannot say that there is only a single occasion of “awareness” within that time window. According to Rayner (1998), “[w]hen we read, look at a scene, or search for an object, we continually make eye movements called *saccades*,” between which “our eyes remain relatively still during *fixations* for about 200 – 300 ms” (p. 373). Further, when reading a text, “new information is acquired from the text only during fixations” (p. 378). This shows that there are multiple occasions of awareness during our sense of nowness.

With regard to (B), Luo et al. (2024) note that when the brain is at rest, “the Default Mode Network (DMN) is activated” (p. 1). Specifically, “neural activities such as beta wave rhythm regulation, “*subconscious*” divergence thinking mode initiation, hippocampal function, and neural replay occur during default mode” (emphasis added, p. 1). Their research suggests that the subconscious portion of our brain works to organize the information learned through conscious training even when we are not working on it.

Now let us discuss (C). When the conscious perceives objects, what parts of the brain are responsible for this perception? Rowe et al. (2024) discuss the roles of the prefrontal cortex (PFC) and “posterior cortical areas” (p. 284). Specifically, “[o]ne family of the theories proposes that the PFC is necessary for perception,” while the other “postulates that the PFC is not necessary and that other areas (e.g., posterior cortical areas) are more important for conscious perception” (p. 284). Based on their study of participants (who were exposed to stimuli but their awareness of these stimuli were inferred indirectly (through EEG data) rather than explicit behavioral reports), Rowe et al. claim that their results “provide partial support for both posterior and prefrontal theories of consciousness but do not provide strong support for either on their own” (p. 296). This likely suggests that conscious perception is a distributed process that involves both of them. The PFC is also known to play a crucial role in our conscious judgment-making.

Meanwhile, perception can also occur on a subconscious level. Dehaene et al. (2006) mention “subliminal processing,” which is defined as “a condition of information inaccessibility whether bottom-up activation is insufficient to trigger a large-scale reverberating state in a global network of neurons with long range axons” (p. 206). Even if some sensory information was received, a person may not be aware of it because the corresponding input was too weak. For instance, if a person is presented with a word but it is immediately “masked” by another visual stimulus (e.g., random letters or shapes), she may not be consciously aware of seeing the word. However, it can still be processed at a subliminal level. This indicates subconscious-level perception. Additionally, judgment can occur on a subconscious level as well. Yin and Knowlton (2006) state that “intentional, goal-directed actions” “often proceed automatically, as habitual responses to antecedent stimuli” (p. 464). They note that the “distinct networks involving the basal ganglia are the neural implementations of actions and habits.” The basal ganglia is a crucial organ in the brain that helps to make spontaneous judgments through habits. Although their study is mostly concerned with habitual decision-making that bypasses conscious control, it provides an example of our subconscious judgment formation.

Regarding (D), the hippocampus plays an important role in remembering subjective experiences. According to Frankland and Bontempi (2005), “the central tenet of most contemporary views of system consolidation” in brain science suggests that “the hippocampus functions as a temporary store for new information, but permanent storage depends on a broadly distributed cortical network” (p. 119). While the PFC is involved in realization of our subjective experiences, the hippocampus stores the neural representations of the subjective content before they are consolidated into long-term memory in the cortex. Meanwhile, the short-term memory that the conscious relies on is called a “working memory.” Per Baddeley (2003), “the concept of working memory proposes that a dedicated system maintains and stores information in the short term, and that this system underlies human thought processes. Current views of working memory involve a central executive” (p. 829). Although its precise mechanism has not been fully clarified, the “central executive … is likely to engage multiple brain regions in a functionally coherent network, including dorsolateral prefrontal cortex” (p. 836).

However, in (E), what does it mean that AI only “continuously appears” to process information rather than processing it in a genuinely continuous way? Today, the most noticeable AI is Large Language Models (LLM). Regarding this, Bender et al. (2021) state: “Contrary to how it may seem when we observe its output, an LM is a system for haphazardly stitching together sequences of linguistic forms it has observed in its vast training data, according to probabilistic information about how they combine, but without any reference to meaning: a stochastic parrot” (pp. 616-617). However, skeptics note that the meaning of “meaning” is inherently ambiguous. Also, when considering that meaning in human language is fluid and context-dependent, it may be unreasonable to expect LLMs to possess a single, unified understanding of meaning. Further, there may be no true “understanding” of meaning. From a purely functional viewpoint, if LLMs perform well enough in real-world tasks, they may have no qualitative difference from human reasoning. In addition, every error they might make can be justified when considering human fallibility.

The power of LLMs is undeniable. Since they have been trained on vast amounts of data (accumulated through collective human efforts) and can link the dots at a non-humanly high speed, they can provide information or even novel insights that nobody can on an individual level. However, they might not yet have achieved a level of understanding where “retention” takes place. Retention is important because without it, there can be no perspective from which to make judgments. Any “first-person perspective” held by LLMs is arguably no-thing. Further, any information synthesis performed on their part may subtly differ from ours because they do not rely on the sense of continuity. This can result in a qualitative difference between their response and ours. But how can this difference be shown?

While discussing a difference between human and machine intelligence, Lee (2024) somewhat abruptly notes that the concept of time traveling to the past is “philosophically worth considering, even though it is unlikely to materialize in reality” (p. 21). In his view, “[i]f a human agent in the past received our knowledge of her history (which would be regarded as a form of future knowledge for her), she would generate a non-trivial response to it. However, a machine agent would not be able to” (p. 27). This is only presented as a pure metaphysical possibility, because it violates the principle of causality in physics. Nevertheless, if we were to accept the impossible and suppose that the human agent came to know about her future, despite the fact that there was no causal link leading from her grand past up to the point of knowing about it, she would be able to provide a non-trivial response to it (e.g., “Whatever action I take right now, was that also predetermined?” (p. 24)). This confirms the continuity of her subjective experience, because she can synthesize her “current” knowledge of her state with the “future” knowledge of her in a continuous way.

However, since AI only operates under a set of specific rules under a mechanical architecture (although it relies on “stochastic” reasoning, which makes it appear unpredictable as in reality), it would not be able to provide a non-trivial response to the knowledge of its future. This does not mean that the AI would not respond in a “continuous” way. It certainly could. From the third-person perspective (i.e., our perspective), the way that AI produces its response is continuous, because the AI is part of the physical. But the physical is only what the mental perceives of and abstracts from reality and nothing more. AI has nothing in it what we might call non-physical; it does not possess a first-person perspective. Thus, it senses no continuity in information processing. Accordingly, the content of its potential response can be only “obvious,” in that it might produce something like “The seminar tires me” (p. 22). Although this metaphysical difference between the two cannot be revealed in reality, it is latent in their operational difference in reality.

Now, in the following section, we will discuss the above features of our mind in the philosophical context of the mind-body problem.

**5. Supervenience Model**

John Searle claims that “[m]ental phenomena are caused by neurophysiological processes in the brain and are themselves features of the brain” (Kim, 1995, p. 189). However, Kim counters that it does not provide a “simple solution” to the mind-body problem (p. 189). Kim questions Searle’s choice to reject reductionism while embracing supervenience to assert that “neural events and processes cause mental phenomena (p. 191). What is supervenience in the mind-body problem?

Kim (1998) explains: “Mental properties *supervene* on physical properties, in that necessarily any two things (in the same or different possible worlds) indiscernible in all physical properties are indiscernible in mental respects” (p. 10). This entails that there can be no change in the mental unless there is any corresponding change in the physical. The supervenience of “phenomenal properties” on the physical has “nomological necessity” (i.e., necessary by virtue of the natural laws of the universe).[[2]](#footnote-2)

Kim does not believe that one can reject reductionism if she accepts supervenience. His position is based on the idea of causal overdetermination. The explanation on it in Kim (1995, p. 193) is summarized below.

M = mental property

B = biological property

Mental event = instantiation of M = instantiation of B

Assumption: “M has causal powers to cause other properties to be instantiated.”

Case 1: The property that M can cause to be instantiated is itself a mental property (M\*). (Same-level causation)

Case 2: The property that M can cause to be instantiated is a biological property. (Downward causation)

Observations:

M\* is also caused by some underlying biological property (B\*).

Thus, M\* has two distinct sufficient causes (i.e., M and B\*).

In other words, M\* was causally overdetermined.

Kim (1998) ironically describes this as a “bless[ing] with an overabundance of causes” (p. 43). He highlights that an “antireductive physicalist who wants to remain a mental realist ... must give an account of how the mental cause and the physical cause of one and the same event are related to each other” (p. 37). Because there does not seem to be a viable way of doing this, Kim looks to reductive physicalism[[3]](#footnote-3) for a solution. According to him, “[r]eductive physicalism saves the mental but only as a part of the physical” (p. 120). He concludes: “To think that one can be a serious physicalist and at the same time enjoy the company of things and phenomenon that are nonphysical ... is an idle dream.” Kim does not seem to deny the authenticity of subjective experience *per se*. It is a brute fact of the matter that subjective experience exists. There is no way getting around this. Qualia (i.e., the “what it feels like” aspect of our subject experience) is undeniable. But why does it exist? Is the mental just an epiphenomenal outcome (i.e., a byproduct of the physical brain with no causal power)?

This paper argues that subjective experience plays a critical role in generating sophisticated information for the brain. As we discussed in the previous section, what sets human intelligence apart from a machine counterpart is its ability to *continuously* synthesize information to output a high level judgment. This continuous synthesis is only possible when an agent can *retain* information until reaching a final judgment. However, Kim’s core implication is that, despite the supposed fact that subjective experiences provide meaningful information to the brain, since every subjective experience is ultimately neuronal in the physical sense, the brain may as well totally work fine without it. But this is not the case. Let us look closely into Features (C) and (D) from the previous section.

Per Feature (C), subjective experiences depend entirely on their corresponding neural activities at all times. In philosophical terms, they supervene on neural activities. Feature (D) alleges that another neural activity takes place to encode and store the content of the subjective experiences. Previously, we saw that the conscious relies on the “working memory.” For instance, understanding a sentence requires that we retain our understanding of the meaning of a subject[[4]](#footnote-4) within the sentence until we recognize its predicate. This would not be possible unless we had memory. However, because this mostly requires short term memory, the conscious portion of our mind would mostly rely on the working memory when trying to grasp its meaning. Features (C) and (D) imply that when our conscious is working, it relies on **dual neural processes**: one for generating our subjective experience and the other for storing information on the content of the experience. These dual processes establish a feedback loop through which the subjective experience proceeds to a subsequent stage while supervening on a corresponding neural activity. To aid understanding, see the figure below.



[Figure 1: Hashing-out Process of the Neural]

N1-1, N1-2, and N1-3 stand for the neural activities that subjective experiences S1, S2, and S3 supervene on.

N2-1, N2-2, and N2-3 stand for the neural activities that encode the content of S1, S2, and S3. The encoded content is fed back to N1-1, N1-2, and N1-3.

The above model suggests that the neural activities that we understand today would be unlike what they are if subjective experiences did not exist. In Fig. 1, both the mental (subjective experiences) and the physical (neurons) have individual roles in the progression. This overcomes Kim’s concern that the mental may be epiphenomenal if it supervenes on the physical. It also addresses causal overdetermination because each has a distinct role. Specifically, it is possible that the subjective (experience) forms the basis on which the neural activities “hash themselves out.” However, the model raises concerns. First, the model does not explain how the mental arises from the physical. Nor does it explain why it is possible to encode the content of subject experiences into neural form. Second, the subjective still seems somewhat passive. They only seem to work as intermediaries.

Regarding the first concern, we need to be reminded that the principles of supervenience between the biological-chemical-physical are just as elusive. One way of addressing this issue is through a metaphysical argument. Section 3 of this paper proposed an “ontology of continuity” thesis in order to bridge between the mental and the physical. This approach shares some sympathy with what Chalmers (1996) calls “psychophysical laws” (p. 127). These laws specify “how phenomenal (or protophenomenal) properties depend on physical properties.” Further, they “will not interfere with physical laws; physical laws already form a closed system. Instead, they will be *supervenience* *laws*, telling us how experience arises from physical processes.” Since “the dependence of experience on the physical cannot be derived from physical laws, so any final theory must include laws of this variety.” Although the conception of psychophysical laws still remains speculative, it provides a tentative holistic framework. What our ontology of continuity thesis can do is to provide a basis for the compatibility between the physical and the mental. This can justify why psychophysical laws may be possible.

However, one may question how the “encoding” process in our model is possible. Empirically, it is well known that events and accidents in our lives mold our brain structure. For instance, the deep traumas of war may substantially “rewire” the victims’ brains. However, just as much it is difficult to explain how the mental arises from the physical, it is also hard to know what enables this transition from the mental to the neural encoding. In the presence of both upward and downward[[5]](#footnote-5) transitions between experiences and neurons, on top of the ontology of continuity thesis, we might have to add that they establish a dialectical relationship where one cannot exist without the other.

Before addressing the second concern recall that Definition (8) defines perception based on awareness. However, in our evolutionary history, it is more likely that perception preceded awareness. The initial rudimentary forms of life on earth most certainly relied on automatic, spontaneous reflexes rather than conscious thinking. This would have provided an evolutionary advantage of quickly detecting prey or avoiding enemies. This cumulative process of building upon the history of sensory experiences likely led to a vague sense of self. As the life forms grew more and more sophisticated, along with the development of memory organs, this sense of self would have become more substantial. The perceptive function powered by this sense of self could have enabled more sophisticated “judgments” for survival. In other words, instead of purely relying on automatic reflexes, they began to develop a more complex understanding of their environmental circumstances through “awareness.” All this culminated in the emergence of *homo sapiens*, which acquired the ability to engage in reasoning by abstracting from perceptions, powered by both short-term and long-term memories.

Now, suppose that the respective time lapses between N1-1, N1-2, and N1-3 *and* N2-1, N2-2, and N2-3 became incredibly short. Then, it would look like they were almost one and the same. This is illustrated as follows.



[Figure 2: Quasi-Parallel Causation]

Let us call this “quasi-parallel causation.” In the figure, the subjective proceeds *almost* in parallel with the neural. Without the neural, the subjective cannot unfold. They are totally dependent on the physical. Meanwhile, the neural would not proceed the way it does unless there were subjective experiences through which it can hash itself out. Thus, the subjective and the neural establish a co-dependent relationship. Further, as the respective lapses between N1-1, N1-2, and N1-3 and N2-1, N2-2, and N2-3 become increasingly shorter and the lapses between N1-1, N1-2, and N1-3 become increasingly shorter, the subjective establishes seamless continuity over these discrete processes. It thereby proceeds on its own terms with the neural backing it up at all times in the background. Again, this seamless continuity is supported by the ontology of continuity thesis. This explanation is believed to partially overcome the second concern that the subjective is merely passive.

This model overcomes the limitation (i.e., causal overdetermination) of non-reductive physicalism[[6]](#footnote-6) by attributing to the subjective a “functional” role in the context of neural workings. This also naturally overcomes a limitation of reductive physicalism propounded by Kim. Reductive physicalism cannot explain the role that the subjective plays in our mental activities. But the above model can.

**6. Conclusion**

The major ideas of the paper are summarized below.

(I) Ontology of Continuity

: Continuity as an ontological construct bridges between the mental and the physical (which is only what the mental perceives of and abstracts from reality and nothing more).

(II) Conscious Mind

: From within reality, by entirely relying on neural activity, the conscious arises, which, through the consecutive steps of nowness, (i) perceives reality as a physical world and (ii) makes judgments by building upon abstractions from the perceptions, while the subconscious dynamically modifies/integrates/organizes the information, which is accumulated through the perceptions and judgments, in order to feed it back to the conscious when needed.

(III) Dual-Neural Process

: Subjective experience supervenes on the neural at all times, while the subjective content is constantly transferred into neural form to be fed back, either through the long-term or short-term memory or both, to the neural that the subjective experience supervenes on.

Through the above conceptions, the paper sought to provide an idealistic stance to solve the tension between idealism and physicalism. Building upon this stance, the paper presented features of our conscious mind that are supported by empirical studies from brain science. Finally, the paper also attempted to overcome the worry of causal overdetermination through the concept of “dual-neural process,” which is provided in diagrammatic form. Although these ideas do not completely resolve the problems in the contemporary mind-body problem debate, the author hopes that they build a meaningful extension to inspire further thoughts on the issue.

**REFERENCES**

Baddeley, A. D. (2003). Working memory: Looking back and looking forward. *Nature Reviews Neuroscience, 4*(10), 829-839. <https://doi.org/10.1038/nrn1201>

Barnes, E. (2012). Emergence and fundamentality. *Mind, 121*(484), 873–902. https://doi.org/10.1093/mind/fzt001

Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). On the dangers of stochastic parrots: Can language models be too big? *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency (FAccT '21)*, 610–623. <https://doi.org/10.1145/3442188.3445922>

Chalmers, D. J. (1996). *The conscious mind: In search of a fundamental theory*. Oxford University Press.

Dehaene, S., Changeux, J. P., Naccache, L., Sackur, J., & Sergent, C. (2006). Conscious, preconscious, and subliminal processing: A testable taxonomy. *Trends in Cognitive Sciences, 10*(5), 204-211. <https://doi.org/10.1016/j.tics.2006.03.007>

Frankland, P. W., & Bontempi, B. (2005). The organization of recent and remote memories. *Nature Reviews Neuroscience*, 6(2), 119–130. https://doi.org/10.1038/nrn1607

Hempel, C. G. (1980). Comments on Goodman's *Ways of Worldmaking*. *Synthese*, *45*(2), 193-199. <https://doi.org/10.1007/BF00413853>

Husserl, E. (1991). *On the Phenomenology of the Consciousness of Internal Time (1893–1917)* (J. B. Brough, Trans.). Kluwer Academic Publishers. (Original work published 1928).

Hofweber, T. (2023). Logic and ontology. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford encyclopedia of philosophy* (Summer 2023 ed.). Stanford University. <https://plato.stanford.edu/archives/sum2023/entries/logic-ontology/>

Kim, J. (1995). Mental causation in Searle's "biological naturalism." *Philosophy and Phenomenological Research, 55*(1), 189-194. <https://www.jstor.org/stable/2108318>

Kim, J. (1998). *Mind in a physical world: An essay on the mind-body problem and mental causation*. The MIT Press.

Lee, J. J. (2024). Rethinking human and machine intelligence under determinism. *PROMETEICA - Revista de Filosofia y Ciencias, 30*, 19-27. <https://doi.org/10.34024/prometeica.2024.30.16025>

Luo, W., Liu, B., Tang, Y., Huang, J., & Wu, J. (2024). Rest to promote learning: A brain default mode network perspective. *Behavioral Sciences, 14*(4), 349. <https://doi.org/10.3390/bs14040349>

Meillassoux, Q. (2008). *After finitude: An essay on the necessity of contingency* (R. Brassier, Trans.). Continuum

Ney, A. (2008). Defining physicalism. *Philosophy Compass*, *3*(5), 1033-1048. <https://doi.org/10.1111/j.1747-9991.2008.00163.x>

Rayner, K. (1998). Eye movements in reading and information processing: 20 years of research. *Psychological Bulletin, 124*(3), 372–422. <https://doi.org/10.1037/0033-2909.124.3.372>

Rowe, E. G., Garrido, M. I., & Tsuchiya, N. (2023). Feedforward connectivity patterns from visual areas to the front of the brain contain information about sensory stimuli regardless of awareness or report. *Cortex, 172*, 284–300. <https://doi.org/10.1016/j.cortex.2023.11.016>

양식의 맨 위

양식의 맨 아래

Stoljar, D. (2022). *Physicalism*. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2022 Edition). Stanford University. <https://plato.stanford.edu/entries/physicalism/>

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>

Wang, L., Lin, X., Zhou, B., Pöppel, E., & Bao, Y. (2015). Subjective present: A window of temporal integration indexed by mismatch negativity. *Cognitive Processing*, 16(4), 405–414. https://doi.org/10.1007/s10339-015-0687-8

Yin, H. H., & Knowlton, B. J. (2006). The role of the basal ganglia in habit formation. *Nature Reviews Neuroscience, 7*(6), 464–476. <https://doi.org/10.1038/nrn1919>

Žižek, S. (2012). *Less Than Nothing: Hegel and the Shadow of Dialectical Materialism*. Verso.

1. All this perception and judgment take place through relevant neural activities. According to Tononi and Koch (2015), the “neural correlates of consciousness (NCC) have been defined as the minimal neural mechanisms that are jointly sufficient for any one conscious percept, thought or memory” (p. 2). “Every experience will have an associated NCC: one for seeing a red patch, another one for hearing a high C.” [↑](#footnote-ref-1)
2. In light of this nomological necessity, it is possible that a complete material replica of a person would have the totally same state of mind and memories as hers. Imagine that she was fully anesthetized, her exact same replica was made, and that they both woke up at the same time in hospital. Then, the replica’s sense of identity and memories would be exactly as real as the authentic person’s. Suppose further that scientists purposefully aborted all the information about their identities. Then there is no way of knowing who is who. Under Kripkean semantics, they are metaphysically different. But epistemologically, they are indistinguishable. Should either of them be biologically disposed of for whatever Kafkaesque reason, she would be as much horrified and frustrated as the other would, because she would believe that she is the “real” one. This thought experiment suggests that our sense of identity is literally totally dependent upon memories. The sense of unity that we have had throughout our lives may be an illusion. In a sense, we have not lived throughout those years. Rather, we have only been alive as many times as we have experienced “nowness.” [↑](#footnote-ref-2)
3. Per Stoljar (2022), “[r]eductionism is true iff for each mental predicate *F*, there is a physical predicate *G* such that a sentence of the form ‘*x* is *F* iff *x* is *G*’ is *analytically true*” (emphasis added, Section 3.1). Simply put, the mental can be explained fully through a mere conceptual analysis of the physical truths. But is it obvious that the mental logically follows from the physical? Based on the ontology of continuity thesis, we may boldly claim that if that is true, it is only because the physical is what the mental perceives of and abstracts from reality and nothing more. [↑](#footnote-ref-3)
4. Our initial recognition of the subject word occurs as we come to “focus” on it as in Definition (9) in Section 2. That is, we encounter its “otherness.” Then, when does the real comprehension of the subject word begin? It presumably begins by retrieving information from the long term memory and synthesizing it with the information from the recognition. The comprehension of the subject word is almost subconscious, as it occurs spontaneously. [↑](#footnote-ref-4)
5. The downward transition subtly differs from “downward causation.” Downward causation suggests that higher-level mental phenomena influence lower-level physical processes. However, the downward transition is a process where the content of a subjective experience is transformed into neural form to be made use of by a neural activity that is generating the subjective experience. Thus, in our model, the downward causation is to be understood as a process where N1-1, N1-2, and N1-3 affect themselves through subjective experiences. [↑](#footnote-ref-5)
6. This view says that while mental states are fully dependent on physical states, they cannot be fully reduced to physical states. For details, see Barnes (2012, pp. 897-899). [↑](#footnote-ref-6)