



主催: 北海道大学数学教室・
数学COEプログラム
協賛: 電子科学研究所
脳科学研究教育センター

Walter J Freeman 学術講演会

日時: 10月11日(火) 13:30 ~ 15:00
会場: 北海道大学電子科学研究所 講堂

(札幌市北区北12条西6丁目)

タイトル: Recent advances in the dynamics of EEG

アブストラクト:

Brains are characterized by every property that engineers and computer scientists detest and avoid. They are chaotic, unstable, nonlinear, nonstationary, non-Gaussian, asynchronous, noisy, and unpredictable in fine grain, yet undeniably they are among the most systems that a billion years of evolution has produced. No one can justifiably claim that he or she has modeled brains, but they are a flowing spring of new concepts, and they provide a standard of what we hope to accomplish in developing more intelligent machines. The most fertile source of ideas with which to overcome the restrictions that characterize modern engineering practice is the electroencephalogram (EEG). In the 20th century it was the action potential of single neurons that provided the foundation of neurobiology; it supported the development of digital computers, neural networks, and computational neuroscience. Now in the 21st century, the EEG will lead us in a very different direction of growth of information technology, which will be dominated by dynamic, hierarchically organized, distributed analog machines. These devices now exist in prototypic models of cortex, in which populations of neurons generate background activity that resembles white noise. This positive bias supports of chaotic oscillations that serve as carrier waves for spatial patterns of amplitude modulation. Measurement of the AM patterns provides an order parameter, which maps trajectories of brain activity through brain state space that are governed by the attractor ruins described by Tsuda. The AM patterns recur in stationary frames that superimpose in multiple overlapping sequences that support the cognitive functions of cortex. The transitions by which the AM patterns form are characterized as spontaneous breakdown of symmetry, and the multiplicity of AM patterns is described as a collection of ground states that is constructed by the chaotic dynamics of cortex through learning.

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経歴:

1954- イェール大学医学部 ニューヘブン病院 病理学科インターン
1967- カリフォルニア大学バークレー校 生理・解剖学科 学科長
同校 神経生物学科 教授
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著書:

"Mass Action in the Nervous System" (Academic Press, 1975)
"Societies of Brains" (Lawrence Erlbaum, 1995)
"How Brains Make Up Their Minds" (Weidenfeld & Nicolson, 1999; Columbia U.P., 2001)
"Reclaiming Cognition" [with Núñez R, editors] (Thorverton UK: Imprint Academic, 1999)
"Neurodynamics: An Exploration of Mesoscopic Brain Dynamics" (Springer, 2000)

受賞:

1991 MERIT 賞、National Institute of Mental Health(NIMH)
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