

DURING SELF-MOVEMENT HUMANS ARE BETTER AT JUDGING WHETHER AN OBJECT IS MOVING (FLOW PARSING) THAN WHETHER THEY WILL HIT IT (HEADING)

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During locomotion we can use information in the retinal flow field to judge whether we will pass to the left or right of an object in the scene (heading). We can also use information in retinal flow to judge whether an object is moving relative to the scene (flow parsing). Both judgements rely on the brain identifying optic flow (global patterns of retinal motion that are characteristic of self-movement). How does the precision of these two judgments compare? Differences or similarities in precision may provide some insight into the underpinning mechanisms. We designed stimuli that allowed direct comparison of the precision of the two judgements. In the heading task, we simulated forward movement of the observer by moving a rigid scene containing wireframe objects, plus a coloured target sphere, towards the observer. Observers judged whether they would pass to the left or right of the sphere. Thresholds were measured as a function of the angle between the sphere and the simulated direction of movement. In the object movement task, the background scene and the target sphere moved on slightly different trajectories which led to a perception of scene-relative object movement. Observers judged whether the sphere was moving to the left or right in the scene. Thresholds were measured a function of the difference in direction of the background and target trajectories. Precision was significantly higher when judging object movement than when judging self-movement. Control experiments removed local cues and confirmed that the results were unchanged. In a simulated rotation experiment we found that performance on the object movement task was unaffected while judgements of self-movement were impaired. These results are compatible with the hypothesis that flow parsing is not dependent upon a prior estimate of heading; flow-parsing is either an independent process, or it precedes estimates of heading.

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