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The art of encephalography and cinematic spatio-temporal pattern visualization to gain insight into brain dynamics associated with different cognitive states

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This presentation is inspired by the work of Walter J Freeman on brain field dynamics and its implications in the understanding of cognitive functions, intentional action and decision-making. The main purpose is to present a novel way of applying the art of encephalography. We have moved from the mere plotting of brain signals in the time domain to spatio-temporal frames that produce a brain dynamics movie with power to give us different visual patterns of behavior in various conditions based on experimental data produced by different stimuli. The methodology of brain movie making is briefly described to explain how massive quantities of brain data images are processed to produce the movies which are then displayed to visually discriminate between different cognitive states, as well as the distinct stages of cognitive processes related to the cycle of creation of knowledge and meaning so vital for decision-making. It is proposed that careful observation of each of these movies will facilitate a learning process, in order to: 1. identify different structures and visual patterns where large-scale synchronizations and desynchronizations are observed together with the temporal evolution of the different stages of the hypothesized cycle of creation of knowledge and meaning and 2. to facilitate the study of brain dynamics across different frequency bands with the aid of different indices like the pragmatic information index which is based on the instantaneous phase and the analytic amplitude. To summarize, the art of encephalography enhanced by brain dynamics movies allows us to identify brain patterns and events associated with different measurements across bands and the various stages of the cycle of creation of knowledge and meaning.

Biography

Joshua graduated as a Systems Engineer with emphasis in systems simulation, optimization and decision analysis in 1985. In Caracas-Venezuela, he was staff to the strategic planning Vice-President of Union Bank S.A.C.A. between 1986 and 1988. He became a consultant for the oil industry together with the firm Sercontec C.A. between the years 1988 and 1991. He was co-founder and Director of BDS (Banking Decision Services C.A.) in between 1991 and 1994. Between 1986 and 1993, he taught systems simulation, decision analysis, time series analysis, systems dynamics, system concepts and mathematical modeling at the Universidad Metropolitana (Metropolitan University) where he supervised seven (7) thesis projects, most of them simulation models and decision support systems. In 2009 he completed a Master's thesis in Cognitive Neuroscience, by the name of "The Brain of Melchizedek" at Otago University in New Zealand. Since 2011, he travelled to different nations in his capacity of Ambassador of Peace, delivering seminars, TV interviews, radio talks and conferences to large audiences at universities, medical clubs and hospitals about the integration between Scientific Knowledge and Spiritual Wisdom. He has also been engaged in research in systems cognitive neuroscience since 2012, co-authoring several publications including work in brain dynamics, applied mathematics, systems modeling and philosophy concerning the understanding of human consciousness, the creation of knowledge and meaning and values based decision making. In 2015 he led the research group at The Embassy of Peace in Whitianga, New Zealand for the International Synchronization Heart Rate Variability (HRV) Study conducted by the HeartMath Institute. Recently, he has also authored and co-authored several publications both in the Journal of Consciousness Exploration & Research and in the Scientific GOD Journal. Currently, he is in preparation for the completion of a PhD dissertation on matters related to human consciousness and the biophysics of brain dynamics.

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