Quantum computation and Schizophrenia

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Abstract: Microtubules in the brain have been associated with quantum computation and consciousness. The microtubules have been reorted to be affected in schizophrenia. Schizophrenia is also associated with hallucinations (auditory, visual etc.). In this paper we propose that quantum computation in the brain may b e altered in the patients with schizophrenia leading to the altered brain frequency and resonance with the parallel universes. This may be the reason for hallucinations experienced by patients with schizophrenia

Keywords: Schizophrenia, Quantum Computation, Parallel Universe, Quantum Hopfield Networks.

Introduction

The Penrose-Hameroff " Orch OR" model proposes that consciousness is a sequence of quantum computations in microtubules with in brain neurons, protected from decoherence to reach threshold for objective reduction (OR). The quantum computations are orchestrated by neuronal/synaptic inputs and extend throughout cortex by tunneling though gap junctions. Each Orch OR is suggested as a conscious event occurring in consonance with the brain physiology. (Hameroff, S. 2006)

Tubulin conformational states and dipoles are regulated by quantum-mechanical London forces within tubulin

molecules (hydrophobic pockets) so that tubulins may exist as quantum superpositions of different conformational states, thus acting as qubits. Proteins may be ideal for behaving as as qubits in terms of being large enough to exert causal efficacy in the macroscopic world and at the same time small enough/ to be regulated by quantum forces. The delicate balance of powerful countervailing forces determining protein conformation in tubulin molecules lends to their functioning as a qubit.

While in superposition, tubulin qubits communicate and compute by entanglement with other tubulin qubits in the same microtubule, other microtubules in the same dendrite and micro tubules in other gap junction connected dendrites. Thus quantum computation occurs among microtubules throughout macroscopic regions of brain via tunneling through gap junctions or other mechanisms such as centriole entanglement (Hameroff, 2004), quantum optical photons and Bose-Einstein condensation.

The tubulin dimer switches between two conformations These are referred to as open and closed states (Melki et al. 1989 Hoenger and Milligan 1997, Ravelli et al. 2004).However studies suggest five possible ligand-induced conformations. In addition to these dynamical states, there is more permanent variability in tubulin as there are 22 different tubulin isozymes in brain besides post translational modifications Thus, intact MTs may be mosaics of slightly different tubulins, allowing dynamical changes to occur.

Hameroff and Watt (1982) suggested that microtubule lattice acted as a two-dimensional computer-like switching matrix with tubulin states influenced by neighboring tubulins, and input/output occurring via MAPs (Microtubule associated proteins). Microtubule information processing potential has been envisaged in the context of cellular automata (Smith et al. 1984, Rasmussen et al. 1990)

A cellular automaton (pl. cellular automata) is a discrete model studied in which It consists of a regular grid of cells, each in one of a finite number of states, such as "On" and "Off". In a two-dimensional checkerboard lattice, each cell has eight neighbours. Neighbor-interaction rules determine each cell's state at the next time step. Microtubules have been envisaged to behave as automata and microtubule automata potentially increase cellular and brain-wide information processing. The interacting MTs have also been modeled as Quantum Hopfield Networks with qubits representing the tubulins and interacting coulombically with each other, at finite temperatures.(Behrman et al. 2006)

Schizophrenia may be associated with altered quantum computation

Schizophrenia is a mental disorder and most commonly manifests as auditory hallucinations, paranoid or bizarre delusions. I have mentioned earlier that scientists have suggested that microtubules in the brain and quantum computation occurring in them are associated with consciousness. I propose that schizophrenia is characterized by alteration in quantum computation in the brain. It has been shown that destabilization of microtubules probably underlie many mental disorders and could be important targets for their cure .For example, the function of the serotonin receptor known as 5-HT1AR is to suppress the activity of the NMDA receptor by coupling to cellular signaling which, in turn, depolymerizes microtubules. The breakup of microtubules, in turn, interrupts NMDAR delivery to the neuronal surface, resulting in suppression of NMDAR function. This study shows that serotonin can regulate NMDAR transport along the microtubule cytoskeleton in neurons. Disruption of this regulation may provide a potential mechanism underlying many mental disorders.(Yuen et al. 2005)

The depolymerization of microtubules may lead to altered Quantum Hopfield network and/or Microtubule automata which may result in altered consciousness. The Quantum Hopfield network may also be altered by structural differences in the brains of patients of schizophrenia. It has been suggested that many people suffering from schizophrenia have less grey matter, and neutral ventricles tend to be larger (Brown, 1986, Karson et al. 1988).

The relationship between the brain and universe

Persinger and Koren (2007) have found many relationships between the physical properties of the human brain and earth as well as the entire universe**.** For example the resonant frequency of the human brain (about 7Hz) is within the same frequency range of the earth . Furthermore Karson et al. (1988) reported that the neural alpha frequency in the brains of patients with schizophrenia is considerably lower than in control groups composed of individuals without schizophrenia. It has been suggested that (1) the human brain functions along a wavelength that is consistent with the wavelength of the entire universe. (2) the brain may have access to a currently immaterial dimension, given appropriate electromagnetic circumstances would allow such information from a universal plane existing throughout time to emerge at an appropriate level of space and time familiarly perceivable to human beings (10^{-2}s),(Irish, K.K., 2010).

Zizzi (Zizzi, P. , 2006) has also proposed that during inflation there was a superposition of universes. The quantum gravity threshold of objective reduction (OR) is reached at the end of inflation, which corresponds to a superposed state of 10^9 quantum registers which is also the number of superposed tubulins- qubits in our brain. These qubits in our brain undergo the orchestrated objective reduction (as proposed by Penrose-Hameroff) leading to a conscious event. (Zizzi, P., 2006).

Parallel Universes

Many-worlds is a theory that asserts the objective reality of the universal wavefunction, but denies the reality of wavefunction collapse, which leads to the conclusion that all possible alternative histories and futures are real —each representing an actual "world"(or "universe" (parallel universes).The original theory was proposed by Hugh Everett in 1957(Everett, H,1956,1957.). Prior to many-worlds, reality had been viewed as a single unfolding history. Many-worlds however views reality as a many-branched tree, wherein every possible quantum outcome is realized.

The theory's main conclusion is that the multiverse is composed of a quantum superposition of very many, possibly even non-denumerably infinitely many, increasingly divergent, non-communicating parallel universes or quantum worlds. (Zeh, H.D. 1970)

The Concluding Hypothesis

As has been mentioned earlier in this article the brain frequency of the patients suffering from schizophrenia is different from that of normal persons. In this article we have suggested earlier that quantum computation in the microtubules of brain is altered in the patients with schizophrenia. Since these microtubules have been suggested to act as automata and/or Quantum Hopfield networks the output of these automata/networks will possibly be different in patients with schizophrenia. This in turn may lead to the altered brain frequency in patients with schizophrenia (see above) . Thus the brain frequency of the patients with schizophrenia may possibly resonate with the frequency of a parallel universe in contrast to the normal persons, which leads to the hallucinations in patients with schizophrenia.

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