brain+cognitive sciences   MIT

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December 23, 2003

Biocomplexity Faculty Search Committee
c/o Professor Rob de Ruyter van Steveninck
Biocomplexity Institute
Indiana University
Swain Hall West 117
Bloomington, IN 47405-7105

Dear Professor de Ruyter van Steveninck:

It is a pleasure to write on behalf of Dr. Dezhe Jin, who has applied for a position in your
department. Dezhe is a postdoctoral fellow with my colleague Sebastian Seung. Sebastian's
lab and mine have a collaboration on analysis and modeling of response plasticity and
dynamics in primary visual cortex. My laboratory has shown, in several papers during the past
3 years, that responses of neurons in primary visual cortex can show a remarkable plasticity of
orientation tuning: brief adaptation for a few seconds to minutes with a particular orientation
alters the selectivity of neurons for a short time, in a reversible manner. More recently, we
showed that such plasticity can be very rapid indeed, and can be triggered by even the few
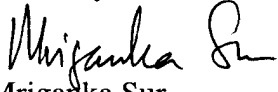hundreds of msec that the eyes rest on one part of a scene.

One issue is to reconcile the magnitude and direction of response change with the perceptual
shifts. Dezhe has come up with interesting explanations for the phenomena. We have
submitted a paper together describing how the neuronal responses explain well the adaptation-
induced perceptual effects. Dezhe also has a deep understanding of nonlinear dynamics and
phase-space approaches, and has applied these insights to network dynamics of visual cortex
neurons.

In another collaboration, Dezhe has worked with my lab to describe how multiple parameters
can be mapped on to visual cortex. Dimension-reduction models of the visual cortex have a
long history going back at least to Kohonen, but several aspects of these models have
remained unclear and have even been questioned recently. Dezhe developed a detailed
dimension-reduction model in which the mapping of visual space was the starting point, and
his model then described how other maps, such as those of orientation, ocular dominance, and
spatial frequency, would be constrained by the visual map and have predictable relationships
with each other at specific locations of the map. Using optical imaging and single cell
recording, my lab has shown that indeed maps in ferret and cat visual cortex follow the
detailed predictions of the model. I believe this is a significant advance in our understanding
of cortical organization. Again, Dezhe is part of a paper that we have submitted on these
findings.

Dezhe has several other projects ongoing, and is extremely bright and energetic. He has the
potential to be an important contributor to a theoretical understanding of neural networks and

brain organization. He is ready to be a faculty member in a research university of the first rank, and has my most enthusiastic recommendation.

Sincerely,

Mriganka Sur
Fairchild Professor of Neuroscience
Head, Department of Brain and Cognitive Sciences