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in honor of Walter J. Freeman III

CONTENTS AND ABSTRACTS:

Abstract: *Walter Freeman's work emphasises the role of individual activity and intentionality as opposed to the traditional stimulus-reaction view and the machine metaphor. The results of our computer modeling studies suggest the nonlinear dynamics of experience emerging from perception-action cycles. We consider the perception-action cycle as a behavioral continuum of anticipated outcomes of actions. Neuroscientific research shows that each behavioral act is based on the activity of behaviorally specialized neurons distributed across the brain. Active learning during individual development leads to an increasing differentiation of the structure of individual experience through the formation of such groups of behaviorally specialized neurons. We consider the differentiation of individual experience as a nonlinear process which is implemented at different levels, and argue that consciousness and emotion can be described as dynamic characteristics prominent at the most and least differentiated systemic levels, correspondingly.*

Abstract: *Walter Freeman III pioneered the application of nonlinear dynamical systems theories and methodologies in his work on mesoscopic brain dynamics.Sadly, mainstream psychology and psychiatry still cling to linear correlation based data analysis techniques, which threaten to subvert the process of experimentation and theory building. In order to progress, it is necessary to develop tools capable of managing the stochastic complexity of complex biopsychosocial systems, which includes multilevel feedback relationships, nonlinear interactions, chaotic dynamics and adaptability. In addition, however, these systems exhibit intrinsic randomness, non-Gaussian probability distributions, non-stationarity, contextuality, and non-Kolmogorov probabilities, as well as the absence of mean and/or variance and conditional probabilities. These properties and their implications for statistical analysis are discussed. An alternative approach, the Process Algebra approach, is described. It is a generative model, capable of generating non-Kolmogorov probabilities. It has proven useful in addressing fundamental problems in quantum mechanics and in the modeling of developing psychosocial systems.*

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Applying the Neurodynamics of Emotional Circular Causalities in Psychosocial and Cognitive Therapy using Multi-Sensory Environments: An ORBDE Case Study Analysis

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Abstract: *This exploratory, evidence-based practice research study focuses on presenting a plausible mesoscopic brain dynamics hypothesis for the benefits of treating clients with psychosocial and cognitive challenges using a mindful therapeutic approach and multi-sensory environments. After an extensive neuroscientific review of the therapeutic benefits of mindfulness, a multi-sensory environment is presented as a window of therapeutic opportunity to more quickly and efficiently facilitate the neurobiological experience of becoming more mindful or conscious of self and environment. The complementary relationship between the default mode network and the executive attention network is offered as a neurobiological hypothesis that could explain positive occupational engagement pattern shifts in a case study video of a hospice client with advanced dementia during multi-sensory environment treatment. Orbital Decomposition is used for a video analysis that shows a significant behavioral pattern shift consistent with dampening of the perceptual system attractors that contribute to negative emotional circular causalities in a variety of client populations. This treatment approach may also prove to be valuable for any person who has developed circular causalities due to feelings of isolation, victimization, or abuse. A case is made for broader applications of this intervention that may positively influence perception during the information transfer and processing of hippocampal learning. Future research is called for to determine if positive affective, interpersonal, and occupational engagement pattern shifts during treatment are related to the improved default mode network-executive attention network synchrony characteristic of increased mindfulness.*

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Comparing the Cognitive Process of Circular Causality in Two Patients with Strokes through Qualitative Analysis

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Abstract: *Walter J. Freeman pioneered the neurodynamic model of brain activity when he described the brain dynamics for cognitive information transfer as the process of circular causality at intention, meaning, and perception (IMP) levels. This view contributed substantially to establishment of the Intention, Meaning, and Perception Model of Neuro-occupation in occupational therapy. As described by the model, IMP levels are three components of the brain dynamics system, with nonlinear connections that enable cognitive function to be processed in a circular causality fashion, known as Cognitive Process of Circular Causality (CPCC). Although considerable research has been devoted to study the brain dynamics by sophisticated computerized imaging techniques, less attention has been paid to study it through investigating the adaptation process of thoughts and behaviors. To explore how CPCC manifested thinking and behavioral patterns, a qualitative case study was conducted on two matched female participants with strokes, who were of comparable ages, affected sides, and other characteristics, except for their resilience and motivational behaviors. CPCC was compared by matrix analysis between two participants, using content analysis with pre-determined categories. Different patterns of thinking and behavior may have happened, due to disparate regulation of CPCC between two participants.*