

# Quantum Decoherence

YOUR JOURNEY TO UNDERSTANDING

## Quantum Cognition and Decoherence

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*Learning about the link between decoherence and consciousness could help us explore cognition.*

### Quantum Decoherence and Consciousness

Have you ever heard of Schrödinger's Cat? It's a famous thought experiment where a cat in a box is somehow both alive and dead—until someone checks. This strange scenario comes from the weird world of quantum physics. But what does it have to do with our brains, thoughts, or sense of being? In a fascinating publication by Jerome Busemeyer and Meijuan Lu, the authors explore how quantum mechanics, brain function, and consciousness might be connected.

#### What Is Quantum Decoherence?

According to quantum brain theory, quantum decoherence is what happens when a quantum system—like an electron or even a thought—gets “interrupted” by its environment.



Quantum decoherence

When that happens, the quantum system loses its special properties, like superposition (where something can be in more than one state at once). Decoherence turns a weird quantum state into something we experience as a regular, everyday event. It's how we go from “cat both alive and dead” to “just alive” or “just dead.” In our brains, if quantum processes do exist, then decoherence would be a big problem. Why? Because our brains are warm, wet, and full of noise—exactly the kind of place where quantum magic breaks down fast.

#### Sci-Fi or Science?

Some scientists, like Penrose and Hameroff, think that tiny parts of our brain cells, called microtubules, may help keep quantum information safe long enough to affect how we think. This idea is called the Orch OR theory. They suggest that quantum actions inside our brains could be responsible for moments of conscious awareness—when we “know” or “feel” something. Others, like Fisher, propose different quantum-safe molecules, called Posner molecules, that might help protect these tiny quantum states even longer—possibly up to hours.

### Quantum Cognition

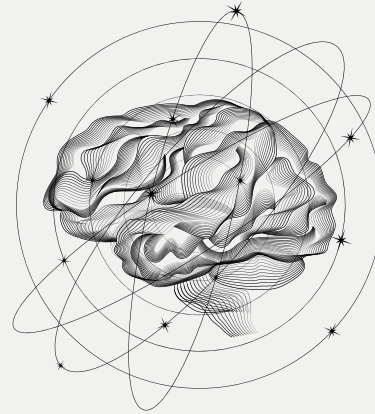
Here's a twist: even if the brain isn't truly quantum, our thinking might follow the math of quantum mechanics. This is called quantum cognition. Have you ever changed your mind after thinking more about something? Or felt uncertain until the moment you made a choice? That kind of fuzzy decision-making looks a lot like quantum superposition. In one experiment, people made different decisions depending on the order of the questions asked. That's similar to how particles act in quantum physics.

### Why Does It Matter?

Quantum decoherence helps us understand if our consciousness comes from classical brain processes or something stranger. If scientists can determine how to protect quantum information in the brain, then it could lead to breakthroughs in neuroscience and quantum computing.

### Learn More

*Curious about how quantum theory may explain your everyday thoughts, feelings, and choices? Dive deeper and challenge what you think you know about reality. Explore the full article to unlock the mysteries of your mind.*



### ABOUT THE AUTHOR

DAWN PEARSON IS A WRITER WITH A BACKGROUND IN BIOLOGY, LIFE SCIENCES, AND BIOTECHNOLOGY.



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### References

Busemeyer, J. R., & Lu, M. (2024). Quantum Consciousness, Brains, and Cognition. Indiana University & Meng River Health.