The Effect of Inhomogeneous Connectivity on Higher-Order Correlations

Yasuhiko Igarashi[1] and Masato Okada[1,2]

[1]*Graduate School of Frontier Sciences, The University of Tokyo, Japan.*
[2]*RIKEN Brain Science Institute, Japan.*

It is widely acknowledged that dependencies among cells determine the detailed nature of a neural population code, namely, the manner in which information is represented by specific patterns of spiking and silence over a group of neurons. Ko *et al*. have reported that connectivity between neighbouring neurons is specifically structured, which affected the firing rates and neural correlations [1]. It would appear that these structured neural connectivities in V1 also affects the structure of higher-order correlations in neuronal firing.

Here, we expanded the previous theoretical framework to higher-order correlations in a parsimonious structured network with common inputs and spiking non-linearities as a model of orientation selectivity [2]. We found that the inhomogeneous mean inputs modulate the spiking nonlinearity to result in the structured higher-order correlations and heterogeneous structure of the network can dynamically control the structure of 3rd-order correlations and can generate both sparse and synchronized neural activity[3,4], and proposed a decisive experiment to test the effect of inhomogeneous connectivity on higher-order correlations.

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