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Point-light walkers with and without local motion features for determining direction

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In 1978, James Cutting published an algorithm to generate point-light displays that resemble the movements of the joints of a human walker. The method has since been used frequently to create stimuli for research on biological motion perception. More recently, Troje and Westhoff (2006) found that pattern of local movement of the feet was used to derive the direction in which a point-light walker is facing, even when structural information is removed. The results of previous studies that direction could not be determined using a scrambled version of Cutting’s walker, may be explained by the significantly different motion of the feet between Cutting’s walker and motion-captured humans.

To compare the two stimuli, 14 participants performed a detection task and a direction task. Walkers consisted of 11 points presenting a sagittal view. In the detection task, walkers were embedded in a scrambled walker mask consisting of 50, 100, or 200 dots. Participants had to decide which of two successive intervals contained the walker. In the direction task, participants judged whether the walking figure was oriented towards the left or the right. The mask consisted of randomly appearing stationary dots (50, 200, or 750) with limited lifetime. Half of the walkers were spatially coherent and half of them were scrambled.

Observers performed equally well for the two walkers in the detection task. However in the direction task, the error rate for Cutting’s walker was significantly higher than for the motion-captured walker. Most of the difference came from the scrambled walker condition, where error rate increased from 39% to 48%. We conclude that Cutting’s walker lacks critical features which signal direction in real walking motion, and suggest that studies which have presented the local motion of the Cutting walker as a stimulus need to be revisited.