

A NEGENTROPIC QUANTUM MODEL OF MENTAL AROUSAL

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Abstract

The present quantum approaches to mind-brain interaction can be roughly separated into three groups, based on the initial assumptions: *quantum mechanics of microscopic states* (e.g. quantum probabilities at microsites [1], field-dipole quantum interaction [2, 3]), *quantum field theory of macroscopic states* (e.g. photon-corticon dynamics [4], quantum coherence in microtubules [5, 6]) and *some new quantum physics* (e.g. virtual photons as carriers [7]). Reviewing these approaches, it can be inferred that practically all of them identify the electric field and cortical dipoles as crucial elements of neural-mental relationship. Consequently, in this paper a negentropic quantum model of mental arousal is proposed, correlating the levels of arousal with the spectra of dipole quantum transitions and the corresponding information entropy variation. The resulting analytical expression for mental arousal appeared to be consistent with the empirical data [8]. In its normalized form, the obtained expression may serve as a quantitative measure of general operation of consciousness, relating it to electric neuronal frequencies. Besides, an explanation why the quiet waking, “eyes closed”, mental state is normally characterized by alpha band is provided.

References:

- [1] J. C. Eccles, *Proc. R. Soc. Lond., B*, **227**, 1986.
- [2] J. Pop-Jordanov, E. Solov'ev, N. Pop-Jordanova, N. Markovska, D. Dimitrovski, *International Journal of Psychophysiology*, **30**, 1-2, 1998.
- [3] D. Dimitrovski, J. Pop-Jordanov, N. Pop-Jordanova, E.A. Solov'ev, *Information sciences: An International Journal*, **168**, 1-4, 2004.
- [4] M. Jibu, K. Yasue, *Quantum Brain Dynamics and Consciousness*, John Benjamins, 1995.
- [5] R. Penrose, S. R. Hameroff, *Journal of Consciousness Studies*, **2**, 98-111, 1995.
- [6] S. Hagan, S. R. Hameroff, J. A. Tuszynski, *Phys. Rev. E*, **65**, 2002.
- [7] H. Romijn, *Journal of Consciousness Studies*, **9**, 1, 2002.
- [8] T. C. Pritchard, K. D. Alloway, *Medical Neuroscience*, Frence Greek Publishing, LLC, Madison, Connecticut, 1999, p. 397.