Salience in movement determines which of direction or coupling of movements constrains bimanual coordination.

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Purpose: To test the hypothesis that the constraint in bimanual coordination is movement coupling when the both limbs movements have a salient point, but is direction when the movement of one limb has no salient point.

Methods: Seven male subjects performed coordinated movements; left index finger extension-flexion and right forearm pronation-supination (both movements have a salient point), and left finger extension-flexion and right wrist ulnar-radial flexion that has no salient point. They performed the movements 20 cycles at 2 Hz with their eyes closed and without any external pace signals. The finger movements were performed on the horizontal plane. The wrist movements were performed on the horizontal plane with the pronated or supinated hand positions. The forearm movements were performed around the vertical axis with the upward or downward forearm positions. The coordination stability was evaluated by the standard deviation of the relative phase of both limbs movements.

Results and Discussion: When index finger flexion was coincident with forearm pronation, the coordination was stable irrespective of movement direction. When the movement directions of index finger and wrist were in mirror symmetrical relation, the coordination was stable irrespective of movement coupling. Thus the hypothesis is supported.

Effect of unilateral muscle damage induced by eccentric contractions on bilateral deficit

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Purpose: To determine the effect of unilateral muscle damage induced by eccentric contractions on the bilateral deficit during bilateral maximal voluntary contractions (MVC).

Methods: Subjects performed unilateral and bilateral MVC with a pincer grip before and 90 minutes after a unilateral eccentric exercise (ECC) that consisted of 81.0 ± 26.6 eccentric contractions of the first dorsal interosseous (FDI) muscle with maximal effort. As indirect markers of muscle damage, the pressure pain threshold (PPT), and electromyography (EMG) activity of the FDI muscle during submaximal contractions (5–50% MVC) were measured before and after ECC.

Results: On the damaged side, a significant decline in MVC and increased EMG activity during submaximal contractions were observed after ECC (p < 0.05), without changes in the PPT. On the intact side, these were unchanged. The bilateral deficit, expressed as the reduction in the bilateral MVC, as compared to the unilateral MVC, was increased significantly after ECC (p < 0.01). The ratio of bilateral MVC to unilateral MVC was reduced significantly on both the damaged and intact sides (p < 0.01).

Discussion: Unilateral muscle damage enhanced the bilateral deficit by decreasing the MVC on both the damaged and intact sides.

Key words: muscle damage, eccentric contractions, bilateral contractions, MVC