Spatial profiles of distractors modify saccade trajectories

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Previous research has established how temporal factors and object similarity affect saccade trajectories to targets amongst distractors, but only in a specific spatial configuration. To better understand the spatial factors, we varied the egocentric distribution of targets and distractors while their similarity also varied. Participants had to search for the target out of two objects, both located at the same distance from a central fixation cross, with the distractor placed either clockwise or counterclockwise to the target. We measured the curvature of saccades made to the target using five metrics, analyzing the effects of similarity and angular distance. As the results demonstrated that saccades curve towards the distractor for shorter reaction times and away from the distractor for longer reaction times, we split the data accordingly. This change in curvature direction depends on the ability to inhibit the distractor object, which only occurs when there is enough time to cortically process both objects. We found that for long reaction times, as angular distance increases, the saccade curvature varies according to a spatial suppressive surround annulus; as the distractor moves away from the target, distractor inhibition increases to a maximum then decreases again, producing a U-shaped curve. As well, for long reaction times only, as the target-distractor similarity decreases, the initial saccade angle away from the distractor increases. These results suggest that visual object discrimination drives saccade trajectories but is also modulated by spatial and temporal factors, and that longer reaction times can allow for full cortical processing of both objects and inhibition of the distractor.