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Slowing of human arm movements during weightlessness: the role of vision

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Original Article

Abstract.

The human motor system responds to weightlessness by the slowing of movement. It has been suggested that deficits in visuo-motor co-ordination cause this effect. We studied the mechanisms of the slowing of movement in three long-term missions to the Russian space station Mir. In particular, the role of vision in the control of movement in microgravity has been studied in these experiments on seven cosmonauts, pre-, in-, and post-flight. The cosmonauts made arm movements to visual targets under the following conditions of visual control: no visual control, interrupted visual control, and undisturbed visual control. The results showed that the slowing of movement during weightlessness was manifested by decreases of peak velocity and peak acceleration, was not associated with a prolongation of the movement phase of deceleration, and was not affected by manipulation of the conditions of visual control. The slowing of movement tended to subside after the months of the flight and completely disappeared within days after the landing. Accuracy of the movements strictly depended on the constraints imposed on the vision and remained unaffected in-flight. The data presented demonstrate that the slowing of movement in microgravity is not directly related to deficits in sensori-motor co-ordination and is not associated with a reduction of the accuracy of movement. The strategy for motor control in microgravity seems to be directed towards the generation of smooth movements and the maintenance of their accuracy.

Microgravity Movement slowing Visuo-motor co-ordination

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