Chaotic Itinerancy in the Cortical Gap Junction Systems Can Mediate Cognitive Function

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One of the authors (I.T.) have proposed a nonstationary itinerant motion in high-dimensional dynamical systems as one of adequate languages (in the sense of Gelfund) for making a bridge between cortical and cognitive functions. A typical dynamic behavior has been provided by "chaotic itinerancy". On the other hand, the other author (H.F.) has proposed an interpretation of cortical dynamically nonstationary motion in terms of dynamic cell assemblies.

We have discussed the possibility of an amalgamation of these two ideas to obtain a sufficient understanding of the correlations between the cortical complex behavior and cognitive function. Recently, the cortical gap-junction systems are highlighted because of its ubiquity. We got an idea that chaotic itinerancy can be connected with dynamic cell assemblies through this system.

In the present talk, we present some examples of chaotic itinerancy-like behavior numerically observed in a model gap-junction system. This computation results may give a neural basis of category formation and hence a formation of episode.