

Neurocomputational Oscillation for Cognitive Modeling

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Abstract: The emerging research interest on neural oscillation in neuroscience has resulted in an ever-increasing number of studies on various cognitive and neuro-developmental phenomena. There is, now, evidence linking brain physiological descriptions with certain phenotypes in normal and atypical behavior, involving neural oscillation. Case studies include brain disorders, such as autism and schizophrenia, as well as limitations in working memory capacity and its executive control.

There is research under way, conducted principally by the author, to establish an exegetic framework, under which neural oscillation can be implemented in neurocomputational models by using self-organizing maps (SOMs). It is claimed that the mechanism of biological lateral inhibition in brain cortical maps, central to a number of neuropsychological theories, could be implemented with higher biological plausibility using a SOM network with an oscillating -rather than a standard- topological neighborhood. Computational models and simulations demonstrate a significant functional equivalence between oscillating and standard SOM implementations.