Discrete Time, Continuous Time and the Self-image: A Gedanken Experiment

Aman Chawla

December 14, 2023

Abstract

In this note, the author examines time and its perception as discrete or continuous in various contexts, using a thought experiment.

A machine may produce a discrete output and thus act like a discrete time source, but a living system is ever alive for its life duration and therefore acts as a continuous source of information, if it emits it at all.

Now since consciousness may be said to be the substratum of the physical universe [1, 2, 3], we may suppose that the universe is a living system for all practical (measurable) purposes. Hence any thing within our ken of physical perception has to be a continuous source of information. This includes machines! In other words, there is no experiment that can ever "prove" or "demonstrate" that things are discrete, even at the so-called 'quantum foam level' of John Wheeler.

One of the only ways this may be overturned is the following. Consider that the experimenter shrinks down to the size of an atom. Then he or she measures the atom. If the atom has a finite life duration then it will be a continuous time source only for that duration.

Thereafter it will stop being a source because its life has ended. Then the experimenter will come across another atom, and so on. Thus you will have, what appears to the experimenter, that the universe has a lot of 'discrete' structure at base.

But this would just be an illusion, because while the experimenter was engaged with the atom measurement, there was a whole other side or part of the universe that he or she was ignoring. Had he or she been able to do a total measurement of all that is, there would be no room for obtaining a discrete record. The record would be continuous.

Thus we can conclude that discrete time sources are a theoretical contrivance which have no relation to the 'totality' of reality. Nevertheless, they may be useful as long as we view ourselves as space-time-circumscribed experimenters obtaining similarly circumscribed data about the world.

References

[1] A. Chawla, "A gedanken experiment on the brain as a quantum computer," *ResearchGate Preprint*, 2022.

[2] ——, "Networked universal awareness: a note."

[3] A. Chawla and S. D. Morgera, "Computer study of metric perturbations impinging on coupled axon tracts," *Physics Essays*, vol. 36, no. 2, pp. 160–167, 2023.