MOTION-DEFINED FORM PROCESSING IN HUMAN VISION: A fMRI STUDY,
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Purpose. We have studied the processing of motion-defined form in the human brain using functional magnetic resonance imaging (fMRI). **Methods.** Subjects (N=15) were scanned on a 1.5T G.E. magnet retrofitted for echo-planar imaging. Subjects viewed full-field random noise textures undergoing either uniform clockwise and counterclockwise rotations or translational left/right motions. Individual experiments contained a single type of motion boundary (occlusion or shear) which was compared to a control condition of uniform motion. The time-averaged motion statistics were identical in the two conditions; the primary difference was the presence of motion-defined form. In addition, we conducted parametric variations on: (1) the density of motion boundaries; (2) speed of surface motions that defined the boundaries. A standard battery of stimuli were shown within the same experimental session to localize overtly retinotopic visual areas and putative MT/MST. **Results.** In general, motion-defined form stimuli selectively activated areas V1, V2, V3, V3A, and ventral V4. No subject showed selective activation of visual area MT or any far extrastriate areas to motion-defined form. Activation in early visual areas was dependent on the density of motion-boundaries: V1 responded best to fine spatial frequency boundaries; V3A responded best to coarse spatial frequency boundaries; other areas responded best to intermediate frequencies. Responses in early visual areas to parametric variations on the speed of surface motions conformed to psychophysical measures: extremely slow and fast speeds of motion boundaries depressed responses significantly. **Conclusion.** Given this result and other reports (c.f. Regan et al 1992, Marcar and Cowey 1992) which indicate that MT is needed to process motion-defined form, we conclude: (1) only areas V1, V2, V3, V3A, and ventral V4 respond to motion-defined form; (2) feedback from MT onto these areas is required for this response. *JR supported by HHMI, RT by NEI07980.*