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SECOND-ORDER MOTION STIMULUS-INDUCED ACTIVATION AND ATTENTIONAL MODULATION OF HUMAN VISUAL CORTICAL AREAS MT & V3A.

((D.C. Somers[1,3], A.E. Seiffert[2], A.M. Dale[3] & R.B.H. Tootell))[3] Brain & Cognitive Sci., MIT[1]; Psychology, Harvard U.[2]; Cambridge MA; & MGH NMR-Center[3], Charlestown MA.

Purpose. "Second-order" or non-luminance-defined motion stimuli are central in the debate about multiple perceptual motion channels. Proposed perceptual mechanisms include: separate "front-end" processing on the (normal) motion channel; an independent second-order motion channel; and attentive tracking of stimulus features. Functional neuroimaging (fMRI) has revealed two early cortical motion areas in the human: area MT and area V3A. Here, the role of these two motion areas in second-order motion processing is investigated. **Methods.** Human subjects viewed stimuli during fMRI at 3T (GE Signa). In "passive viewing" experiments, subjects viewed moving and static, luminance- and texture-defined (dynamic random noise or thin concentric rings) stimuli. In "attentional modulation" experiments, subjects fixated a central spot while peripheral motion stimuli were presented simultaneously with a foveal set of letters. On each trial, the motion stopped and the letters disappeared for 300ms. Upon reappearance, a letter and/or the direction of motion may have changed. Subjects were required to make a same/different judgment for either letters or motion. Blocked sets of "attend letter" and "attend motion" were alternated. **Results.** Second-order motion, like first-order motion produced its strongest region of activation in area MT. Both motion forms also strongly activated area V3A. Attentional modulation in MT for first-order motion was approximately 30% of passive viewing response amplitude. In contrast, attentional modulation of second-order motion responses in V3A and MT produced response amplitudes approximately equal to passive viewing response amplitudes. Attentional modulation of first-order motion responses in V3A was similarly robust. **Conclusions.** Second-order motion perception appears to use the same early cortical motion areas used by first-order motion. The strong attentive modulation of responses to second-order motion supports the notion that attentional tracking is a key factor in second-order motion perception.

EY-11005 (D.S.), NSF Grad. (A.S.), Human Front. Sci. Prog. & EY-07980 (R.T.). None