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Inversion effects on the structural encoding and recognition of biological motion

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The human visual system is very sensitive to animate motion patterns. Humans can detect efficiently another living being in a visual scene and retrieve many features of psychological, biological and social relevance.

By representing the main joints of a person's body by bright dots against a dark background, observers can easily recognize a human walker and determine his/her gender, recognize various action patterns and identify individual persons. The importance of the perception of biologically relevant motion patterns is reflected by the identification of a specific neural circuitry as shown by brain imaging studies. Whereas basic principles of the neural basis of perception of biological motion are understood, many issues concerning the temporal characteristics of the processing of such kind of information are as yet unclear.

In the present study we investigated how inversion of biological motion stimuli affects components of event related potentials (ERP). ERPs were recorded in response to point-light displays of an upright walking person, point-light displays of an inverted walking person and displays of scrambled motion, in which the moving dots had the same motion vectors as in biological motion displays with their initial starting positions being randomized.

Analysis yielded a N170 component at parieto-occipital electrodes, which was more pronounced for upright walkers than for inverted walkers and scrambled motion. A later component in the time window between 300 and 400 ms after stimulus onset had a larger amplitude for upright walkers and inverted walkers as compared to scrambled walkers. We hypothesize that the N 170 component reflects the holistic recognition of prototypical configurations of a human body, whereas the later component is associated with the integration of the dots' interrelations to a coherent percept.