On the topic of: The Orchestral Brain: High-Fidelity Coding With Correlated Neurons

ELSC & ICNC cordially invite you
to the lecture given by:

**Rava da Silveira**
École Normale Supérieure, Paris, France

On the topic of:
"The Orchestral Brain: High-Fidelity Coding With Correlated Neurons"

The lecture will be held on Thursday, January 24, 2013
at 17:00, at ELSC-ICNC: Silverman Bldg., 3rd Wing, 6th Floor, Edmond J. Safra Campus

Light refreshments at 16:45

Abstract:

While single-cell activity may be well correlated with simple aspects of sensory stimuli, rich stimuli or subtly differing stimuli require concomitant coding by several neurons in a population. It is then natural to ask whether the nature of the coding is 'orchestral' in that it relies upon correlation and physiological diversity among cells. Positive correlations in the activity of neurons are widely observed in the brain and previous studies stipulate that these are at best marginally favorable, if not detrimental, to the fidelity of population codes, compared to independent codes. Here, we put forth a scenario in which positive correlations can enhance coding performance by astronomical factors. Specifically, the probability of discrimination error can be suppressed by many orders of magnitude. Likewise, the number of stimuli encoded—the capacity—can be enhanced by similarly large factors. These effects do not necessitate unrealistic correlation values and can occur for populations with as little as a few tens of neurons. The scenario relies upon 'lock-in' patterns of activity with which correlation relegates the noise in irrelevant modes. We further demonstrate that, quite generically, coding fidelity is enhanced by physiological heterogeneity. Finally, we formulate heuristic arguments as to the plausibility of 'lock-in' patterns and possible experimental tests of the theoretical proposal.
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