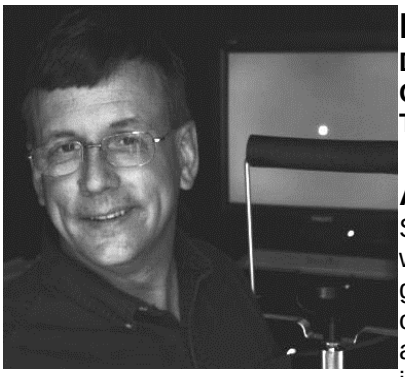
COLLOQUIUM SERIES

TITLE: Experience - dependent changes in behavior and brain state: Capacity and efficiency in visual perceptual learning

Date: March 13, 2009
Location: Somerville House, Room 3345
Time: 3:00 - 4:00 p.m.

(Please join us after the talk for light refreshments.)



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Abstract:

Studies of visual perceptual learning have documented the extent to which basic perceptual abilities, such as contrast detection, can improve given systematic practice. The majority of these studies have focused on reductions in detection and identification threshold. Recently, Blaha and Townsend demonstrated perceptual practice can produce large improvements in perceptual capacity, measured as the total work per unit time, quantified at the level of the integrated hazard function of the response time (RT) distribution. In addition, their results strongly suggested the increase in capacity was indicative of a strong perceptual organization. The present effort had three goals: (a) replicate the large improvements in capacity documented by Blaha and Townsend using measures based on RTs, (b) relate those improvements to improvements in measures based on response frequencies (specifically, detection thresholds), and (c) relate both types of improvements to changes in measures based on scalp-level EEG. Six observers began by performing a detection task with a contrast-defined pattern. Contrast levels were supra-threshold and the stimulus was split vertically into two halves. Each half of the stimulus could be present or absent. Half of the observers were instructed to give a positive response if they detected one or both halves present. Remaining observers were instructed to give a positive response only if they detected both halves present. EEG, RT and response choice were recorded. Following the initial session, observers completed 10 days of perceptual practice with the stimulus pattern and threshold changes were recorded. Finally, observers completed an additional set of detection blocks in which EEG, RT, and response choices were again recorded. Critical results were (a) large and reliable reductions in detection thresholds, (b) large and reliable increases in capacity, and (c) large changes in ERP amplitudes and latencies. Results are interpreted with respect to implications for cortical efficiency in perceptual learning.

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