Arm choices behavior depends on interlimb differences in motor performance: effect of sensorimotor conditions and long-term practice.

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BACKGROUND

Previous studies on interlimb differences in sensorimotor performance provided evidence for brain lateralization of motor functions.

Left Hemisphere - Right Dominant Arm: proficient in control of movement dynamics  
Right Hemisphere - Left Nondominant Arm: proficient in movement impedance

Arm choices, or hand preference, have been often measured using handedness questionnaires. While reliable, questionnaires do not address the underlying neurobehavioral processes that give rise to the choice of which arm to use.

We hypothesized that choice of arm results from an interaction between underlying neurobehavioral asymmetries and imposed task conditions. Further, we examined whether intense long-term practice of the right dominant arm could modify arm choice for reaching and performance asymmetries.

METHODS

Right handed non-athletes and elite fencers performed 3 sessions of targeted reaching (320, 10 per target): (1) Right Arm; (2) Left Arm; (3) Choice of Arm. Measures: final position error (FPE), hand path deviation from linearity (HPDL), reaching frequency (RF).

RESULTS: Right vs. Left Arm Performance

FPE with VISION: Right Arm better
FPE with NO VISION: Left Arm better

RESULTS: Arm Choice - Reaching Frequency

VISION: Right Arm covers 2/3 of space

HPDL Means: Left Arm better under no vision

RF Means: Left Arm employed more under no vision

Fencers: Left Arm employed more