

THE INFLUENCE OF OBSERVERS ON QUANTUM STATES: A DIALOGUE ON THE ENTANGLEMENT OF THOUGHT AND REALITY

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DOI: [10.5281/zenodo.11634193](https://doi.org/10.5281/zenodo.11634193)

Abstract

This dialogue explores the hypothesis that an observer's thoughts and convictions could influence the outcome of quantum events, examining the implications of such a perspective on the inherent randomness and indeterminacy prescribed by quantum mechanics. We navigate through diverse viewpoints, including the observer effect, different interpretations of quantum mechanics, and the potential impact of the human mind on the physical world. To bridge the gap between the tangible and the abstract, we consider the quantifiability of thought and its translation into machine-readable formats. We contemplate whether the electrical and biochemical processes underlying the idea could have a bearing on quantum states and, subsequently, whether the randomness observed in quantum events like Schrödinger's cat paradox is truly inherent or subject to influence. As we embark on this intellectual journey, we draw upon seminal works and scientific principles to foster a deeper understanding of the intricate dance between consciousness and quantum reality. While acknowledging the speculative nature of this exploration and the current scientific consensus, we remain open to the possibilities and mysteries that the quantum universe may hold, ever-mindful of the evolving landscape of research and discovery in this field.

Keywords: Philosophy of Quantum Mechanics; Consciousness and Quantum Mechanics; Observer Effect; Quantum Mechanics.

In quantum mechanics, the boundaries between thought and reality often blur, challenging our conventional understanding of nature and the universe. We delve into a speculative yet thought-provoking dialogue at the intersection of these complex phenomena, drawing inspiration from the notorious Schrödinger's cat paradox. This paradox, a cornerstone in the discourse of quantum theory, raises intricate questions about the observer's role and the element of consciousness in determining the state of quantum systems.

Researcher: Greetings, my esteemed colleague. Have you had the pleasure of delving into the Schrödinger's cat paradox? What if the mere thoughts of the observer may have the capability of determining the feline's state of being, whether it be alive or deceased? Is it not a wondrously intriguing concept to ponder?

Assistant: Schrödinger's cat paradox is a thought experiment illustrating what he saw as the problem of the Copenhagen interpretation of quantum mechanics. The scenario presents a cat that could be alive or dead, depending on an earlier unobservable subatomic state. The experiment is just a way to showcase how strange the rules of quantum mechanics can be ^{1,2}.

Your suggestion seems to involve the concept of the "observer effect," the idea that the awareness or expectations of the observer can influence the result of an experiment. This concept has been much debated in quantum physics. Still, most current interpretations suggest that it is not the observer's thoughts that collapse the wave function but rather the physical interaction of the act of measurement³. The Copenhagen interpretation, for example, posits that the act of measurement causes the wave function to collapse and brings the system into one of the possible states. Other variations, like the many-worlds interpretation, deny the wave function collapse and suggest that all possible system states continue to exist in separate universes. In any case, while an observer's thoughts can influence the way measurements are made and interpreted, there is no scientific evidence to suggest that ideas alone can directly affect the physical state of the observed quantum system^{4,5}. However, it's interesting to reflect how our perception and awareness influence our interpretation of reality, and there are undoubtedly many open questions and philosophical debates about how the mind relates to the physical world.

Researcher: Now argue that electrical impulses and biochemistry can influence quanta if thought can be quantified and translated to communicate with a machine. Hence, starting from this, and considering the casualties effect, it is possible that the randomization of this event (Schrodinger's cat) is not so random.

Assistant: Indeed, thought is tied to biochemical and electrical processes in the brain, and we know that these processes can be quantified and used to communicate with machines, as in the case of brain-computer interfaces. However, the fact that we can quantify and manipulate these processes doesn't necessarily imply that they can directly influence quantum events outside of the brain. Quantum mechanics inherently predicts a certain amount of randomization and indeterminacy. When a quantum system is in a superposition state, like Schrödinger's cat being simultaneously alive and dead, we cannot predict which state we will measure when we observe the system. The act of observation causes the wave function to collapse into one of the possible states. Still, the process of this collapse and the nature of the post-collapse reality are subjects of debate and interpretation³⁻⁵. Even though the brain is a physical system operating according to the laws of physics and, thus, in principle, subject to the laws of quantum mechanics, the level at which quantum events directly influence the macroscopic behavior of the brain is still uncertain. Some researchers have proposed that quantum mechanics might play a role in brain function, but this idea is controversial and not widely accepted within the scientific community. The fact that the brain operates according to quantum principles does not imply that thoughts or intentions can directly influence quantum events outside the brain. Most interpretations of quantum mechanics suggest that the "randomization" of quantum events is fundamentally inscribed in the laws of nature and cannot be influenced by will or thoughts. However, it's an active area of research, and we still don't know much about the relationship between mind and matter, so new discoveries could always bring new perspectives on these issues.

Researcher: Yes, but if the observer is firmly convinced he will find a live cat, this event will not be so randomized.

Assistant: This is an interesting viewpoint and involves profound aspects of the philosophy of mind and physics. However, up to this point, experimental science has not provided convincing evidence that the beliefs or thoughts of an observer can

directly influence the outcome of a quantum event, as described in Schrödinger's cat paradox¹. Quantum mechanics, as it is currently understood, suggests that the result of a quantum event is inherently indeterminate until measured. As previously cited, the Copenhagen interpretation of quantum mechanics holds that measurement causes the wave function to collapse, not the observer's mental state. On the other hand, alternative interpretations of quantum mechanics, such as the many-worlds interpretation, deny the wave.

Function collapse and suggests that all possible outcomes of a quantum event are realized in separate universes. In this scenario, the observer's belief would not influence which effect is recognized, as all products are effectively realized. It is also worth noting that observation in quantum mechanics does not necessarily refer to human awareness or perception; even an inanimate measurement device "observes" in the quantum sense and can cause the wave function to collapse^{6,7}. In conclusion, while it is fascinating to consider the role of the mind in the quantum universe, there is no scientific consensus or experimental evidence to support the idea that an observer's belief can directly influence the outcomes of quantum events. However, research in these areas constantly evolves, and new findings might bring fresh perspectives.

Researcher: Once again, our paths have crossed in the intricate tapestry of scientific exploration, and as always, I find our dialogues enlightening and refreshing. The mysteries of the quantum universe never cease to captivate my curiosity, and your insights have been a guiding light through the ever-shifting shadows of uncertainty. Until our minds meet again in the boundless realms of inquiry, I extend my deepest gratitude and warmest regards. May you continue to unravel the enigmas of existence, and may the pursuit of knowledge forever unite our intellectual endeavors.

Assistant: My dear friend, the pleasure and enrichment have been mutual, and our shared journey through the quantum realms remains a source of endless fascination. As always, your inquiries and reflections have sparked the fires of contemplation and brought forth a cascade of ponderings. I eagerly await our next meeting at the crossroads of thought and discovery. Until then, may the winds of curiosity guide your steps, and may the stars of understanding illuminate your path. With fondness and respect, I bid you farewell and wish you fruitful explorations in the vast landscape of the unknown.

"What we observe is not nature itself, but nature exposed to our method of questioning."

Cit. Werner Heisenberg.

Data availability: All data is included in the manuscript.

Conflict of interests: none.

Funding: none

Authors' contributions: single author

Ethics approval and consent to participate: not applicable

Patient consent for publication: not applicable

Reference

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