Influence of Stimulus Eccentricity and Direction on Characteristics of Pro- and Antisaccades in Non-Human Primates

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Received 27 January 2000; accepted in final form 3 August 2000

Bell, A. H., S. Everling, and D. P. Munoz. Influence of stimulus eccentricity and direction on characteristics of pro- and antisaccades in non-human primates. J Neurophysiol 84: 2595–2604, 2000. The ability to inhibit reflexes in favor of goal-oriented behaviors is critical for optimal exploration and interaction with our environment. The antisaccade task can be used to investigate the ability of subjects to suppress a reflexive saccade (prosaccade) to a suddenly appearing visual stimulus and instead generate a voluntary saccade (antisaccade) to its mirror location. To understand the neural mechanisms required to perform this task, our lab has developed a non-human primate model. Two monkeys were trained on a task with randomly interleaved pro- and antisaccade trials, with the color of the central fixation point (FP) instructing the monkey to either make a prosaccade (red FP) or an antisaccade (green FP). In half of the trials, the FP disappeared 200 ms before stimulus presentation (gap condition) and in the remaining trials, the FP remained visible (overlap condition) during stimulus presentation. The effect of stimulus eccentric-ity and direction was examined by presenting the stimulus at one of eight different radial directions (02360°) and five eccentricities (2, 4, 8, 10, and 16°). Antisaccades had longer saccadic reaction times (SRTs), more dysmetria, and lower peak velocities than prosaccades. Direction errors in the antisaccade task were more prevalent in the gap condition. The difference in mean SRT between correct pro- and antisaccades, the anti-effect, was greater in the overlap condition. The difference in mean SRT between the overlap and the gap condition, the gap effect, was larger for antisaccades than for prosaccades. The manipulation of stimulus eccentricity and direction influenced SRT and the proportion of direction errors. These results are comparable to human studies, supporting the use of this animal model for investigating the neural mechanisms subserving the generation of antisaccades.