

# Higher-order Correlation in a Feed-forward Network with Inhomogeneous Connectivity

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We investigated a parsimonious structured network with common inputs and spiking non-linearities. Unlike a homogeneous network [1], a network with heterogeneous connections can provide not only a tuning curve of firing rates but also a relationship among the statistics gathered from neurophysiological experiments in the primary visual cortex[2,3]. We found that the heterogeneous structure of the network can dynamically control the structure of 3rd-order correlations and can generate both sparse and synchronized neural activity, and proposed a decisive experiment to test the effect of inhomogeneous connectivity on higher-order correlations. These theoretical results indicate that the 3rd-order correlations resulting from visual stimulation can carry stimulus-specific information.

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[3] I. E. Ohiorhenuan and J. D. Victor, *J. Comput. Neurosci.*, **30**(1), 125 (2011).