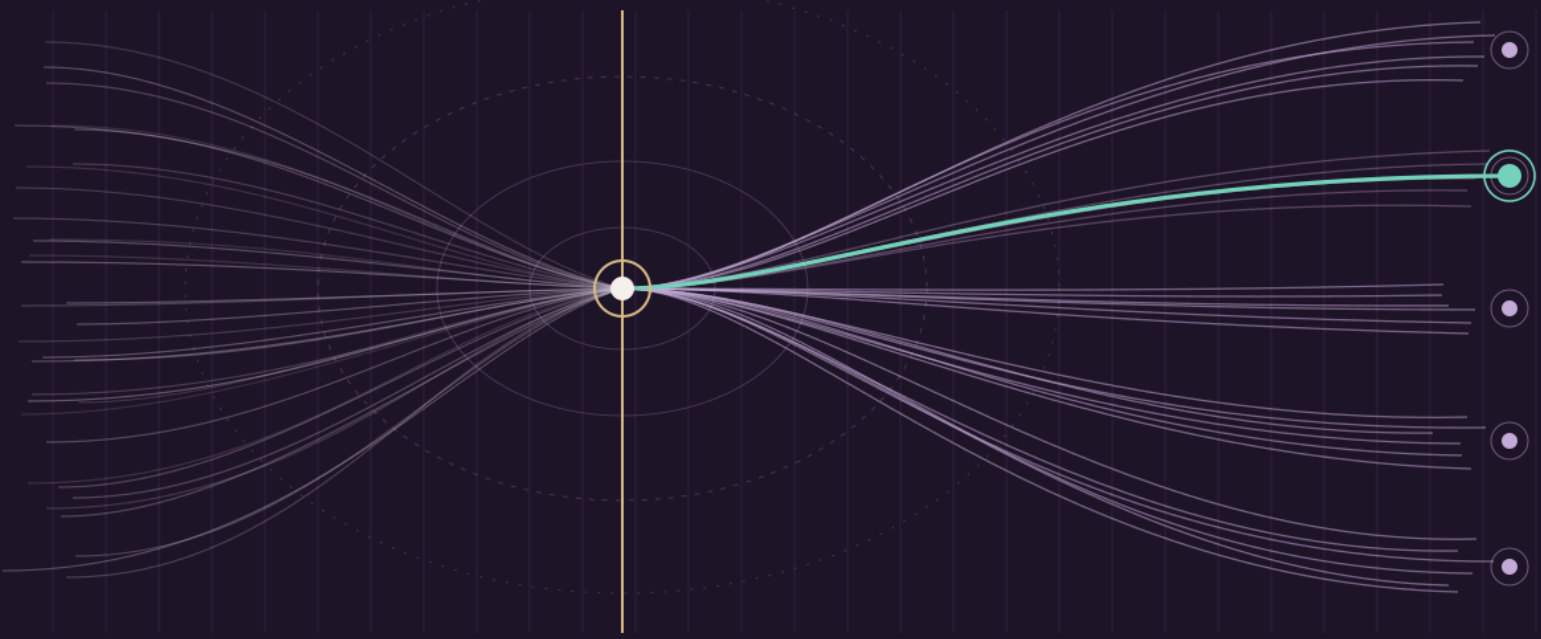
CP COMPANION RESEARCH PAPER

Quantum Consciousness *and Temporal Belonging*

A research companion to A Homeland in Time

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Abstract

The foundational white paper *A Homeland in Time* proposes that a person can establish, in consciousness, a homeland-like relationship with a possible future: *temporal belonging*. It grounds this proposition in reflective and intentional consciousness. Whether quantum processes contribute to subjective experience is a separate and open question.

This companion paper examines that question for three reasons. It is a serious scientific horizon. It is often confused with the project's own claims. And readers deserve to know exactly where the evidence stands. The paper separates three uses of "quantum": technology, a mathematics of human judgment, and physical hypotheses about the brain. It classifies the physical hypotheses as theoretical proposals and reviews the experiments that bear on them. It explains why temporal belonging is independent of the outcome, and it sets out what the programme will and will not claim. Its conclusion is that no experiment has shown that quantum processes contribute to human conscious experience. The question nonetheless remains open and testable, and temporal belonging stands on its own whatever the answer.

How to read this paper

MARK	MEANING
P	Philosophical proposition: argued, not measured
T	Theoretical proposal or calculation in the scientific literature: not experimental evidence
E·A	Empirical evidence, replicated or large-scale
E·B	Empirical evidence, peer-reviewed, single study or line of research
E·C	Empirical evidence, contested or unreplicated
H	Hypothesis of this programme, stated so that it can fail

1. Why a separate paper

The foundational paper distinguishes two research areas of consciousness:

- **Area A**, reflective and intentional consciousness: the capacity to imagine possible futures, recognise values, choose and act across time.

- **Area B**, phenomenal consciousness: subjective experience itself, and whether quantum processes contribute to it.

Temporal belonging is built on Area A. Area B is kept apart, so that a philosophical proposal about how people relate to the future is not made to depend on an unresolved question in physics and neuroscience. Keeping it apart is not the same as setting it aside. If the physical basis of experience is ever understood, it will change how human agency is understood, including the agency that temporal belonging describes.

2. Three uses of "quantum"

USE	WHAT IT IS	STATUS	RELEVANCE TO THE PROJECT
Quantum technology	Computers, sensors and communication built on quantum physics	Engineering in progress; timing of practical advantage uncertain	Context: the "quantum era" as a period of changing world models
Quantum probability in judgment	A mathematical framework that fits some human judgments better than classical probability	Established research field; e.g. question-order effects in 70 US national surveys (Wang et al., 2014) E·A	Used as a modelling tool in the Temporal Noosphere; tested for future judgments in EX02 H
Quantum-physical hypotheses about the mind	Proposals that quantum processes in the brain contribute to experience	Theoretical; experimentally unconfirmed	The subject of this paper; nothing in the proposal depends on it

The second use is often mistaken for the third. Quantum cognition models describe the *structure* of judgments, for example how an undecided preference is shaped by the act of being asked. They are mathematical. They say nothing about whether neurons maintain quantum states (Busemeyer & Bruza, 2012; Pothos & Busemeyer, 2013).

3. The problem of experience today

Neuroscience has identified many correlates of conscious states. How experience arises from brain activity remains unexplained. The leading classical theories differ on where and how experience is generated:

- **Global neuronal workspace theory** links consciousness to the broadcasting of information across the brain.
- **Integrated information theory** links it to the intrinsic causal structure of a system.

In 2025 a preregistered adversarial collaboration tested predictions agreed in advance by proponents of both theories. Its results matched some predictions of each, but substantially challenged key tenets of both (Cogitate Consortium, 2025). E·B The study is significant precisely because it shows that

even the best-developed classical theories remain unsettled. That is the background against which quantum proposals should be read: not as rivals to an established account, but as further candidates in an open field.

4. Quantum proposals: theories, not evidence

4.1 Orchestrated objective reduction

Penrose and Hameroff propose that quantum superpositions form in microtubules, protein structures inside neurons. These superpositions are thought to end through a gravity-related "objective reduction", and each such event is linked to a moment of experience (Hameroff & Penrose, 2014). [T] The proposal makes physical commitments that can be tested: coherence in microtubules, a specific collapse mechanism, and an involvement of microtubules in anaesthesia.

4.2 Nuclear-spin proposals

Fisher proposed that nuclear spins of phosphorus atoms in certain molecules could hold quantum information in the brain for long periods, because nuclear spins interact only weakly with their environment (Fisher, M. P. A., 2015). [T] The proposal predicts that isotopes with different nuclear spins should, in some circumstances, have different biological effects.

4.3 Radical-pair mechanisms

In some animals the sensing of magnetic fields is thought to depend on spin-dependent chemical reactions of radical pairs (Hore & Mouritsen, 2016). Proposals that similar spin chemistry plays a role in anaesthesia or neural function extend this idea to the brain. [T]

4.4 Theoretical arguments against

Tegmark calculated that quantum coherence in warm, wet neural tissue would decay far faster than neural processes operate (Tegmark, 2000). [T] Hagan, Hameroff and Tuszyński replied that his model did not match the proposal it criticised, and that revised assumptions lengthen coherence times considerably (Hagan, Hameroff & Tuszyński, 2002). [T] Both are calculations based on assumptions. They frame the question but cannot settle it without measurements.

5. What experiments have shown

FINDING	TYPE	WHAT IT SHOWS	WHAT IT DOES NOT SHOW	MARK
An underground experiment found no radiation predicted by the simplest gravity-related collapse model (Donadi et al., 2021)	Physics experiment	The simplest parameter-free version of the collapse model on which orchestrated objective reduction draws is ruled out	Not all versions of objective reduction are excluded	E·B

FINDING	TYPE	WHAT IT SHOWS	WHAT IT DOES NOT SHOW	MARK
Xenon isotopes with nuclear spin were less potent anaesthetics in mice than spin-zero isotopes (Li et al., 2018)	Animal experiment	A difference consistent with spin-dependent mechanisms	Not independently replicated; chemical or other explanations not excluded; says nothing about experience in humans	E·C
A microtubule-stabilising drug delayed loss of righting reflex under isoflurane in rats (Khan et al., 2024)	Animal experiment	Microtubules may be involved in anaesthetic action	A classical role of microtubules is equally compatible; not replicated	E·C
Electronic energy migrated further along microtubules than expected, and anaesthetics reduced it (Kalra et al., 2023)	In-vitro photophysics	Microtubules have unusual energy-transfer properties	Not a measurement in living neurons; no link to experience shown	E·C
MRI signals interpreted as evidence of non-classical brain function (Kerskens & López Pérez, 2022)	Human imaging	A claimed anomaly	The interpretation was disputed in a published comment in the same journal (2023); not replicated	E·C

Summary. P The physics experiment narrows the theoretical options. The biological findings are compatible with quantum accounts but not specific to them, and none has been independently replicated. **No experiment has shown that quantum processes contribute to human conscious experience.** Equally, no experiment has ruled out every quantum proposal.

6. Experiments that could discriminate

Progress needs studies in which quantum and classical accounts predict different outcomes: H

1. **Isotope studies.** Independent, preregistered replication of the xenon result with blinded dosing and control of chemical differences between isotopes, extended to other isotope pairs.
2. **Microtubule pharmacology.** Dose–response studies of microtubule-targeting drugs under several anaesthetics, designed where quantum and classical mechanisms diverge.
3. **Coherence measurements.** Direct measurement of coherence lifetimes in candidate structures under physiological conditions, not only in purified preparations.
4. **Collapse models.** Continued laboratory and underground tests of the collapse parameters the hypotheses require.
5. **Replication of imaging claims.** Independent replication of claimed non-classical MRI signals with alternative explanations tested in advance.

The programme does not conduct such research. It follows it, reports it accurately, and will support it where competent partners exist.

7. Relation to temporal belonging

Independence. [P] Temporal belonging is defined as a relation of membership with a possible future world, formed by imagining, valuing and choosing. These capacities exist and can be studied whatever the physical basis of experience turns out to be. If quantum proposals were confirmed, the definition, the four acts and the hypotheses H1–H5 would stand unchanged. If they were refuted, the same would be true.

What confirmation might add. [P] Confirmation would deepen the understanding of agency, of how possibilities are held open in a mind before a choice is made. It might enrich the philosophical vocabulary of the project. It would not establish that minds are physically connected or that a collective consciousness exists.

What the programme does not claim:

- that quantum entanglement physically connects human minds;
- that the Temporal Noosphere is a physical field;
- that MITOSIS reads consciousness or establishes quantum links between people;
- that quantum cognition models describe quantum physics in the brain;
- that any result in quantum biology supports temporal belonging.

What the programme does test. [H] Hypothesis H4 asks whether judgments about possible futures show the question-order effects predicted by quantum probability models, across six languages (protocol EX02). This is a test of a mathematical model of judgment, not of quantum physics in the brain.

8. Conclusion

The question of whether quantum processes contribute to consciousness is legitimate, open and testable. The present evidence consists of theoretical proposals, theoretical arguments on both sides, one physics experiment that constrains a key model, and a few unreplicated biological findings that are compatible with quantum accounts but not specific to them. A responsible research programme should say exactly that.

A Homeland in Time treats this question as a horizon, not a premise. Temporal belonging rests on the capacities by which people imagine, value and choose their futures. Those capacities are real today, whatever physics eventually says about the experience that accompanies them.

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