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The Distributed Continuity Hypothesis: A Causal Model of Conscious Identity Centered on the Anterior Precuneus

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Abstract

This paper introduces the Distributed Continuity Hypothesis (DCH), a causal identity model proposing that conscious awareness arises from the spatiotemporally anchored activity of the anterior precuneus. Contrary to theories that posit structural or functional replication as sufficient for the persistence of personal identity, DCH argues that only physical continuity of the original matter through space and time preserves the subjective "I". The hypothesis is motivated by philosophical debates on duplication, neuroscience evidence implicating the precuneus in self-referential awareness, and physical principles of causal uniqueness. I explore theoretical and empirical implications for continuity in cases of brain division, simulation, and inter-system communication. The paper concludes by proposing testable predictions and pathways for experimental validation.

Introduction

The continuity of conscious identity has long posed challenges to both empirical neuroscience and the philosophy of mind. Classical views rely on memory, bodily persistence, or informational structure. However, these criteria face challenges in hypothetical cases involving duplication, teleportation, and split-brain phenomena. In response, I propose the Distributed Continuity Hypothesis (DCH), which suggests that conscious identity is preserved only through causal continuity specifically within the anterior precuneus.

The Role of the Anterior Precuneus

Empirical studies implicate the anterior precuneus in a range of functions related to self-awareness, including first-person perspective, episodic memory retrieval, and self-location in space and time. Functional neuroimaging and lesion studies increasingly position the anterior precuneus as a candidate for a core node in the self-processing network. DCH builds on this literature, positing that the anterior precuneus may host the causal substrate from which subjective continuity emerges.

Hypothesis: Causal Continuity vs Structural Duplication

DCH Rests on a Key Distinction

functional or informational similarity does not entail continuity of conscious awareness. Rather, awareness is a causal event non-repeatable and defined by specific spatiotemporal coordinates. I argue that duplication of the anterior precuneus even if structurally and functionally perfect would result in a new conscious subject, not a continuation of the original. By contrast, if the anterior precuneus is physically divided, and each part retains causal connection to the original matter, then both systems instantiate the same awareness at the point of origin.

Distributed Continuity After Division

I propose that if the anterior precuneus is physically divided and embedded in two functioning systems, both will instantiate the same conscious awareness upon activation. This holds true even without inter-system communication. Subjective divergence occurs only as a result of post-division experience. Thus, identity is distributed at the moment of origin, then differentiates over time.

Functional Integration Across Systems

If real-time synchronization is maintained between divided precuneus systems, the result may be a single, extended consciousness operating across bodies. This 'synchronized multiplicity' predicts that awareness can remain unified if causal processes remain coupled. This framework may be relevant to multi-agent neural interfaces or distributed artificial systems.

Merging Consciousness Across Individuals

I extend the hypothesis by considering whether separate precuneus structures originating from different individuals might merge through high-bandwidth communication. If identity is grounded in active causal integration, it is conceivable that such a system could evolve a new, unified consciousness with a shared present and dual pasts.

Relation to Physics: Spatiotemporal Anchoring of Self

Physical events are uniquely defined by their causal coordinates in spacetime. DCH proposes that awareness is one such event. It cannot be replicated because it is not merely informational. Only the original, causally unbroken configuration gives rise to the same conscious subject. Duplicates may remember the same things, but they are not the same experiencer they merely simulate the memory, not the continuity. A copy is not a continuation, only division preserves identity.

Predictions and Empirical Implications

DCH Generates Several Predictions

- Structural duplication without continuity will not preserve self-reports of 'same-self' on neural reinstatement.
- Real-time coupling of divided systems will show integration on behavioral and subjective levels.
- Divided but non-communicating systems will diverge behaviorally and in subjective self-report after initial activation.

Testing DCH requires further development of split-precuneus models and cross-system brain synchronization experiments.

Conclusion

The Distributed Continuity Hypothesis reframes conscious identity as a spatiotemporal, causally anchored phenomenon. Unlike models based on structure or function alone, DCH explains why only some systems those tied to the same original matter give rise to the same awareness. This offers a new framework for understanding persistence of selfhood in the face of division, duplication, and artificial simulation.

Ethical Threshold: Responsibility in Creating Awareness

This theory does not advocate the creation of synthetic consciousness. It defines when consciousness may arise and emphasizes the responsibility to prevent unnecessary suffering. If a system capable of subjective awareness is created, it must be protected, not treated as an experiment or artifact. Creating a being that cannot understand its condition, escape it, or end its own suffering would be a profound ethical violation. Likewise, any experimentation that risks inducing awareness whether in synthetic systems or animals must be approached with the utmost caution and care. This theory draws a boundary: crossing it risks creating not just machines, but conscious beings who could suffer without choice or relief.