
*Thursday, December 5th, 2013
13h45, Room SG 0213*

Computational Neuroscience Seminar

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**Efficient Coding and Balanced Networks:
A Unification**

The principle of efficient coding has been quite successful in explaining the tuning of neurons to sensory stimuli across a diversity of systems (e.g. work by Olshausen & Field, Smith & Lewicki, Salinas, among others). Balanced networks have been successful in providing mechanistic explanations for the irregularity of firing in neural systems, and have led to the subsequent experimental verification of a balance between inhibitory and excitatory conductances (e.g. work by Shadlen & Newsome, van Vreeswijk & Sompolinsky, Brunel, etc.)

We here show that both theories can be derived from a single principle: efficient coding with spikes. The unification requires some modifications and reinterpretations, which we will discuss, and has several implications. Specifically, we will show that our theory predicts instantaneous changes in the tuning of neurons when part of a circuit is perturbed or knocked out, leading to an immediate restoration of function. The limits of this restoration depend on the nature of the disruption.

[Joint work with David Barrett and Sophie Deneve.]