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The influence of crowding on grip scaling during grasping

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Abstract

It is well known that nearby objects influence the perception of a target (crowding), but little is known about how nearby objects influence our actions towards the target. In this study, a white disk of either 3 cm or 3.75 cm in diameter, was presented along the horizontal meridian at an eccentricity of 30° either in isolation (uncrowded) or surrounded by six disks of different sizes (crowded). At the beginning of each trial, LCD goggles worn by the participants were closed. Participants held down the start button with their thumb and index fingers pinched together. After the disks had been placed on the table, the goggles were opened. On perceptual trials, participants were required to manually indicate the size of the target disk using their thumb and index finger, and after that to pick up the disk. On grasping trials, participants were required to grasp the target disk with their thumb and index finger as quickly and accurately as possible. On some trials, the goggles were closed as soon as the start button was released (open loop) so that participants could not see their hands or the disks during the execution of the movement. On other trials, the goggles were closed 3 s after participants released the button (closed loop), permitting a full view of the moving hand and the target. In all tasks, the distance between the index finger and thumb was measured with OPTOTRAK. Even though participants could not indicate the size of the targets on perceptual trials, they scaled their grip aperture to the size of the target on grasping trials. These results were observed on both closed- and open-loop trials. Overall, these findings support the dissociation between vision-for-action and vision-for-perception – and suggest that the neural coding of objects may be different for these two systems.

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