

Separate contribution of eye movements to hand tracking and its adaptation to visuomotor rotation

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a b s t r a c t

When tracking targets moving in various directions with one's eyes, horizontal components of pursuit are more precise than vertical ones. Is this because horizontal target motion is predicted better or because horizontal movements of the eyes are controlled more precisely? When tracking a visual target with the hand, the eyes also track the target. We investigated whether the directional asymmetries that have been found during isolated eye movements are also present during such manual tracking, and if so, whether individual participants' asymmetry in eye movements is accompanied by a similar asymmetry in hand movements. We examined the data of 62 participants who used a joystick to track a visual target with a cursor. The target followed a smooth but unpredictable trajectory in two dimensions. Both the mean gaze-target distance and the mean cursor-target distance were about 20% larger in the vertical direction than in the horizontal direction. Gaze and cursor both followed the target with a slightly longer delay in the vertical than in the horizontal direction, irrespective of the target's trajectory. The delays of gaze and cursor were correlated, as were their errors in tracking the target. Gaze clearly followed the target rather than the cursor, so the asymmetry in both eye and hand movements presumably results from better predictions of the target's horizontal than of its vertical motion. Altogether this study speaks for the presence of anisotropic predictive processes that are shared across effectors.