

## **The interlimb synchronization during bimanual reach-to-grasp task**

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It is known that a successful performance of bimanual reach-to-grasp task requires a strong end-point synchronization of the movements of both arms. The mechanisms underlying such bimanual synchronization are still not clearly understood. The goal of the study was to investigate how the bimanual synchronization may be affected by a sudden external perturbation of one arm at different movement phases.

While sitting, 10 non-disabled college age subjects performed a bilateral reach-to-grasp movement. They were required to reach forward and grasp a jar with the left (non-dominant) hand while open the lid with the right (dominant) hand. The jar was placed in the sagittal midline. During some movements, one arm (left or right) was suddenly and transiently stopped. The perturbation was applied at 4 equidistant phases of the reaching. Kinematic data from markers placed on the wrists, elbows and shoulders were recorded. The dependency of end-point arms synchronization on the movement phase at which perturbation occurred was analyzed. Results showed that the perturbation of one arm applied at early phases of reaching caused prolonged movement time of the non-perturbed arm. As a result, strong coupling between both arms was preserved at the end of the reaching movement. In contrast, the arm arrest at the late phases resulted in desynchronization of the bimanual movement at the end point, when arms arrived to the object with significant time difference.

Results suggest that the end-point interlimb synchronization is initiated before the bimanual movement begins and preserved at early phases of movement, i.e. until the central program of movement is accomplished. The results argue with the hypothesis that the temporal arm synchronization is produced by the on-line correction of movement.