

## The Motor Somatotopy of Speech Perception

D'Ausilio et al. (2009)

### In general:

- Interactive neural systems that are distributed over the inferior frontal and superior temporal cortex are reciprocally connected and contribute to both speech production and speech perception. This allows a fast interactive processing of multimodal information across cortical areas.

Hypothesis: Focal stimulation with TMS (inferior precentral cortex vs. lateral precentral cortex) facilitates the perception of the concordant phonemes (d/t vs. b/p) and inhibits the perception of discordant items (b/p vs. d/t)

- [b] and [p] are labial sounds, requiring the critical lip movement (IPCC) for their production
- [d] and [t] are dental sounds that require a significant tongue movement (LPCC)

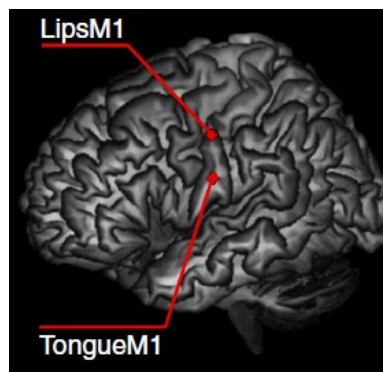


Figure 1 LipM1 and Tongue M1 normalized mean coordinates are projected on a standard template

- IV<sub>1</sub>: Phonemes (d/t; b/p) IV<sub>2</sub>: TMS Stimulation (IPCC (TongueM1); LPCC (LipsM1))
- DV<sub>1</sub>: Reaction Time DV<sub>2</sub>: Error Rates

- Task: Participants were asked to listen and recognize the consonants (d,p,d,t) (phoneme-discrimination task)

Results:

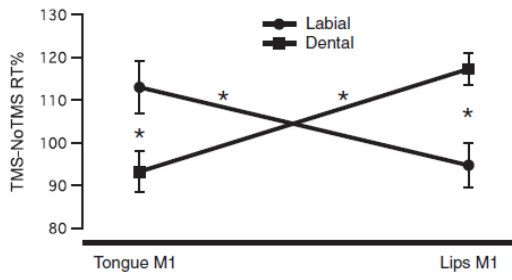


Figure 2 Reaction Times During Speech Discrimination

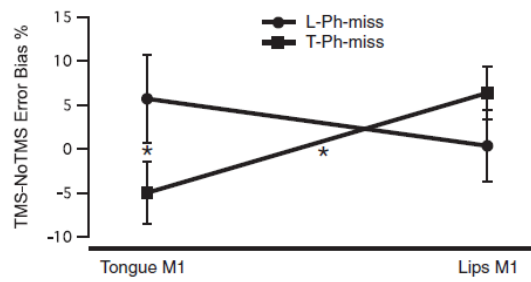


Figure 3 Accuracy Results

> i.e. faster reactions and better performance in phoneme discrimination when stimulating the concordant M1 compared to the discordant M1