
Perception of Human Movement executed under Microgravity: an fMRI study.

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Abstract

The human motion (HM) relies on Earth's gravity and there is evidence that this component is internalized in the vestibular cortex. The aim of the present study was to delineate brain regions participating in both the perception and the integration of the gravity vector during the observation of HM performed with or without the Earth's gravity. Subjects who had never been exposed to microgravity watched point-light movies of HM executed with or without the Earth's gravity (recorded during parabolic flights). Participants had to categorize movies based on the presence or absence of gravity in HM. Functional imaging results showed the recruitment of the right anterior insula and the left inferior frontal gyrus when the subjects watched HM executed without gravity. The inverse contrast shows an activation of the bilateral middle occipital gyrus (higher in the right hemisphere than the left) when the subjects watched HM executed with gravity. The results suggest that the perception of HM executed without gravity implies a larger effort made by the subject to understand the actions, and needs a projection of the body image (internal representation of the body from perceptual and cognitive processes) within a reconstructed environment (based on the subject's sensorimotor experience). On the other hand, the perception of HM executed with gravity relies on the body schema (internal representation of the body from sensorimotor afferences). Further analysis with a group of experts of microgravity will be performed to investigate the role of the acquired sensorimotor skills in the perception of HM.

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