THE SURPRISING UTILITY OF TARGET DRIFT IN NATURAL HEADING JUDGEMENTS

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Gibson (1950) proposed that optic flow provides information about the direction of self-motion (heading) relative to objects in the environment. Llewellyn (1971) pointed out that the change in egocentric direction of an object, "drift", also provides information about whether an observer is passing to the left or right of the object. We compared the precision of heading judgements with flow and drift cues, presented in isolation, and together. With flow alone, observers were quite precise (< 1°), but observers were more precise with drift, and equally precise with drift alone and with both flow and drift. Next we examined how precision changed with display duration (0.2-1.6s). There was evidence of cue-combination at 0.2s but at longer durations the precisions for the drift and both cue conditions were similar and lower than for the flow condition. To explore whether flow contributes at all with display durations longer than 0.2s, we replicated the 0.4s condition and also measured reaction times. Lower reaction times when flow was available suggested that flow does contribute. We next checked to see whether poorer precision in the flow condition was due to the fact that the object probe was presented after the stimulus display. We ran an experiment in which we added simulated gaze rotation noise in the range between -1 and +1°/s in the display to perturb the drift signal. This led to a drop in the precision of heading judgements. We then added a simulated gaze rotation at +1 or -1°/s. This led to not only a larger reduction in the precision but also a large systematic difference in the accuracy of heading judgments between the two rotation rates, suggesting drift dominating flow. We conclude that target drift is a surprisingly powerful cue for the perception of naturalistic object-relative heading.

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