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1998 Annual Meeting
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See list of themes and topics, pp. 17-18. Indicate below a first and second choice appropriate for programming and publishing your paper.

1st theme title: SENSORY SYSTEMS
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Key Words: (see instructions p. 4)

AN fMRI INVESTIGATION OF SECOND-ORDER VISUAL MOTION PROCESSING WITH ATTENTIONAL MODULATION. D.C. Somers^{*,†,‡}, A.E. Seiffert[§], A.M. Dale[†], R.B.H. Tootell[†], MGH-NMR Center[†], Charlestown, MA, Dept. of Brain & Cognitive Sciences[†], MIT, and Dept. of Psychology[§], Harvard Univ., Cambridge, MA.

The human neural substrates that support processing of non-luminance defined or "second-order" motion and spatial attention to motion were explored using fMRI (3T GE Signa; 4x3x3mm). Data were analyzed in a flattened cortical format and areas V1,V2,V3,VP,V4v, and MT/MST were functionally labeled. Subjects viewed luminance-based (1st-order) and texture-based (2nd-order) moving and static stimuli. ~~The strongest activation (motion vs. static) for 1st- and 2nd-order motion each occurred within areas MT/MST and V3A. Stimulus saliency for the two types of motion was equated by setting contrasts to approximately 10X standard threshold (1st:10%; 2nd:25%). This saliency matching of motion stimuli was reflected in the well-matched activation (motion vs. fixation) observed for both motion types in all labeled cortical areas. Matched activation does not simply reflect saturation, as flicker patterns of the same spatial extent produced stronger activations in all areas. Static 2nd-order patterns (vs. fixation) activated all areas more strongly than static 1st-order patterns, except in MT/MST which had little static activation. Together, these results reflect the psychophysical requirement that second-order motion be of higher contrast than first-order motion to achieve the same perceptual salience, and suggest that processing of both motion types share common neural substrates.~~

To explore attentional effects, a 1-back task was performed alternately on motion direction or on the identity of a rapid stream of foveal letters (~ 1° high, 4-5/sec). Both stimuli were always present. Attentional modulation for motion (attend motion vs. attend letters) was strongest in V3A, V3, and VP. Attention to motion produced strong modulation (~ 1%) in all labeled visual cortical areas except MT/MST. Unlike a recent report (Rees et al., Science 278:1616), here MT activation (vs. fixation) was ~~observed to remain robust even under the high attentional load distraction task.~~

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