Review of: "Neural Quantum Superposition and the Change of Mind"

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This article gives a well-written and thoughtful perspective on quantum cognition. It is interesting to see the subject discussed from the viewpoint of a chemist, for example in the connection made between mental states and physical states within the brain. As feedback, I have two main points. One is that the piece would benefit by referring to the existing literature on quantum cognition, which is now quite large (see for example *Quantum Models of Cognition and Decision* by Busemeyer and Bruza which also relates decision-making to the two-slit experiment). Much of this work focuses on empirical studies which compare the ability of quantum and classical models to fit experiments. The examples given in the paper work well for illustrating points, but it would be good to supplement them with some actual data.

My second point is that, while it is interesting and valuable to see the connection made with chemical dynamics within the brain, one can also look at this the other way, and simply ask what kind of mathematical model is more accurate or makes better predictions - a quantum model, or a classical one? Quantum probability is the next-simplest kind of probability after the classical one, and exists as a mathematical framework that is separate from physics. Its main advantage is that it allows us to model dynamic probabilistic effects - along with properties such as superposition, interference, and entanglement - which describe the mental world as much as the subatomic one. The article mentions that most researchers in the area “do not presume the existence of a real, biological QM fabric of consciousness, limiting their statements to the apparent similarity between QM formalisms and human behavior” which sounds like a bit of a cop-out. But even if the brain does turn out to reply on quantum processes, this would not necessarily meant that we should model cognition using quantum models (water is quantum too, but we don't require plumbers to train in quantum mechanics). The real test of quantum social science is not to show that mental or social processes can somehow be reduced to quantum processes in the brain, but a much harder one, which is to ask, if we knew nothing of quantum mechanics, would social scientists have wanted to invent it?