Human Eye-Head Gaze Shifts in a Distractor Task. I. Truncated Gaze Shifts

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J. Neurophysiol. 82: 1390–1405, 1999.

This study examines two current ideas regarding the control of eye-head gaze shifts. The first idea stems from recent studies involving elec-trical stimulation in the primate superior colliculus that suggest that a residual feedback of gaze displacement persists for ;100 ms after completion of a gaze shift. In light of this hypothesis, we examined the accuracy of gaze shifts generated very soon after the end of a preceding gaze shift. Human subjects were presented with a visual or auditory target along with an accompanying stimulus of the other modality. The accompanying stimulus appeared either at the same place as the target or at the diametrically opposite position, in which case it was termed a distractor. Subjects often made an incorrect gaze shift (IGS) in the direction of the distractor, followed by a recorrect gaze shift (RGS) in the direction of the target. We found that RGSs were accurately driven to the target, even when they followed IGSs by ,5 ms, regardless of the size of the IGS. The second idea is that a gaze shift cannot be cancelled in midflight. The end point of IGSs frequently fell short of the distractor. The dynamics of these move-ments, and of the head movement components during the IGSs in particular, suggests that these hypometric IGSs were planned for a much larger excursion but were truncated and superceded by the reversing RGSs. These results emphasize that the gaze shifting system can change the desired goal of a gaze shift in midflight and that the superceding movement is accurate regardless of the metrics or timing of the preceding movement.