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Inverted gravity, not inverted shape impairs biological motion perception

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Biological motion point-light displays produce a strong inversion effect which shows similarities to the well known inversion effect in face recognition. In face recognition, the inversion effect has been interpreted in terms of a distinction between configural processing and featural processing. There is evidence that turning faces upside-down hinders configural processing. The inversion effect for biological motion may also be based on impaired configural processing. The effects of turning a walker upside-down should then be comparable to the effects observed with scrambled motion stimuli, i.e. with stimuli that keep local motion intact but displace the trajectories of the single dots randomly. An alternative explanation for the inversion effect in biological motion is based on recent findings that assumptions about the direction of gravity play a role in interpreting biological motion. If inverted gravity is the reason for the inversion effect, upright scrambled motion should produce less effects than intact but inverted motion.

We tested the two alternative predictions using a task in which subjects had to determine the apparent walking direction of human and animal point-light walkers shown in sagittal view. The displays maintained stationary on the screen, i.e. they looked like being recorded on a treadmill, and they were masked with a dynamic random dot background.

Both response times and accuracy clearly showed that scrambling the motion had only a very minor impact on direction perception. Even though subjects had no idea what kind of animal they might be seeing they could indicate its walking direction fast and accurately. On the other hand, turning the displays upside-down had a strong impact on the perceived direction with performance being almost at chance.

We conclude that the inversion effect in biological motion is not due to disturbance of configural processing but is rather a result of prior assumptions about the direction of gravity becoming invalid.

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