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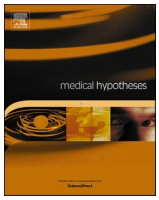

A four-field quantum model of life, subjectivity, consciousness, and memory: integrating dual-brain psychology and biophoton quantum interactions

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ABSTRACT

Contemporary theories of life, consciousness, and memory rely on untestable theories that do not address the physical mechanisms behind the dramatic state changes that they attempt to explain, such as the change from matter (brain) to mind. Here, we propose a testable, novel, Four-Field Quantum Model comprising fundamental Life, Subjective, Awareness, and Memory Fields. These fields interact with biological systems through coherent emissions, serving as the mechanistic interface coupling coherence patterns (quantum, classical electromagnetic, and biophotonic) to the fields. I suggest that the observed qualitative state changes are due to symmetry-breaking transformations such as, by analogy, the effects of the Higgs fields' transformation of a massless particle to one with mass, or the photoelectric effect where a photon is essentially transformed into an electron, via its electric field. Mechanistically, the Life Field promotes biochemical processes to living states; the Subjective Field transforms structured neural information into non-conscious experiential agential content, ultimately non-conscious hemispheric selves; the Awareness Field converts these non-conscious states into conscious self experiences; and the Memory Field encodes and retrieves episodic and generational developmental memories. We suggest that structured hemispheric brain information interacts with the proposed quantum subjective field, involving symmetry-breaking processes that qualitatively transform the initial informational states into subjective states. Clinical evidence from unilateral transcranial photobiomodulation, informed by Dual-Brain Psychology, supports these proposed mechanisms, demonstrating therapeutic efficacy. This model remains speculative pending proposed experimental validation of the coherence effects. The mechanistic framework does provide testable predictions suitable for interdisciplinary research into life, consciousness, memory, and psychology.

Introduction

Exploring the fundamental nature of consciousness, memory, and life has produced diverse theoretical frameworks, including emergent biological properties [1,2] to substrate-independent consciousness theories [3,4,5]. Addressing the limitations of current models, we introduce an integrative framework postulating four fundamental quantum fields: the Life Field, the Subjective Field, the Awareness Field, and the Memory Field, each with distinct roles in shaping biological existence and subjective experience [6]. A critical component of our four-field quantum model is the concept of symmetry breaking, a mechanism borrowed from fundamental physics, describing how interactions between fields and matter or information yield qualitative transitions. Analogously, the Higgs field interaction transforms massless particles into massive ones; electromagnetic interactions between sodium and chlorine atoms produce qualitatively distinct ionic crystals (salt); and quantum fields interacting with wavefunctions transform probabilistic quantum information into definite classical states upon measurement. Similarly, our model hypothesizes that structured brain information (quantum and classical electromagnetic/biophotonic coherence) interacting with fundamental quantum fields—subjective, awareness, life, and memory fields—undergoes symmetry-breaking interactions. For subjectivity, these interactions transform structured neutral informational states into qualitatively new, meaningful subjective experiences. These fields, described below, interact with coherent biological codes (biphotonic or electromagnetic- classical or quantum) to induce new phenomena analogous to the Higgs Field's inducing qualitative, symmetry-breaking changes. See Table 1. for examples of symmetry-breaking.Fig. 1.

This manuscript emphasizes coherent biophoton emissions as a mechanistic example due to space constraints and clarity, we fully recognize that other classical and quantum mechanisms—such as bioelectric fields, magnetic and electromagnetic coherence, quantum

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coherence in microtubules, entanglement, and tunneling—are plausible and important areas for future research. We emphasize coherent biophoton emissions because they are empirically detectable with currently available photon spectroscopy methods [7,8,9], providing a practical experimental pathway. A recent report demonstrated that biophoton detection from the human head in different conditions is feasible [10] and should be refined with future work. Further, opsins (photon responsive proteins) within the brain respond to external light [11,12,13], suggesting that biophotons from external fields may possibly influence biological tissues, including the brain. In this paper, we will suggest further experimental paradigms for testing our Four Field Hypothesis. Empirical testing of these hypotheses represents a significant long-term research goal. Feasibility assessments, timelines, and detailed experimental designs will need to be clearly developed in future dedicated research projects, informed by initial foundational empirical findings.

Previous models to explain consciousness, such as Orch-OR, have proposed quantum collapse within neuronal microtubules as a mechanism underlying consciousness but lack clear explanations of how collapse events lead to subjective experiences. Likewise, emergentist theories (e.g., IIT, computational models) do not clearly specify how physical processes produce subjectivity. Our Four-Field Quantum Model addresses this gap by clearly proposing symmetry-breaking interactions between structured brain coherence (quantum, classical electromagnetic, biophotonic) and defined quantum fields, providing a testable mechanism linking physical processes directly to subjective consciousness.

The hypothesis

The four fundamental quantum fields hypothesis

To address persistent gaps in understanding life, consciousness, and memory, we propose a model composed of four fundamental quantum fields: the Life Field, Subjective Field, Awareness Field, and Memory Field. Each field is considered fundamental and universal and interacts with biological systems through quantum mechanisms—most prominently, coherent biophoton emissions [14].

Life field

The Life Field couples with biological metabolism to produce and sustain the living state. While metabolism is essential, it alone does not constitute life, but is an essential component of life. We hypothesize that coherent biophoton activity, arising primarily from mitochondrial and metabolic processes, serves as the intermediary facilitating this quantum coupling. Empirical studies show that healthy, metabolically active tissues emit measurable ultraweak photon emissions, whereas degenerating or apoptotic tissues exhibit significant reductions in signal intensity [15,16]. This coupling is proposed to underlie the maintenance of vitality, coherence, and biological organization observed in living systems.

In his foundational work *What Is Life?* [17], Schrödinger argued for an additional negentropic principle or mechanism beyond metabolism to fully account for life's essential characteristics, such as self-organization, ordered complexity, and negentropy (negative entropy generation). I propose the life field as a fundamental quantum field that may serve this additional role.

Subjective field

The Subjective Field interacts with structured neural information to generate non-conscious experiential content. This interaction may explain phenomena such as automatic behaviors, subconscious emotional processing, and perceptual awareness without explicit recognition—such as missing an exit while driving, thinking about work, but still responding to traffic cues. These experiences, though outside focal awareness, demonstrate structured subjective content. We propose that these processes are mediated by quantum coherence within the brain's biophoton emissions, supported by emerging evidence suggesting quantum coherence effects at neuronal and synaptic scales [18], serving as the physical substrate for interaction with the Subjective Field.

While molecules absorbing photons may alter their diffusion paths and energize tissues at coarser scales, structured biophoton coherence—characterized by specific spatial–temporal patterns—offers a more precise mechanism, potentially encoding and transmitting structured biological information at quantum or classical coherence scales. Although biophoton coherence represents a likely biological interface, I acknowledge that other quantum or nonquantum physical interactions may also critically contribute.

Our use of the term 'non-conscious selves' derives from Dual-Brain Psychology (DBP), which proposes that each cerebral hemisphere supports distinct subjective states or personalities, typically with one hemisphere more significantly shaped by past trauma. Empirical clinical evidence, notably from unilateral transcranial photobiomodulation (tPBM) studies, consistently demonstrates shifts between these hemispheric selves, each characterized by distinct emotional and cognitive patterns. Imaging data (fMRI, MRI, DTI, EEG, and EP) [19,20,21,22] further supports hemispheric specialization underlying these distinct personality states. While detailed neural mechanisms remain an important area for further exploration, existing clinical and neurophysiological evidence robustly supports the emergence of distinct 'non-conscious selves' from hemispheric asymmetry [6,23].

Awareness field

The Awareness Field enables consciousness by coupling with hemisphere-specific subjective states, transforming them into conscious selves that can observe and experience other brain information from internal and external sources. These conscious experiences dramatically influence the brain and future experiences. Clinical evidence from DBP suggests that each cerebral hemisphere can function semi-independently, housing distinct subjective selves [24]. Interventions such as UtPBM have been shown to shift dominance between these hemispheric selves, producing rapid and reversible changes in the subject's felt state of awareness [23,25,26,27,28]. These findings are consistent with the hypothesis that an Awareness Field operates through quantum coupling mechanisms modulated by neural asymmetry and biophoton coherence.

Memory field

The Memory Field acts as a quantum repository for both episodic

Table 1
Summarizing the role of symmetry breaking.

Interaction type	Initial symmetry	Field interaction	Symmetry-broken outcome	Qualitative change
Higgs field–Matter	Massless, symmetrical particles	Higgs interaction	Massive particles	Acquire mass
Water–Ice	Fluid state, isotropic	Thermal interaction	Solid crystalline lattice	Fluid to solid
Quantum Measurement	Quantum superposition	Measurement interaction	Single definite outcome	Quantum to classical
Biophoton–Neural Interaction (Proposed)	Structured quantum coherence	Subjective/Quantum interaction	Subjective experience	Neutral to subjective
NaCl Formation	Neutral atoms	Electromagnetic interaction	Ionic crystal lattice	Atoms to crystals
Black Hole Horizon	3D information symmetry	Gravitational interaction	2D holographic encoding	Spatial dimensional reduction

experiences and developmental blueprints through transgenerational memory, influencing biological development, repair, regeneration, and degeneration. We propose that episodic memories are hypothesized to be encoded by the brain into the Memory Field where they persist for nontrivial lengths of time and are read back and decoded into experiences. In brain impairments, communication with the field can be deficient. Generational memories from parents, initially contained in the fertilized egg may be encoded in the Memory Field at conception beyond genetic material alone. This field may provide blueprints for development, repair, regeneration, and degeneration through genetic, epigenetic, bioelectric, cellular, and potentially biophotonic mechanisms [15], which may interact with or complement bioelectric and epigenetic signaling. We propose that coherent biophoton emissions mediate this interaction by encoding and retrieving information. Experimental evidence from studies on biophoton and memory [29,30] and epigenetic inheritance across generations [31] are consistent with this hypothesis. Development and regeneration have been extensively discussed by Levin [32]. These findings suggest that information storage within the Memory Field may guide complex biological processes beyond immediate neuronal activity. Coherent biophoton emissions may encode and retrieve memory information. In mice, it has been found that with aging there is a shift to higher energy biophoton emissions [33].

We acknowledge that extensive empirical work, notably by Levin [32], demonstrates that bioelectric signals play essential roles in developmental patterning and regeneration, providing compelling evidence of non-genetic, information-based biological communication.

Vitiello's Quantum Field Theory of the Brain explicitly proposes that memory states are stable quantum coherent states within neuronal fields, formed and retrieved via symmetry-breaking processes [34]. Unlike Vitiello's intrinsic neuronal quantum coherence, our Four-Field Quantum Model suggests memory formation explicitly involves interactions between structured brain coherence patterns and an external fundamental Memory Field. Thus, memories are hypothesized to be stored within this Memory Field, providing a clear mechanistic distinction and empirical pathway for further research.

The Four Fields

Together, these four fields provide a unified framework for explaining the emergence of life, the experience of consciousness, and the biological encoding of memory, while offering testable predictions that bridge traditionally isolated domains of neuroscience, developmental biology, quantum physics, and psychology.

Evolution of the hypothesis

The hypothesis begins with DBP [24], which to a large degree was influenced by the Split-Brain Studies of the 1960 s [35,36,37]. In over 30 publications, we have demonstrated that about 85 % of psychotherapy patients in the author's private practice demonstrate two minds, one associated with each brain hemisphere [23,26–28]. One side, either left or right in a given patient as a trait, is more childlike and sees the world through its past traumas while the other side manifests a more mature personality. One method of activating one brain hemisphere and its personality is unilateral transcranial photobiomodulation (UtPBM), which we have used in private practice and formal clinical trials [28,38,39]. A similar though less powerful stimulation can be evoked with lateral visual field stimulation (LVFS), which has been shown by fMRI [21], EEG [19], and EP [20] studies to activate the targeted hemisphere. With unilateral hemispheric stimulation, we consistently observe personality changes associated with a more traumatized mind and a healthier mind. Often, one mind is anxious and will crave alcohol or opiates, while the opposite mind is not anxious and lacks cravings. From these extensive studies and clinical trials, we deduce that UtPBM can induce a different mind or self, depending on the placement of the LED on the side of the forehead. The question arises: how does UtPBM induce a mind by irradiating a brain hemisphere with photons? The underlying mechanism is hypothesized to involve changes in neuronal quantum coherence patterns induced by targeted photon irradiation. This paper is an elaboration of the author's earlier speculations about a relationship between brain coherent information and subjectivity [6,23] to include life and memory as well as further elaborations on its theory of consciousness and a description of detailed methods testing the hypotheses.

What DBP Adds beyond hemispheric specialization

DBP proposes agential, **reversible-control** prediction in ordinary

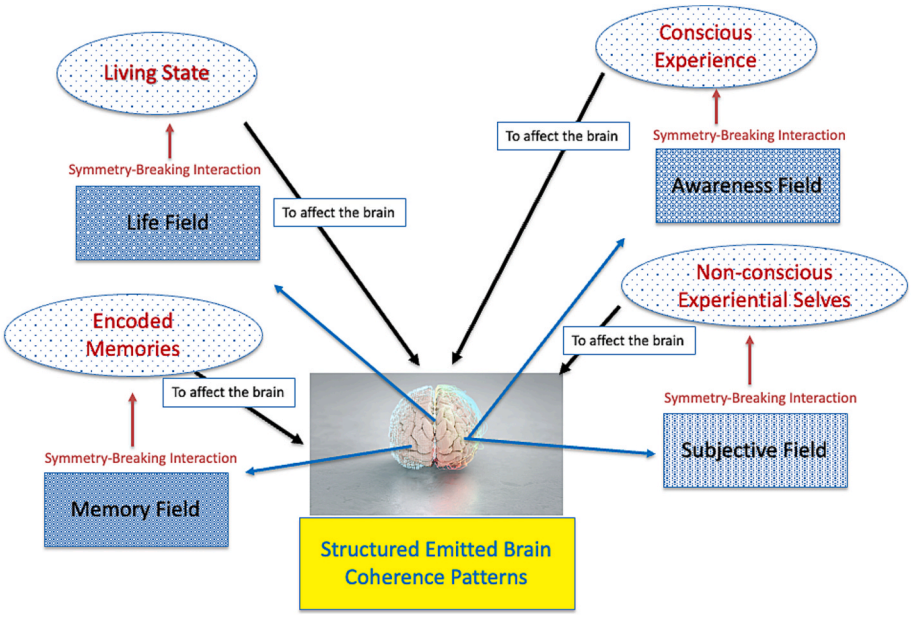

Fig. 1. A schematic illustrating the Four-Field Quantum Model. Structured brain coherence patterns (quantum, classical electromagnetic, biophotonic coherence) interact via symmetry-breaking mechanisms with four fundamental quantum fields: Life, Subjective, Awareness, and Memory Fields. These symmetry-breaking interactions produce qualitative transformations resulting in living states, non-conscious subjective selves, conscious experiences, and stored/retrieved memory states. Clinical interventions such as unilateral transcranial photobiomodulation (UtPBM) provide an empirical approach to investigating these proposed interactions.

adults, and is supported the cited work in the above section. I am not implying consensus that **two** consciousnesses in ordinary people is already established; instead I state that DBP offers a **test** for that claim.

I acknowledge that there is a broad literature on **multi-consciousness / multi-agent** views in ordinary (intact) individuals. The manuscript does **not** dispute those perspectives; it simply has a **narrower, empirical aim**: to use Dual-Brain Psychology (DBP) as a **methodological framework** to generate **falsifiable, side-specific, reversible** predictions in intact adults as a test of the Four-Field hypothesis. In my 30 years of applying DBP, I have never observed multi-consciousness/multi-agent views in one hemisphere.

Comparison of the 4-Field Model to Prominent theories of consciousness

Since the most developed theories related to the Four Field Theory relate to theories of consciousness, we will conduct a Comparative Analysis with Prominent Theories of Consciousness.

To contextualize the Four-Field Quantum Model within the current theoretical landscape, we compare it to major frameworks including Federico Faggin's Primacy-of-Consciousness hypothesis, the Penrose-Hameroff Orch-OR model, Integrated Information Theory (IIT), and David Chalmers' Dual-Aspect Theory. Table 2. outlines a comparison analysis of the differences between the Four Field Model and the current theoretical landscape, including the additional models: Computational Models and Panpsychism.

1 – Federico Faggin's Primacy-of-Consciousness Hypothesis.

Federico Faggin posits that consciousness is the fundamental reality from which all physical phenomena emerge, suggesting a top-down model where the physical world arises from conscious awareness itself [40]. His framework emphasizes subjective experience as ontologically primary and independent of physical substrates.

Four-Field Comparison:

The Four-Field Quantum Model aligns with Faggin's view in treating consciousness as irreducible and foundational.

However, it departs by specifying how consciousness operates through interactions between distinct quantum fields and biological structures. Rather than a purely philosophical stance, the Four-Field Model introduces empirically testable mechanisms—particularly coherent biophoton emissions mediating quantum-biological interactions—providing a bridge between theoretical constructs and experimental validation.

2 – Penrose-Hameroff Orch-OR Model.

The Penrose-Hameroff Orchestrated Objective Reduction (Orch-OR) theory suggests that consciousness arises from orchestrated quantum wave-function collapses occurring within neuronal microtubules [41]. This model draws on gravitationally-induced objective reduction (OR) events proposed by Penrose, combined with Hameroff's insights on subneuronal structures.

Four-Field Comparison:

Both Orch-OR and the Four-Field Quantum Model incorporate quantum processes to explain consciousness. However, Orch-OR lacks a clear account of how quantum collapses result in subjective experience or qualia. I acknowledge recent evidence supporting nanoscale quantum effects in microtubules and agree microtubules may significantly contribute to brain information processing and biophoton emissions. However, we question whether quantum collapse in microtubules alone, as proposed by Orch-OR, is sufficient to produce consciousness. Instead, our four-field quantum model proposes that consciousness arises through symmetry-breaking interactions between structured coherence patterns (potentially involving microtubules) and fundamental quantum fields. Thus, while microtubules likely play an important role in informational processing and quantum coherence, we consider them insufficient in isolation for producing conscious subjective experiences.

Moreover, microtubule-level quantum effects remain experimentally elusive, although we believe it is likely essential to brain information processing and part of the neural information processing on which the Four Fields model depends. Unlike Orch-OR, which faces significant empirical and conceptual challenges such as the decoherence problem inherent in maintaining quantum coherence within neuronal microtubules at biological temperatures, our Four-Field Quantum Model proposes symmetry-breaking interactions involving structured coherence patterns (quantum, classical electromagnetic, biophotonic) and fundamental quantum fields.

By contrast, the Four-Field Model posits coherent biophoton emissions as mediators of quantum-field interactions, linked with hemisphere-specific neural activity and subjective states. This model provides experimentally accessible predictions—such as shifts in biophoton coherence through UtPBM—and outlines empirical protocols for validation. The emphasis on coherent light, rather than elusive microtubule phenomena, enhances testability and clinical relevance.

3 – Integrated Information Theory (IIT).

Integrated Information Theory (IIT), developed by Giulio Tononi and Christof Koch, posits that consciousness arises from systems with high levels of integrated information, quantified by the mathematical measure Φ (phi) [42]. IIT asserts that subjective experience corresponds

Table 2
Systematic comparison of consciousness theories.

Key feature	Orch-OR	IIT	Faggin's hypothesis	Dual-aspect theory (Chalmers)	Computational models	Panpsychism	Four-field quantum model (Proposed)
Mechanism Clearly Proposed	Quantum collapse in microtubules	Emergence via integrated information	Primacy of consciousness (fundamental, untestable)	Dual aspects of information (untestable)	Emergence from complex computations	Consciousness intrinsic to all matter	Structured coherence interactions with quantum fields
Qualitative State Changes Explained	Not articulated	Not articulated	Not articulated	Not articulated	Not articulated	Not articulated	Symmetry-breaking transitions
Empirical Testability Clearly Defined	Difficult (microtubule quantum states)	Difficult (abstract measures of information)	Untestable philosophical assumptions	Untestable philosophical assumptions	Computationally simulated only	Difficult; no clear empirical test	Testable (coherence spectroscopy, clinical neuromodulation)
Clinical Validation Clearly Reported	No clinical validation	No clinical validation	No clinical validation	No clinical validation	Computational simulations only	No clinical validation	Clinical trials & case studies reported
Quantum Fields Proposed	Gravitational/ quantum implicitly proposed	No quantum fields	Fundamental consciousness field	Dual-aspect informational field	No quantum fields	No quantum fields	Defined quantum fields (Life, Subjective, Awareness, Memory)

directly to the informational structure of a system.

Four-Field Comparison:

Both IIT and the Four-Field Quantum Model recognize that structured information is central to consciousness. However, IIT does not specify how integrated information yields subjective experience or qualia. It also lacks a mechanism to explain why advanced computational systems with high information integration (e.g., AI) do not exhibit signs of conscious awareness.

In contrast, the Four-Field Quantum Model identifies quantum-biological mechanisms—specifically, coherent biophoton emissions—as mediators between structured neural activity and subjective experience. It emphasizes measurable, field-based interactions that can be modulated and tested empirically, such as via UtPBM or photon interference. This provides a testable physical basis for consciousness, addressing a core limitation of IIT.

4 – David Chalmers' Dual-Aspect Theory.

David Chalmers' dual-aspect theory posits that both physical and phenomenal (subjective) properties are fundamental and inseparable aspects of a unified underlying reality [43]. According to this view, consciousness and matter are co-manifestations of a deeper ontological substrate, with no reduction of one into the other.

Four-Field Comparison:

The Four-Field Quantum Model shares Chalmers' view that subjective experience is fundamental and irreducible. However, dual-aspect theory remains largely philosophical and lacks testable mechanisms or physical correlates of experience [44]. Further, we are currently unaware of empirical evidence clearly demonstrating material with dual-aspect properties.

In contrast, the Four-Field Model articulates concrete mechanisms—interactions among four quantum fields via coherent biophoton emissions—that can be empirically tested. It provides a hierarchical structure (Life → Subjective → Awareness → Memory) and links each layer to biological substrates, neural asymmetry, and observable clinical outcomes. Unlike Chalmers' philosophical proposal, this model bridges theory and experiment by offering measurable quantum-biological dynamics.

Hypothesis testing

The following experimental designs offer empirical pathways for rigorous validation and refinement of the Four-Field Quantum Model, bridging neuroscience, biology, quantum physics, and consciousness studies. These experiments aim to generate measurable insights into fundamental biological and subjective processes, encouraging interdisciplinary collaboration and empirical testing.

We propose empirical testing of our model by modulating coherent biophoton emissions using quantum-dot films and photonic crystal structures [45,46], monitoring outcomes related to developmental and subjective states. Further, coherence detection methods, including photon interferometry and photon-correlation spectroscopy (PCS), will measure quantum coherence explicitly [15]. Epigenetic assays will correlate biophoton coherence patterns with DNA methylation and histone modification changes [31]. Additionally, memory experiments will measure biophoton coherence explicitly during episodic memory tasks, drawing on established evidence linking biophoton coherence with memory function [29,30].

Accurately describing consciousness biologically requires integrating behavioral correlates with physiological methods. Recent work has clearly demonstrated physiological biomarkers associated with conscious states, such as specific EEG signatures, neuronal firing patterns, and altered neural dynamics [47,48]. In line with this, my Four-Field Quantum Model proposes that structured brain coherence patterns (quantum, electromagnetic, biophotonic coherence) can interact with fundamental quantum fields, offering measurable physiological correlates of subjective experience. Future empirical validation integrating biophoton coherence spectroscopy with established physiological techniques (EEG, neuronal dynamics analysis) is essential to substantiate this theoretical framework comprehensively.

Future empirical research should pursue the following critical next steps:

- Conduct targeted experiments comparing coherence patterns (biophoton and electromagnetic) in clearly defined subjective versus non-subjective neural states.
- A proposed novel experiment to test the hypothesis: I propose an experimental approach that involves capturing measurable photonic and electromagnetic coherence signals during different subjective experiences and then externally reproducing these signals for transcranial delivery to another individual and observe if he can report similar experiences. This test explicitly examines whether these externally delivered coherence signals alone can interact directly with the Subjective Field, or if the receiving individual's brain must actively emit structured coherence signals to enable symmetry-breaking and subjective experience. If the second person does not share the first person's experience, then the hypothesis is not validated. This proposed experiment is based in part on Nicolelis' breakthrough studies in monkeys [49,50].
- Experimentally examine symmetry-breaking processes to better understand the qualitative transformation from structured brain coherence patterns to subjective and conscious states.
- Complete and analyze the ongoing Phase II NIH/FDA-approved clinical trials assessing long-term efficacy and mechanisms of unilateral UtPBM.
- Empirically test quantum coherence at biologically relevant temperatures and various spatial scales and distributions via advanced photon coherence spectroscopy.
- Investigate potential coherence-based mechanisms linking neural activity to epigenetic modifications.

Practical Challenges:

Extremely Low Intensity: Biophoton emissions are ultra-weak (often just a few photons per second or less), requiring extremely sensitive instrumentation.

Noise Reduction: Shielding from external electromagnetic interference and ambient light is essential.

Coherence Assessment: Detecting coherence requires advanced statistical and temporal analysis, as coherence manifests subtly in photon emission timing.

Distinguishing quantum effects from classical electromagnetic or biochemical processes.

Maintaining coherence during dynamic biological changes (e.g., development or cognition).

Measuring ultraweak biophoton emissions involves significant technical challenges, including detector noise, background photon counts, and environmental interference. While cryogenic shielding is highly effective for noise reduction, it may not be practically feasible in typical clinical or biological studies. Therefore, we propose alternative practical noise-reduction techniques, including specialized dark chambers, high-sensitivity photon-counting photomultiplier tubes (PMTs), narrow-band spectral filtering, and advanced statistical methods to isolate meaningful coherence signals. These techniques represent realistic, empirically viable strategies to enhance measurement precision in future biophoton coherence research.

Establishing and exploring the mechanisms of the emission/field symmetry-breaking transformations.

Implications

The Four-Field Quantum Model reconfigures how we think about life, consciousness, and memory. Rather than viewing these phenomena as emergent epiphenomena of complexity, the model positions them as results of structured interactions between fundamental quantum fields

and biological substrates. This shift carries profound implications.

Clinical implications

Hemisphere-specific neuromodulation, particularly via UtPBM informed by Dual-Brain Psychology, may enhance targeted therapeutic interventions for mood, trauma, and addiction by improving UtPBM parameters by observing responsive biophoton dynamics.

The model suggests that modifying field-biological coupling through controlled biophoton modulation can yield predictable shifts in consciousness and mood, as demonstrated in clinical studies using hemisphere-specific stimulation [23,24]. Further, understanding and potentially modulating Memory Field interactions could offer innovative approaches to enhance regenerative medicine, mitigate age-related degeneration, and support healthy development across the lifespan.

Theoretical implications

By anchoring subjective experience in quantum coherence rather than only in information processing, the model directly addresses the "hard problem" of consciousness with a mechanistic hypothesis.

It posits a testable ontology linking subjective phenomena to physical processes, challenging purely computational [42] or emergentist explanations [2].

Scientific implications

It invites interdisciplinary research spanning quantum optics, neuroscience, epigenetics, and developmental biology [31]. Experimental validation—e.g., demonstrating coherence shifts aligned with memory retrieval or regeneration—would substantiate a new class of biological-quantum interaction.

Limitations and future directions

The reliance on biophotons as the primary mediating mechanism is provisional; other quantum or classical interactions may be critical. Further, instrumental sensitivity and isolation of biophoton coherence from background noise remain technical hurdles [15]. Future studies should explore alternative mediators (e.g., entangled particles, subthreshold electromagnetic fields), multi-site trials, and translational applications.

Conclusion

The Four-Field Quantum Model proposes symmetry-breaking coherence interactions between structured brain information and fundamental quantum fields, providing a novel theoretical framework. By suggesting structured biophoton coherence as a plausible biological interface, this model provides testable predictions measurable through coherence spectroscopy and hemisphere-specific clinical neuromodulation.

Important limitations remain: the proposed quantum fields are inherently speculative and currently lack direct empirical validation; distinguishing quantum coherence effects from classical electromagnetic phenomena remains challenging; and detailed mechanisms linking quantum fields to subjective experiences and memory encoding require further empirical clarification. Nonetheless, substantial existing clinical evidence—from NIH-funded clinical trials, rigorous case reports, and independent replication—provides compelling support for the model's therapeutic efficacy and clinical promise.

One clearly defined future experimental test involves recording photonic and electromagnetic coherence emissions during a specific subjective experience and externally reproducing these structured coherence patterns for transcranial delivery to another individual. This explicit experiment could test whether externally delivered coherence signals directly interact with the proposed quantum fields to produce subjective experience or whether active re-emission of structured coherence by the receiving brain is required.

Future experimental and clinical studies—including potential studies currently proposed by the U.S. Army and other institutions—will be essential to address these limitations, refine the proposed mechanisms, and fully assess the model's explanatory power relative to established theories of life, consciousness, and memory. While additional rigorous validation is needed, the Four-Field Quantum Model represents a promising interdisciplinary approach, potentially advancing our understanding of life's most fundamental phenomena. When further information becomes available, while retaining the guiding concepts, the details of the complement of fields in our stated theory of consciousness and life may be adjusted in number, function, and interactions.

Ethics statement

This manuscript presents a theoretical framework and involves no original clinical or experimental studies with human or animal subjects performed by the author. All cited clinical data originate from previously published studies that complied with applicable ethical guidelines. This study did not require ethical approval as it did not involve human or animal subjects, clinical trials, sensitive data collection, or any other research activities that would necessitate an ethics review.

Declaration of generative AI in scientific writing

Pre-submission language editing was generated with ChatGPT-4.5 (OpenAI, March 2025); all outputs were reviewed and verified by the author, who accepts full responsibility for the content.

CRediT authorship contribution statement

Fredric Schiffer: Writing – review & editing, Writing – original draft, Resources, Methodology, Investigation, Conceptualization.

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Declaration of competing interest

The author declare the following financial interests/personal relationships which may be considered as potential competing interests: The author is the founder and Chief Executive Officer of MindLight, LLC, which holds 3 U.S. patents on hemisphere-specific transcranial photobiomodulation devices. He receives no consulting fees or royalties from MindLight, but is the sole owner of the company. All pevious research was conducted in accordance with NIH/FDA and/or institutional (Harvard and IRB) guidelines to manage potential conflicts of interest.

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Glossary of Key Terms

Awareness Field: A proposed quantum field specifically enabling certain non-conscious subjective states (**non-conscious selves**) to become conscious experiences.

Dual-Brain Psychology (DBP): A psychological model proposing distinct, hemisphere-specific agential subjective states or personalities within an individual, potentially influenced by unilateral hemispheric neuromodulation. One hemisphere, left or right, has been observed to have a personality more affected by past traumas.

Life Field: A proposed quantum field hypothesized to couple with metabolic processes, thereby maintaining living biological states.

Memory Field: A hypothesized quantum field capable of storing and retrieving experiential information, including episodic and generational developmental memories.

Non-conscious Selves: Patterns of agential structured brain information that influence cognition, emotions, or behavior below conscious awareness; empirically identifiable via neuroimaging or implicit behavioral tests.

Quantum-Classical Coherence Interaction: An interaction involving both classical coherence (electromagnetic neural signals or biophoton coherence) and subtle quantum coherence, proposed as a mechanism linking brain activity to subjective fields.

Selves: Distinct hemispheric agents within the brain, each associated primarily with one cerebral hemisphere (left or right). These selves can exist either as non-conscious subjective states ("non-conscious selves") influencing cognition, emotion, and behavior below awareness, or as conscious agents, when interacting directly with the Awareness Field.

Structured Brain Information: Neural activity or coherence patterns (including classical electromagnetic, biophotonic, and quantum coherence) expressing high-level continuous brain processing, carrying identifiable, measurable informational content.

Subjective Field: A fundamental quantum field hypothesized to interact with structured brain information, converting neutral informational states into subjective experiences.

Subjectivity (Subjective Experience): The experiential quality of conscious or non-conscious mental states; directly "felt" experiences such as perceptions, emotions, or thoughts, distinguishable from purely objective or informational states such as computer states.

Symmetry Breaking: The process by which multiple informational states (structured brain coherence patterns) interact with the hypothesized fields, producing clearly defined, qualitatively new subjective states.