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ECVP 2003 abstract

Representing biological motion

I M Thornton, M A Giese¶, S Edelman§ (Max Planck Institute for Biological Cybernetics, Spemanstrasse 38, D 72076 Tübingen, Germany; ¶ Department of Cognitive Neurology, University Hospital, Hoppe-Seyler-Strasse 3, D 72076 Tübingen, Germany; § Department of Psychology, Cornell University, Ithaca, NY 14853, USA)

Recently, we have been using a novel spatiotemporal morphing algorithm (Giese and Poggio, 2000 *International Journal of Computer Vision* **38** 59 - 73) to explore the mental representation of biological-motion patterns. We presented observers with animated patterns of point lights corresponding to trajectories generated by spatiotemporal morphing between three prototypical human locomotion patterns: walking, running, and marching. The seven patterns obtained from this morphing procedure were organised into stimulus spaces corresponding either to a (T)riangle or an L-shape. For each configuration, observers were asked to judge the similarity between all pairs of stimuli using a comparison-of-pairs paradigm. A measure of perceived dissimilarity computed from these judgments was submitted to multi-dimensional scaling. The perceived structures recovered in this way closely matched the original stimulus structures. This suggests that the visual system represents related categories of locomotion in a common metric space, reflecting the spatiotemporal similarity of motion trajectories. Here, we relate these findings to previous research using static shape categories (eg Cutzu and Edelman, 1998 *Vision Research* **38** 2229 - 2257) and in particular to the results of a recent simulation study. In this latter study, we used the neural responses of a physiologically plausible model of biological-motion recognition (Giese and Poggio, 2003 *Nature Reviews Neuroscience* **4** 179 - 192) to recover metric structures which also closely resembled the original stimulus structure. Implications of these simulation results for our understanding of biological motion processing are discussed.

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