High-level aftereffects in biological motion perception

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The human visual system shows an impressive sensitivity to subtleties in animate motion patterns carrying biologically relevant information. Frontal views of biological motion point-light walkers can be classified with respect to the gender of the walker with high accuracy. Here, we document pronounced adaptation effects that alter the perceived gender of a point-light walker.

Stimuli were generated using a morphing technique which provides smooth transitions along a linear discriminant function classifying a set of 80 walkers according to their sex. Thirteen different walkers were sampled along the male-female walking axis covering a total range of 7 standard deviations of the walker distribution. In a first experiment we determined the location of a perceptually neutral walker on the male-female axis. Five different presentation times between 350 and 7000 ms were used. Using a two-alternative-fourced-choice procedure, subjects had to indicate for each display, whether it showed a man or a woman. The data were fitted by logistic psychometric functions. A morph half way between an average male and an average female walker was rated to be male. To obtain a perceptually neutral walker about one standard deviation of femaleness has to be added. Those results were independent of the presentation time.

In a second experiment, observers were first presented with 7000 ms point-light displays of either an exaggerated male walker, an exaggerated female walker or a perceptually neutral walker. After this adaptation period, they were tested with short presentations of walkers sampled along the male-female walking axis. The presentation time of the test stimulus was either 350, 700, or 1400 ms. Adaptation results in a pronounced shift of perceived gender of the test stimulus. A neutral walker is perceived to be female after adaptation with the exaggerated male and male after adaptation with the exaggerated female walker.

Our data demonstrate that adaptation can occur not only within low-level vision processes but also at high-level information processing stages. In the case of biological motion perception the aftereffects are affecting stages at which the complex information from the series of single moving light-dots is integrated into a coherent percept of walking person.

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