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## MODIFICATION OF GOAL-DIRECTED ARM MOVEMENTS DURING SHORT- AND LONGTERM SPACEFLIGHT

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Introduction: The influence of microgravity on goal-directed arm movements (GDAMs) depends on the duration of spaceflight as well as on the required task. Missing visual control during learning and performance as well as changed head-to-trunk position offer possibilities to study detailed mechanisms of adaptation of sensorimotor control to microgravity. **Methods:** In this presentation different GDAMs of one short-term (7d. A) and one long-term cosmonaut (14 months. B) are compared. Measurements were performed preflight and on the 2nd and 5th day of flight (A). resp. approximately every month inflight (B). Postflight tests were on the 2nd and 5th day after landing. In a first test the cosmonaut's outstretched arm was passively moved along a visually given pattern by the second cosmonaut. Still with eyes closed the test person tried to repeat actively the movement sequences (the shape of an isosceles triangle) from memory (passive learned movement). In a second test the cosmonaut traced the figure on the LEDs-matrix for three times with open eyes and repeated it with eyes closed., In a third test the cosmonauts learned to point to LED's in horizontal line. then turned or sidebended the head to the right and repeated the movement with eyes closed. The position of the arm was measured by two IR scanning cameras. On earth the subjects were sitting upright on a chair. the arm pointer placed on the right hand. the LEDs-matrix in front of them. In the space lab MIR they were fixed in supine position on the floor by belts. **Results**: The influence of the different gravity levels resulted in significant offsets and torsions of the reproduced figures.The reproductions of actively learned movements differed significantly in length parameters of the memorized triangle from those passively learned which showed no adaptation to preflight values. The analysis of the GDAMs during the changed head-to-trunk positions revealed that. with eyes closed, sidebending of the head is correlated with considerable (A) and increasing (B) counterclockwise slant of the movement plane of the arm. Conclusion: In comparing the inflight with the preflight condition. intact proprioceptive afferentation seems to play an important role for reproducing movements from motor short-time memory. In the short-term flight large effects were seen with hardly any aftereffect on the 2nd day after landing. The longterm cosmonaut showed optimization of visually controlled arm movements but no improvement without visual guidance

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