

Origin and Storage of Consciousness

Tapan Das

ABSTRACT

Consciousness is created by Yukawa coupling between Nambu-Goldstone boson scalar field and electron Dirac field in the brain. Nambu-Goldstone boson is created by breakage of symmetry of the quantum electric dipole field of brain due to brain wave. The image of consciousness is stored as binary data in the microtubular structures of the neurons like computer memory.

Key Words: Nambu-Goldstone, Yukawa, boson, quantum electric dipole, quantum brain dynamics; quantum field theory

DOI Number: 10.14704/nq.2015.13.1.806

NeuroQuantology 2015; 1:108-110

Introduction

In my previous paper (Das, 2009), I proposed that consciousness is based on Yukawa coupling between Nambu-Goldstone boson scalar field ϕ and electron Dirac field ψ in the brain. Umezawa and Takahashi applied quantum field theory (QFT) (Zee, 2010) to explain quantum state in the brain. In QFT, photons are not considered as little particles, but as quanta-ripples in a field. Similarly fermions like electrons are considered in a field where each kind of fermion has its own field. Hence according to QFT, particles are considered as excited states of field.

Origin of Consciousness

In neuroscience, quantum brain dynamics (QBD) (Jibu, 1995) is a hypothesis to explain the

function of the brain within the framework of QFT. Hiroomi Umezawa proposed that QFD might have a role in the working of the brain (Ricciardi, 1967). According to QBD, the electrical dipoles of the water molecules in the brain constitute a cortical field. Water comprises 70% of the brain and plays a major part in the brain process. The quanta of this cortical field are described as corticons and are capable of interacting with biomolecules that are also electric dipoles. With this QBD approach to the brain in the cranium, brain made up of atomic constituents can be considered as spatial distribution of quantum electric dipoles. Thus brain is quantum electric dipole field coupled with electromagnetic field (Tarlaci, 2015).

Umezawa, Takahashi and Stuart described a physical process for memory retrieval in the brain. In the quantum electric dipole field, Nambu-Goldstone bosons emerge due to breakage of symmetry triggered by arbitrary small incoming energy (Stuart, 1978). This small energy is created by the wave in the brain according to Planck's constant and frequency of brain wave. If the incoming wave has frequency ν and h is the Planck's constant, then the energy E

Corresponding author: Tapan Das

Address: Tapan Das, Ph.D., P.Eng. 209-2090 Neepawa Avenue, Ottawa, Ontario K2A3M1, Canada.

e-mail ✉ tkdas@rogers.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Received: 23 January 2015; **Revised:** 16 February 2015;

Accepted: 2 March 2015

eISSN 1303-5150



is $h \vartheta$. However, this can be looked in a different way as explained by Roger Penrose and Stuart Hameroff in explaining consciousness (Hameroff *et al.*, 1996). According to them, when the neural correlates of consciousness thoughts become well-formed then quantum jump occurs. In explaining when it should occur. They combined quantum theory with Einstein's theory of gravity.

According to Einstein's theory of gravity (Chaisson, 1990), time is another dimension with space and space-time is a curved structure. The curve depends on the matter distributed in the space-time structure. But according to quantum theory, electron is a probability cloud, hence the location is not clearly defined and that is not acceptable by the theory of relativity. Here Penrose conjectured that when too much ambiguity occurs in the space-time structure a quantum jump occurs to a less ambiguous state. This theory allows him to tie quantum jump to the theory of relativity.

As regards, when the quantum jump occurs he used Planck's constant as follows

$$E = h \vartheta = h/t$$

Where t is the time.

As regards the source of energy E , Penrose proposed gravitational energy between two parts of the divided cloud.

However, in my proposed theory of the creation of Nambu-Goldstone boson, the energy is created by the wave in the brain as mentioned previously according to Planck's constant and frequency of brain wave.

Consciousness is a physical property created by Yukawa coupling, which is an interaction between Nambu-Goldstone scalar field ϕ and electron Dirac field φ . The electrons causing the Dirac field come from axons of the neurons in the brain for a certain event. The Yukawa coupling is given by,

$$V = K \varphi \phi \varphi'$$

Where K is the Yukawa coupling factor and V is the energy transfer due to Yukawa interaction.

The wave function of the $\phi(x)$ of the Nambu-Goldstone boson is given by

$$\phi(x) = \rho(x)e^{i\theta(x)}$$

where $\rho(x)$ is the local density of the condensate and $\theta(x)$ is the phase

The Dirac field for an electron is

$$\varphi = m_e e^{i\omega t}$$

Where m_e is the electron mass

$$\text{Hence } V(x) \approx K m_e^2 \rho(x) e^{i\theta(x)}$$

These energy levels come from different couplings and will have different phases. If we call these energy levels $V(x1)$, $V(x2)$, $V(x3)$, etc..., then these energy levels will form an interference pattern creating an image which is the consciousness created in the brain.

Storage of Consciousness

The image of consciousness created by the interference pattern is stored in a certain location in the brain. This could be similar to microtubular substructure of the neuron as proposed by Hameroff and Penrose (1996; 2003; 2014; Hameroff, 1998; 2001; 2007). Neurons are filled with intricate structure of microtubules. Each microtubule is a cylindrical structure many millimeters long. The surface of the cylinder is formed by a spiral chain of tubular molecules. Each tubulin molecule has a single special electron that can be in one of two stable locations (Zelado *et al.*, 2007). Each stable location should be able to store a bit '0' or '1'. Hence each location of the tubulin molecule can hold a 'bit' of information like computer memory. This may be how the image of consciousness is stored digitally in the microtubular substructures of the neurons in the brain like computer memory.

Conclusion

Consciousness is an image of the interference pattern of the energy levels created by the Yukawa coupling of the scalar fields of Nambu-Goldstone bosons and Dirac field of electrons. Nambu-Goldstone bosons emerge from the quantum electric dipole field of the brain triggered by small energy of brain wave according to Planck's constant and the frequency of the wave. The electrons come from the axons of the neurons. The image of consciousness is stored as binary data in the microtubular structures of the neurons like computer memory.



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