

Running title: ADAPTATION OF LOCOMOTION

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Optic flow drives human visuo-locomotor adaptation

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Summary

Two strategies can guide walking to a stationary goal: (1) the optic flow strategy, in which one aligns the direction of locomotion or “heading” specified by optic flow with the visual goal [1, 2]; and (2) the egocentric direction strategy, in which one aligns the locomotor axis with the perceived egocentric direction of the goal [3, 4], and error results in optical target drift [5]. Optic flow plays a central role in steering control when it is available, in visually structured environments [2, 6-8]. The egocentric direction strategy plays the primary role in visually sparse environments [2, 3, 9]. Here we determine whether optic flow also drives visuo-locomotor adaptation, using an ambulatory virtual environment. Participants adapted to walking with the virtual heading direction displaced 10° to the right of the actual walking direction, and were then tested with a normally aligned heading. Two environments, visually structured and visually sparse, were crossed in adaptation and test phases. Adaptation of the walking path was more rapid and complete in the structured environment, with twice the negative aftereffect on path curvature. Optic flow thus plays a central role in both online control of walking and adaptation of the visuo-locomotor mapping.