
Visual field mapping of visuomotor adaptation to prisms

Visual field mapping of visuomotor adaptation to prisms. Ling Lin, Brian Barton, Derrik E. Asher, Christian Herrera, and Alyssa A. Brewer; J Vis August 5, 2009 9(8): 762; doi:10.1167/9.8.762

Stratton (Psych. Rev., 1897) first described visuomotor adaptation to altered visual input by wearing inverting prism spectacles. A number of studies (e.g., Miyauchi et al., J. Physio., 2004) have tried to confirm his findings and further examine the question of how responses in visual cortex change during this adaptation process. There is evidence from these studies that changes occur in parieto-occipital cortex. Recently, several human visual field maps have been described in parietal cortex that are thought to be involved in visuomotor integration (Swisher et al., J. Neurosci., 2007). Here, we further investigate the adaptation of these cortical maps to an extreme alteration of visuomotor processing.

Our study specifically measured the changes in parietal visual field maps throughout a 14 day continuous adaptation period to left-right reversing prism spectacles. We first defined the baseline organization of the posterior and dorsal visual field maps using retinotopic stimuli comprised of wedges, rings, and bars. At multiple pre-prism, with-prism and post-prism time points, we measured the alterations in the occipital and parietal visual field maps. We also compared the population receptive fields within these maps across the time points (Dumoulin and Wandell, Neuroimage, 2008). Throughout the adaptation period, subjects practiced a daily battery of visuomotor behavioral tasks (e.g. Richter et al., Exp. Brain Res., 2002).

These measurements allowed us to identify the cortical regions subserving the dynamic remapping of visuomotor representations and altered visual perception following adaptation to the prisms. These data add to our current understanding of the visual pathways and the neural mechanisms for visuomotor processing.

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