

Eye movements when observing predictable and unpredictable actions.

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We previously showed that, when observers watch an actor performing a predictable block-stacking task, the coordination between the observer's gaze and the actor's hand is similar to the coordination between the actor's gaze and hand. Both the observer and the actor direct gaze to forthcoming grasp and block landing sites and shift their gaze to the next grasp or landing site at around the time the hand contacts the block or the block contacts the landing site. Here we compare observers' gaze behavior in a block manipulation task when the observers did and when they did not know, in advance, which of two blocks the actor would pick up first. In both cases, observers managed to fixate the target ahead of the actor's hand and showed proactive gaze behavior. However, these target fixations occurred later, relative to the actor's movement, when observers did not know the target block in advance. In perceptual tests, in which observers watched animations of the actor reaching partway to the target and had to guess which block was the target, we found that the time at which observers were able to correctly do so was very similar to the time at which they would make saccades to the target block. Overall, our results indicate that observers use gaze in a fashion that is appropriate for hand movement planning and control. This in turn suggests that they implement representations of the manual actions required in the task and representations that direct task-specific eye movements.