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Characterizing global and local mechanisms in biological motion perception.

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The perception of biological motion is subserved by both a global process that retrieves structural information and a local process that is sensitive to individual limb motions. Here, we present an experiment aimed to characterize these two mechanisms psychophysically. Naive observers were tested on one of two tasks. In a walker detection task designed to address global processing, observers were asked to discriminate coherent from scrambled walkers presented in separate intervals. In an alternate direction discrimination task designed to address primarily local processing, observers were asked to discriminate walking direction from both coherent and spatially scrambled displays. In both tasks, we investigated performance-specificity to human (versus non-human) motion and the effects of mask density and learning on task performance. Performance in the walker detection task was best for the human walker, was susceptible to learning, and was heavily hindered by increasing mask densities. In contrast, performance on the direction discrimination task, in particular for the scrambled walkers, was unaffected by walker type, did not show a learning trend, and was relatively robust to masking noise. These findings suggest that the visual system processes global and local information contained in biological motion via distinct neural mechanisms that have very different properties.