LABORATORY OF COMPUTATIONAL NEUROSCIENCE (LCN)

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Thursday, October 9th, 2014
13h30, Room AAC 132

Computational Neuroscience Seminar

Albert COMPTE,
Theoretical Neurobiology of Cortical Circuits,
IDIBAPS, Barcelona

Bump attractor dynamics explains behavioral precision in spatial working memory: neurophysiology and psychophysics

Prefrontal persistent activity during the delay of spatial working memory tasks is thought to maintain spatial location in memory. A “bump attractor” computational model can account for this physiology and its relation to behavior. However, direct experimental evidence for such bump representation of memorized location is still lacking. Here, we test model-derived predictions in PFC responses and in human psychophysical responses in these tasks. We confirm predictive relationships between the variability of prefrontal activity in the delay and the fine details of recalled spatial location, evident in trial-to-trial imprecise oculomotor responses. Furthermore, we find behavioral evidence for attraction of memorized adjacent locations, as expected in a model with multiple bump attractors. The results support a diffusing bump representation for spatial working memory maintenance instantiated in persistent prefrontal activity. The findings reinforce persistent activity as a basis for spatial working memory, provide evidence for a continuous prefrontal representation of memorized space, and offer experimental support for bump attractor dynamics mediating cognitive tasks in the cortex.