ELSC-ICNC Seminar: Robert M. Shapley

March 18, 2012

On the topic of: "Inadequacy of the receptive field concept in the visual cortex"

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

**Robert M. Shapley**  
Natalie Clews Spencer Professor of the Sciences  
Center for Neural Science, New York University, USA

On the topic of:

"Inadequacy of the receptive field concept in the visual cortex"

The lecture will be held on Sunday, March 18, 2012  
at 17:00, at ELSC-ICNC: Silverman Bldg., 3rd Wing, 6th Floor, Edmond J. Safra Campus  
Light refreshments at 16:45
Abstract:

Neurons in the primary visual cortex, V1, are often modeled with an L-N-P [dynamic Linear filter ? static Nonlinearity ? Poisson spike encoder] model. The LNP model predicts that receptive fields should be invariant with different stimulus ensembles. This is equivalent to what we've called the Receptive Field Hypothesis (RFH): that the responses of a visual neuron to any visual stimulus can be predicted from the neuron's receptive field. We tested the RFH by comparing spatio-temporal maps of V1 neurons estimated from two commonly used stimulus ensembles: sparse noise and Hartley subspace stimuli (a particular set of sine gratings). Spatial maps from the two methods agreed for neurons in the input layer 4C but were very different for neurons in superficial layers of V1. Many layer 2/3 cells have receptive fields with multiple elongated subregions when mapped with Hartley stimuli, but their spatial maps collapse to only a single, less-elongated subregion when mapped with sparse noise. Quantitative tests of similarity reveal very low similarity between Hartley and sparse noise maps in layer 2/3 neurons. These results challenge the RFH and imply that intracortical interactions shape basic visual properties of layer 2/3 neurons.

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