

Motor imagery in speech processing

ABSTRACT:

Background

Activity in (primary) motor cortex (M1) increases as we imagine actions. Speech imagery occurs when we silently prepare what we want to say before speaking. Past research focused on neural bases of gesture imagery only and not on speech imagery. Theories on the neural organisation of speech attribute a key role to covert motor simulation processes such as imagery. Two processes have been identified: imagery and action observation. These processes differ in two important aspects: while observation is passive and requires exposure to an external stimulus, imagery is active and requires attention, and that can occur without external stimulus. A key role for M1 in motor simulation of speech has not been established.

Aims

This project tested if and how imagery and observation of speech engaged M1.

Method

We combined Transcranial Magnetic Stimulation (TMS) with behavioural tasks. When TMS is applied to left speech M1, the relative excitability of M1 and linked lip and tongue muscles is measured using Motor Evoked Potentials (MEPs). We recorded MEPs from lip (study 1a) and tongue (1b) muscles when participants imagined producing simple (1a) or complex (1b) speech actions.

Conclusions

The results showed that lip M1 was only in imagery of complex (but not simple) speech actions.

Keywords

Imagery, Cognitive processes, Movement, Somatosensory system

Published Work:

Maegherman, G., Nuttall, H. E., Devlin, J. T., & Adank, P. (2019). Motor imagery of speech: The involvement of primary motor cortex in manual and articulatory motor imagery. *Frontiers in Human Neuroscience*, 13:195. doi: 10.3389/fnhum.2019.00195

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