

Review of: "The Case for Conscious Experience Being in Individual Neurons"

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Potential competing interests: No potential competing interests to declare.

Topics:

- Is a neuron a what or a who?
- neural correlates of consciousness?
- direct electromagnetic coupling between a pattern of synaptic potentials
- pattern of electrical potentials generated at synapses

Review comment: Consciousness without memory is a biologic non-starter; a creature without memory would not long survive. Thus, identifying a mechanism of neural memory would go a long way to clarifying the phenomenon of consciousness.

Describing Brain as a 'Hologram' does not avoid the conundrum of conscious memory, but it does imply that more than 1 neuron is involved. After all, a "hologram" is a three-dimensional image reproduced from a pattern of interference from many point sources.

Conscious memory is not a field.. They suggest that consciousness is something being affected by a field, almost certainly electro-magnetic.

Synchronous oscillations in neuronal potentials and gamma frequencies, sometimes, correlate with conscious activity. But what is experiencing that field?

The authors would be well-served to look to evolutionary biology to identify the origin of memory in neural creatures. The long discussion between, PS and JE about single neuron consciousness folds into a discourse about possible existential self-awareness by individual neurons, covering topics such as dreams, depression, stories, mental states, codes, integrate, information, etc.

It has an interesting section entitled "Catch 22 of Entanglement" where quantum rules

dictate that *"whatever information you get from one, the information you get*

from the other is the same, or correlated'. We point out that quantum "entanglement" relates to the temporal coupling of physical properties of particles, such as position, momentum or spin, even when particles are far apart ("spooky interactions") (1-3). However, quantum mechanics cannot formulate the emotive dimensions of mentality, which are based

on physiologic reactions accompanied by psychic states. To account for the transition of metabolic energy into a mental phase, one needs to recognize that subjective experience of the neural net is entangled with the physiologic reactions of the body.

Regarding the consciousness in individual neurons (xx, this cannot be proved or demonstrated. Rather, we look to evolutionary biology to provide guidance. For example,

the most primitive neural creature (i.e., *C. Elegans*) employs ~300 neurons to transcend metabolic energy into memory (4,5, White et al., 1986; Ardiel & Rankin, 2020). The evolution of larger and more complex neural aggregates has paralleled the emergence of more complex mental talents.

Assuming that memory is the key talent of consciousness, it makes sense to try to identify a biochemical code for memory. Marx & Gilon (6-8) have proposed a tripartite mechanism for emotive memory that involves the interaction of 3 physiologic compartments, namely:

- **Neural cells** which form a processing circuit
- **Neural extracellular matrix/perineural net (nECM/PNN)** which performs as a “memory material” around the cells.
- **Dopants** (metal cations and neurotransmitters (NTs)) which encode experience into emotive memory

This mechanism necessarily involves more than a single neuron, but suggests the emergence of a psychic talent from a neural net. There is no such creature as an individual neuron much less one that exhibits mental consciousness. Mentality is a group phenomenon, a psychic talent emerging from the global interactions of interconnected neurons.

The continuing dialogue between PS and JE does not clarify a mechanism.

Rating: 3.5

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