Proprioceptive influences on motor imagery

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Mental imagery is believed to be an important cognitive strategy in human reasoning and can be evoked by visual and motor imagery tasks. Several lines of evidence argue that sensorimotor structures support motor imagery (de Lange et al, in press; Parsons 1994). To test the functional relevance of the responses observed in these sensorimotor structures, we have evaluated whether changes in body posture influence behavioral and neural responses during performance of a motor imagery task. We manipulated the posture of the left and right forearms while seventeen healthy right-handed male subjects performed a hand laterality judgment task (motor imagery task) and a letter laterality judgment task (visual imagery task). During two successive fMRI scanning sessions, the subjects had to vary the posture of their left and right arm in a block-wise manner, allowing us to compare postural contributions to visual and motor imagery. Posture only affected the reaction time profile in the motor imagery task, and this effect was specific for the manipulated hand. Parietal and frontal responses were modulated by the hand to be rotated and by the posture of the same hand. These results indicate that the contribution of sensorimotor structures to motor imagery is functionally relevant.

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