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Abstract: Perceptual constancy across saccadic eye movements requires the integration of eye position signals and visual information. Physiological studies have shown that visual information is encoded in a variety of coordinate frames across the visual cortex of nonhuman primates, with receptive fields being more explicitly space centered in the more parietal areas. Neurons in those parietal areas, however, typically have large receptive fields and it is unclear how they could form the basis for high acuity perceptual constancy. Furthermore, it remains a possibility that the world-centered representation in parietal areas, rather than being the result of an explicit coordinate transform of retinotopic information through oculomotor signals, represents the result of an implicit coding of spatial constancy in earlier visual areas. We used functional imaging to investigate the possibility of such an implicit representation in human visual cortex. We first mapped subjects' visual areas using standard retinotopic mapping techniques. Then, we used auditory cues to instruct the subjects to direct their eyes to five distinct head centered directions - left, right, up, down and center. This eye-position experiment took place in complete darkness. We then trained support vector machines to predict eye position from the time course of voxels within the early visual areas. Crossvalidation showed that the BOLD signal originating in early visual cortex can be reliably decoded to predict viewing direction, suggesting that the signals required for achieving spatial constancy are available very early in the visual processing stream.