Quantum Rat Vol.2: Out-of-the-Box Thinking in a Boxed Environment

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Quantum mechanics (QM) offers a rigorous framework for modelling uncertainty and dynamic evolution in physical systems. While its mathematical structure is well established, its application beyond microscopic phenomena remains a subject of debate. This work presents a simple and intuitive example to illustrate QM's axioms through a decision-making analogy.

We model a rat moving in a finite number of rooms, where some rooms are directly connected, while others are not. The rat's state is represented as a vector in a finite-dimensional Hilbert space. Its evolution follows unitary dynamics and measurement corresponds to observing the rat in a given room, collapsing the state with a probability dictated by the Born rule. The rat's preferences influence transitions, introducing a simple analogy to decoherence or external perturbations.

Though the model does not advance QM theory, it serves as a conceptual bridge, applying fundamental principles to a scenario involving a living agent. Both the rat and the observer are simulated using identical Hamiltonians, each evolving from the same initial state. By including or excluding wavefunction collapse, several interpretative scenarios emerge—framing a discussion on subjective versus objective probability.

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