Spatial frequency tuning of Body Inversion Effects

Background: That upright bodies are recognized better than inverted bodies (Body Inversion Effect; BIE) is held to reflect configural processing of body stimuli. It has been demonstrated that BIE modulates activity of body selective areas in both the ventral stream (occipito-temporal cortex) and dorsal stream (fronto-parietal areas; Urgesi et al., 2006).

Purpose: By exploiting the differential tuning of dorsal and ventral pathways, respectively, to low- (LSF) and high-spatial frequencies (HSF), here we aimed to disentangle the contribution of the two streams to the configural-processing of bodies along gender and posture dimensions.

Methods: Sixty-seven participants performed a matching-to-sample task in which they were asked to recognize which ones of two probes, differing for gender or postures (Task), matched a previously presented target image. Importantly, the stimuli used could be presented in their original intact form or containing only low-spatial or high-spatial frequency information (Spatial frequency); also, they could be presented with an upright or inverted orientation (Orientation).

Results: The 3-way ANOVA showed that, in the gender task, performance was significantly lower for LSF as compared to HSF and intact images independently from orientation, while in the posture task upright bodies were matched better for HSF and LSF than for intact images. Further, a significant BIE was obtained in all conditions in the gender task, even if it was reduced for LSF images. Conversely, it was significant only for HSF images in the posture task.

Discussion: The reduction of gender perception accuracy and of BIE for LSF images seems to support the role of the parvo-biased HSF information and, thus, of the ventral stream in the configural processing of body gender. In the posture task, BIE improved for both parvo- and magno-biased stimuli, suggesting that posture discrimination may require either dorsal or ventral stream processing. However, eliminating the magno-biased information heightened the configural processing of body postures, since reliable BIE was obtained only for HSF. Thus, the configural processing of either body gender or body posture points to the mainly involvement of parvo-biased information processed in the ventral stream.