

354.6

**A developmental model of map registration in the Superior colliculus using predictive hebbian learning** A. Pouget\*, P.R. Montague, P. Dayan, and T.J. Sejnowski. The Salk Institute, La Jolla, CA 92037.

The deep layers of superior colliculus are believed to encode the amplitude and direction of saccadic eye movements in motor coordinates. As demonstrated by Jay and Sparks, and Groh and Sparks, the position of sensory targets, whether visual, auditory or somesthetic, is cast into this reference frame regardless of the original sensory coordinates.

These sensory-motor transformations seem to involve a cortical loop either through the prefrontal cortex or through the posterior parietal cortex, two polysensory regions that project strongly to the superior colliculus. We present a model in which an appropriate cortical representation as well as the weights between the cortex and the superior colliculus are learned using a predictive form of the hebb rule for synaptic plasticity that is only activated when there is a failure to predict reinforcing stimuli. During training, units in the model develop response properties consistent with the ones reported in the prefrontal and parietal cortices.

Previous models have used either biologically implausible optimization procedures or reinforcement learning in networks with hand-crafted weights. Our model demonstrates that it is possible for the brain to learn complex sensory-motor transformations without any need for detailed supervision or a priori knowledge of the task.