brain+cognitive sciences

2008 Spring Colloquium Series

Speaker	Rufin Vogels, Katholieke Universiteit Leuven
Time	4pm, Departmental Tea immediately following.
Date	Friday, 8 February 2008
Place	BCS Auditorium, 46-3002
Title	Stimulus selective adaptation in macaque inferior temporal neurons: fMRI, Local field potentials and spiking activity.

Abstract:
Repetition of a stimulus reduces the response in many cortical areas. This adaptation effect has been observed at the single cell level in macaques as well as in fMRI signals in humans. This adaptation effect has been used in fMR-Adaptation (fMR-A) studies to infer neuronal stimulus selectivities in human cortex. Inferring neuronal selectivities from fMR-A, however, requires an understanding of the relationship between the stimulus selectivity of neuronal adaptation and responses, which can be studied by measuring directly neuronal activity in monkeys. We demonstrated that monkeys show fMRI adaptation in inferior temporal (IT) cortex using the same adaptation protocol and visual stimuli as in human fMRI. Subsequently, we recorded spiking activity in the IT region of macaques that shows fMRI adaptation, investigating the relationship between stimulus selectivity of adaptation and responses. As expected, repetition of identical object images reduced the spiking activity of single IT neurons. Presentation of an image to which the neuron was unresponsive did not alter the response to a subsequent image that activated the neuron. Successive presentation of two different images to which the neuron responded similarly produced adaptation, but less so than the repeated presentation of an image. Thus neuronal adaptation at the single cell level showed a greater degree of stimulus selectivity than the responses. Furthermore, we measured the effect of adaptation on the shape tuning of spiking activity and local field potentials in macaque IT cortex. For both neuronal activity measures, the degree of shape tuning was unaffected by adaptation. The adaptation effect was greater when repeating a less effective shape than when that shape followed the most effective one, indicating that the degree of adaptation depends on the relation between test and adapter shape and not only on the response to the adapter. I will discuss the implications of these findings for mechanisms of adaptation as well as for the interpretation of fMR-A data.