

The origin of the articulatory effect on speech perception

Sarah Carneiro Pereira¹, Charlie Guérit¹, Charlotte Dutrieux¹, Gilles Vannuscorps^{1,2}

⁽¹⁾ Psychological Sciences Research Institute, Université catholique de Louvain, Belgium

⁽²⁾ Institute of Neurosciences, Université catholique de Louvain, Belgium

INTRODUCTION

Executing speech-related lip movements interferes with the perception of lip-related speech sounds.¹

WHY?

Motor theory of speech perception (MTSP): because articulatory resources are depleted.²

Alternative: because this activates phonological representations.³

Aim: to discriminate these two hypotheses.

METHOD

PARTICIPANTS

Experiment 1: 20 adults.

Experiment 2: 23 adults.

MATERIAL

/TA/ vs /PA/ (Lingual / Labial).

/TA/ vs /KA/ (Lingual / Lingual).

White noise (constant level of 55dB).

PROCEDURE: DUAL TASK PARADIGM

4 conditions: 2 pairs of syllables x 2 movements.

/TA/ and /PA/		/TA/ and /KA/	
Finger	Lip	Finger	lip

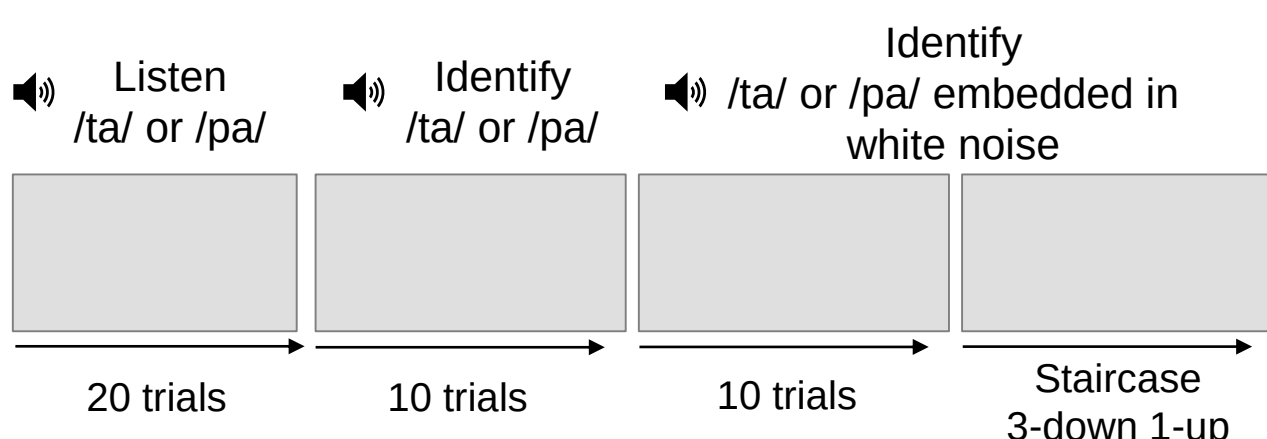
Lip movement differs between Experiment 1 & 2:

Exp 1: open and close the lips.

Exp 2: protrusion and retrusion of the lips.

Each condition is repeated 3 times: 12 blocks.

Each block comprises 4 steps.

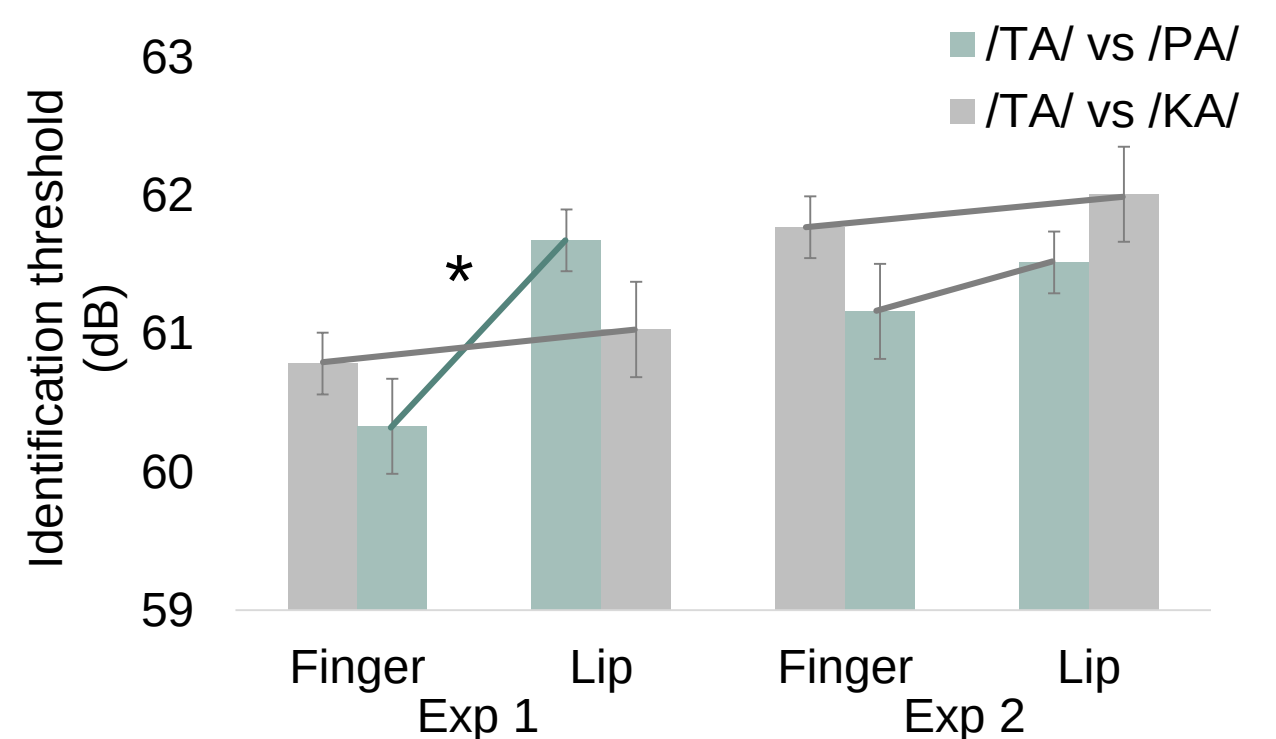


PREDICTIONS

If the MTSP is true, any lip movements (speech-related or not, i.e., in Experiment 1 and 2) should affect disproportionately the discrimination of TA and PA (vs. TA and KA) in comparison to the finger movements.

If the alternative hypothesis is true, then, this effect should be observed only for speech-related lip movements (i.e., only in Experiment 1).

RESULTS



• RM ANOVA: significant interaction only in Exp 1.

• Bayesian paired t -test (with Cauchy scale at .707):

H1: $IT_{lip} - IT_{finger}$ movements is larger for TA/PA than TA/KA.

Exp 1: $BF_{10} = 6.44$

Exp 2: $BF_{10} = 0.3$

DISCUSSION

Our results suggest that the influence of speech-related movements on speech perception is a by-product of the activation of phonological representations.³

These findings invite a reinterpretation of previous results claimed to support the MTSP.

REFERENCES

¹ Sams, M., Möttönen, R., & Sihvonen, T. (2005). Cognitive Brain Research, 23(2-3), 429-435.

² Berent, I. et al. (2020). Frontiers in Communication, 5, 34.

³ Whitford, T. et al. (2017). Elife, 6, e28197.

CONTACT

Sarah.carneiro@uclouvain.be