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Reference frames for biological motion inversion effects

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If biological motion point-light displays are presented upside down, performance on most tasks is strongly impaired. We have recently shown that this inversion effect has two entirely different and independent causes. One is due to the inversion of the familiar upright shape. The second is related to a visual filter tuned to the gravity-constrained local motion of the feet of a human or animal in locomotion. Here, we are investigating whether the two inversion effects operate in retinal coordinates or in gravitational coordinates. We designed two different tasks isolating the structure-from-motion aspect of biological motion, on the one hand, and the mechanism tuned to local motion, on the other hand, and conducted experiments in which either the stimulus or the observer were turned upside down. The results clearly indicate that both inversion effects operate in retinal coordinates and are not affected by vestibular input. Apparently, a heuristic that gravity is aligned with retinal coordinates is replacing a reality check that would require visual-vestibular sensory integration.