
*Wednesday, August 29th, 2012
12h15, Room SV 2510*

Computational Neuroscience Seminar

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Optimality in sensory representations

The idea of optimality has long been used to study sensory coding, both as a practical experimental strategy and as a general principle for brain organizations. I'll review some new results from several lines of research related to optimality arguments in the sensory systems, including the search for the optimal stimulus, the optimal experimental design approach, and information-maximization of the population codes. The optimal stimulus, which maximizes the neural response, is often hard to find for high-level sensory neurons and its existence turns out to depend on the degeneracy of the weight matrices of the underlying neural network. The optimal experimental design, a model-based online adaptive method that seeks to maximize information about the assumed models, can be used to speed up model estimation as well as model comparison. Information-maximization theory provides a natural interpretation of many observed results, for example, why neurons may sometimes over-represent stimulus features that rarely occur in nature instead of those features that are common. I'll compare the theories with neurophysiological data from both the visual system and the auditory system of awake primates.