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PhD Dissertation Announcement

Dynamics of Feature Processing for Static and Moving Objects in the Human Visual System

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Neurophysiological studies indicate that different stimulus features are processed to a large extent within different anatomical areas in the visual system and that neurons in distinct areas differ in their dynamical properties. Our broad, long term goal is to understand the computational basis of spatio-temporally distributed processing dynamics of the visual system in order to address how the visual system computes in concert different features of an object and how features are attributed to the appropriate objects in the presence of spatio-temporal ambiguities. Particularly, we investigated temporal dynamics of three basic stimulus features: *(i)* contour (boundary), *(ii)* surface (brightness), and *(iii)* position. The combined results of our masking and simulation (RECOD) results indicate that surface and contour features are computed by separate cortical processes and the temporal response characteristics of these two processes are distinct with the contour process having a shorter latency than the brightness process. Additionally, our paracontrast results support the existence not only prolonged inhibitory effects but also facilitatory effects and we propose three processes involved in paracontrast masking: Brief inhibition, facilitation and prolonged inhibition. Moreover, flash-lag experiments suggest an increase in the visual latency of position processing when there is 2-D motion and this latency increase is attributed to an increase in the complexity in motion integration when horizontal motion is combined with vertical expansion or contraction. Overall, results presented in this dissertation highlight the importance of processing latencies and perceptual asynchronies in the visual system and the relative timing of different stimulus attributes at the perceptual level can be different from their physical timing.

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Place: N355, Engineering Building 1
Date: November 19th 2007
Time: 2:00pm-3:30pm