

Abstract Submitted
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Can correlations among receptors affect the information about the stimulus?¹ VIJAY SINGH, MARTIN TCHERNOOKOV, ILYA NEMENMAN, Emory University, Atlanta, GA — In the context of neural information processing, it has been observed that, compared to the case of independent receptors, correlated receptors can often carry more information about the stimulus. We explore similar ideas in the context of molecular information processing, analyzing a cell with receptors whose activity is intrinsically negatively correlated because they compete for the same ligand molecules. We show analytically that, in case the involved biochemical interactions are linear, the information between the number of molecules captured by the receptors and the ligand concentration does not depend on correlations among the receptors. For a nonlinear kinetic network, correlations similarly do not change the amount of information for observation times much shorter or much longer than the characteristic time scale of ligand molecule binding and unbinding. However, at intermediate times, correlations can increase the amount of available information.

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Vijay Singh
Emory University, Atlanta, GA

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