TWO (EXP+THEORY) POSTDOCTORAL FELLOWSHIPS IN SYSTEMS NEUROSCIENCE
Perceptual decision-making in a probabilistic inference framework

The laboratories of Rick Born in the Dept. of Neurobiology at Harvard Medical School, and Ralf Haefner in the Dept. of Brain & Cognitive Science at University of Rochester, are seeking applications for two NIH-funded postdoctoral fellowships to study the role of top-down connections in conveying learned priors within a theoretical framework of perception as probabilistic inference. Specific projects will address the neural bases of multi-tasking and confirmation bias. Experimental techniques include population recordings from area V1 with and without cortical feedback inactivated by cooling V2/3. Data analysis techniques include applying latent-state inference methods. Theoretical work will involve generating empirically testable predictions using sampling-based and variational techniques applied to probabilistic models.

The successful candidates will interact extensively with each other, both PIs and their labs. Please visit the lab web sites (Born Lab & Haefner Lab) to obtain more information on current interests and electronic versions of recent research papers. Preliminary results from a closely related project on learning can be found here.

Multi-electrode array recordings in V1 during reversible inactivation of cortico-cortical feedback from V2/V3.

a. Intraoperative photograph taken from behind the head showing placement of 3 cryoloops within the lunate sulcus of the right hemisphere and a 10x10 multi-electrode array (3.6 x 3.6 mm) just below in the V1 operculum. b. Receptive fields for each of the 96 channels in the array along with its preferred orientation, superimposed on the visual stimulus that the monkey uses to report which of two orientations are present. c. Hierarchical model for Bayesian inference in visual cortex. We hypothesize that V1 neurons compute posterior beliefs concerning the orientation of a noisy stimulus by combining bottom-up information from the retina (likelihood) with task-relevant information (priors) communicated by feedback connections.

The ideal candidate for the experimental position will have experience in one or more of the following areas: training nonhuman primates, extracellular electrophysiology, reversible inactivation of cortex, MATLAB programming. Candidates with a computational neuroscience background and an interest in visual processing will also be considered.

Candidates for the theoretical position should have strong quantitative and programming skills, ideally (but not necessarily) with experience in computational neuroscience and probabilistic modeling.

Salary will be commensurate with experience according to the current NIH scale. **Please send curriculum vitae, statement of research interests, up to three reprints, and a minimum of two letters of recommendation** to either richard_born@hms.harvard.edu or rhaefne2@ur.rochester.edu.

Harvard Medical School and University of Rochester are Affirmative Action/Equal Opportunity Employers. Applications from minorities and women are especially encouraged.