

Gender bias in the influence of gravity on perception

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Abstract

Females are influenced more than males by visual cues during many spatial orientation tasks; but females rely more heavily on gravitational cues during visual-vestibular conflict. Are there gender biases in the relative contributions of vision, gravity and the internal representation of the body to the perception of upright? And might any such biases be affected by low gravity? 16 participants (8 female) viewed a highly polarized visual scene tilted $\pm 112^\circ$ while lying supine on the European Space Agency's short-arm human centrifuge. The centrifuge was rotated to simulate 24 logarithmically spaced g-levels along the long axis of the body (0.04-0.5g at ear-level). The perception of upright was measured using the Oriented Character Recognition Test (OCHART). OCHART uses the ambiguous symbol "p" shown in different orientations. Participants decided whether it was a "p" or a

"d" from which the perceptual upright (PU) can be calculated for each visual/gravity combination. The relative contribution of vision, gravity and the internal representation of the body were then calculated. Experiments were repeated while upright. The relative contribution of vision on the PU was less in females compared to males ($t=-18.48$, $p\leq 0.01$). Females placed more emphasis on the gravity cue instead (f:28.4%, m:24.9%) while body weightings were constant (f:63.0%, m:63.2%). When upright (1g) in this and other studies (e.g., Barnett-Cowan et al. 2010, EJN, 31,1899) females placed more emphasis on vision in this task than males. The reduction in weight allocated by females to vision when in simulated low-gravity conditions compared to when upright under normal gravity may be related to similar female behaviour in response to other instances of visual-vestibular conflict. Why this is the case and at which point the perceptual change happens requires further research.

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