

Essay

Life After Death? An Improbable Essay

Stuart Kauffman*

I believe nothing of what I shall write. Yet I think that, scientifically, what I shall say is remotely possible.

The hopes for, or firm belief in, an afterlife is antique. With the rise of Newtonian mechanics and the secularization of the West, a theistic God largely vanished from Western thought, although held firmly in place among many religious people. Heaven and Hell are central in much Christian thought.

But is life after death even conceivable on any view of modern science? Yes, but barely.

I have published on this topic, skeptically, in “Cosmic Mind?”,¹ and shall bring forward the same considerations here.

These considerations derive from an interpretation of quantum mechanics in which consciousness is associated with quantum measurement and from the emerging facts of quantum biology. In the latter cases, it is becoming clear that at body temperature, some or many aspects of life are quantum. The clearest example is in the light harvesting molecules² where long lived, nanosecond, quantum coherence is observed and thought to play a role in the efficiency of energy harvesting in photosynthesis. Bird migration and perhaps smell may be in part quantum phenomena.³

We have little idea at present of the extent to which quantum phenomena play a role in the “living state”. Moreover, it is well to remember that it is not clear how the classical world arises from quantum mechanics (see e.g. Bohr⁴; von Neumann⁵).

Into this confusion, I must add the “Poised Realm” that appears correct and hovers reversibly between quantum and “classical”, or “classical for all practical purposes” behaviors, due to decoherence and recoherence.⁶

Quantum effects in biology will demand that we rethink aspects of biology. For example, in the light harvesting molecules, the quantum efficiency of that harvesting

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is thought to be due to the excited electron taking, simultaneously, all possible pathways to the reaction center. This taking of all possible pathways is quantum superposition, which mystery evades Aristotle's law of the Excluded Middle.⁷ In this law, the cat is either on the mat or not, with nothing in between. So "The cat is on the mat and simultaneously not on the mat" is a contradiction. But superpositions evade that law in stating that the electron is simultaneously "here and there", or in the famous Schrodinger cat paradox, the unmeasured cat is simultaneously alive and dead.

One approach to the mystery of superpositions is to consider ontologically real *possibles*, for as noted by C. S. Peirce, possibles avoid the law of the excluded middle.⁸ This is easily seen in, "The cat is possibly on the mat and simultaneously possibly not on the mat," which is not a contradiction. Then we arrive at the hypothesis that superpositions reflect ontologically real possibles, *Res potentia*. This is a new interpretation of quantum mechanics, *Res potentia* (*possibles* that do NOT obey the law of the excluded middle) and *Res extensa* (*actuals* that do obey the law of the excluded middle), linked by measurement. On this view, what are waving in the Schrödinger equation at the basis of quantum mechanics are possibilities.⁹

This view harkens back to Heisenberg in some ways,¹⁰ but is quite radical. On the view of *Res potentia* and *Res extensa* linked by measurement, measurement converts possibles to actuals, and there can be no deductive mechanism for measurement since the "X is possible" of *Res potentia* does not entail the "X is actual" of *Res extensa*. Indeed no deductive derivation of the outcomes of quantum measurement, if measurement is real, has been found since 1927 when the Schrödinger equation was formulated. So the hypothesis of *Res potentia* is scientific, disproved if ever such a deductive mechanism is found.

Now in classical physics there are no *possibles* at all, only *actuals* linked by causality as is seen in both Newton and Einstein's general relativity, where all causal influences are limited by the fixed speed of light.

This raises the issue of the link between the quantum and classical worlds, where the former may concern both *possibles* and *actuals*, and the latter only *actuals*. This is not remotely a settled issue, for, obviously, the hypothesis of *Res potentia* is unestablished. However, elsewhere I hope I have shown that this hypothesis can account for four major mysteries of quantum mechanics, including non locality.¹¹ The potential success of this account of non-locality must count to some extent in favor of *Res potentia*.

If something like the classical world exists, even if its derivation from quantum mechanics remains fraught, as seen in the hopes of the decoherence program, which has not quite succeeded,¹² then we confront a new issue. Given quantum biology of unknown extent, is life both quantum and classical? Probably to some extent, "yes".

If life is both quantum and classical, what is death? A new hypothesis is that death is “going fully classical”. You see, we really do not know what death is. It is not inconceivable that life, partly quantum, loses those quantum aspects at death, perhaps by decoherence to classicality itself or for all practical purposes, FAPP.

Suppose death is “going classical”. Then what happens to the quantum aspects of the living state? It is remotely conceivable that these persist as something like “soul” after death.

To venture further requires some highly speculative ideas about consciousness and quantum entanglement.

I have proposed elsewhere that consciousness is associated with quantum measurement.¹³ This is testable and there is already faint positive evidence.¹⁴

Now we need to consider quantum entanglement. Quantum variables can be entangled and described by a single wave function. If one of N such variables is measured, that instantaneously changes the wave function of the remaining $N - 1$ still entangled variables. Now if quantum measurement is associated with consciousness, as I shall posit and discuss elsewhere,¹⁵ it is barely conceivable that disembodied but entangled quantum variables can be jointly conscious, presumably jointly for there is a single wave function for the N entangled variables. We surely do not know this.

But we are freely speculating. I will return to the potentially testable aspects of these ideas below.

If life is quantum and classical (for all practical purposes or otherwise), and at death the body “goes classical” the remaining quantum variables might “escape” the body, the mortal coil, as disembodied soul. I stress that of course I do not believe this, but I do think it is remotely possible. Were this true, something like soul could persist after death, perhaps with disembodied mind.

Because entanglement among quantum variables can appear and disappear, such “souls” might be highly evanescent, perhaps they are a ghostlike presence for mere moments after death, perhaps they persist longer. In either case, reincarnation is not inconceivable.

Is any of this testable? In Kauffman,¹⁶ I discuss several approaches to testing the relation between measurement and consciousness. Von Neumann postulated that consciousness was sufficient for measurement.¹⁷ Radin et al.¹⁸ has tentative evidence in favor. Time will tell. But further tests can be done.

Is it possible to test if entangled quanta persist after death? Yes, in principle. Would that show that such entangled quantum variables are conscious at measurement of

some or many of the entangled variables? No, not at all. I can conceive of no way to test this, but nevertheless I propose¹⁹ that consciousness is necessary and sufficient for measurement, and that quantum variables can measure one another, the latter being testable by a Quantum Zeno Effect induced co-trapping of quantum variables.²⁰ If quantum variables do co-measure one another, it's testable, and IF consciousness is both NECESSARY and demonstrably sufficient for measurement, then perhaps quantum variables such as entangled disembodied variables are actually conscious at measurement. Then disembodied consciousness can exist. Finally, if at death, quantum entangled variables reflecting the living state in some way can escape the now dead classical body, perhaps souls can exist and can in some remotely conceivable manner, reincarnate.

I do not believe any of this, but it is not obviously impossible scientifically and is slightly defensible. I do believe I have shown that it's logically possible.

Conclusion

I have discussed the remote possibility that entangled quantum variables are jointly conscious, that the living state is quantum, a poised realm, and classical, that death may be "going classical" with the release of entangled quantum variables from the now dead body – which variables, reflecting a quantum entangled aspect of the living state, could just conceivably, be *souls*. There are ways to test a few aspects of these ideas, but not many. The central idea that quantum variables are conscious at measurement cannot now be tested. These are very remote possibilities, but not, I think, ruled out scientifically.

Notes

¹ Kauffman, S. (2016a). Cosmic mind? *Theology and Science*, 14 (1): 36–47. [dx.doi.org/10.1080/14746700.2015.11225](https://doi.org/10.1080/14746700.2015.11225)

² Engles, G., Calhoun, T., Read, E., Ahn, R., Mančal, T., Chen, Y., Blankenship, R., & Fleming, G. (2007). Evidence for wavelike energy transfer through quantum coherence in photosynthetic systems, *Nature* 446 (7137): 782-786. [doi:10.1038/nature05678](https://doi.org/10.1038/nature05678)

³ Gauger, E. M., Rieper, E., Morton, J. J., Benjamin, S., & Vedral, B. (2011). Sustained quantum coherence and entanglement in the avian compass, *Physics Review Letters* 106 (4): 040503.

⁴ Bohr, N. (1948). On the notions of complementarity and causation, *Dialectica* 2: 312-319.

⁵ von Neumann, J. (1933). *Mathematical Foundations of Quantum Mechanics*. Princeton University Press.

⁶ Kauffman, S. (2016b). *Humanity in a Creative Universe*. Oxford University Press.

⁷ Ibid.

⁸ Ibid.

⁹ Ibid.

¹⁰ Heisenberg, W. (1958). *Physics and Philosophy*. George Allen & Unwin.

¹¹ Kauffman (2016b).

¹² Zurek W. H. (1991). The environment, decoherence and the transition from quantum to classical, *Physics Today* 44: 96.

¹³ Kauffman (2016b).

¹⁴ Radin, D., Michales, L., Johnston, J., & Delome, A. (2013). Psychophysical interactions with a double-slit interference pattern, *Physics Essays*, 26 (4).

¹⁵ Kauffman (2016a).

¹⁶ Kauffman (2016b).

¹⁷ von Neumann (1933).

¹⁸ Radin et al. (2013).

¹⁹ Kauffman (2016b)

²⁰ Ibid.

Autobiographical Note: Stuart Alan Kauffman is an American medical doctor, theoretical biologist, and complex systems researcher who is known for his explorations of the origin of Earthly life. He is widely known for arguing that the complexity of biological systems results as much from autopoiesis (self-organization) as from Darwin's natural selection. Though an atheist, he sees such creative freedom in Nature as an expression of the *sacred*. He has published hundreds of articles and five books: *The Origins of Order* (1993), *At Home in the Universe* (1995), *Investigations* (2000), *Reinventing the Sacred* (2008), and *Humanity in a Creative Universe* (2016).