

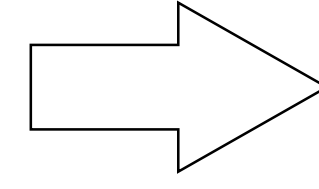
The effect of articulatory suppression on speech perception originates from phonological rather than motor interference

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INTRODUCTION

- Articulatory suppression hampers speech perception¹⁻⁴. This is often considered evidence that speech perception is supported by motor/articulatory resources⁵.
- However, articulatory suppression also involves phonological resources⁶.



- Does the effect of “articulatory suppression” originate from motor or phonological interference?
- The aim of the three experiments reported here is to discriminate these two interpretations.

METHOD

Motor task

- Lips protrusion (kiss) → lip-related but not speech-related
- Index tapping → not lip-related
- Lips opening → lip-related and speech-related
- Following the pace of the visual metronome (1Hz)

EXP 1
(n=24)

EXP 2
(n=24)

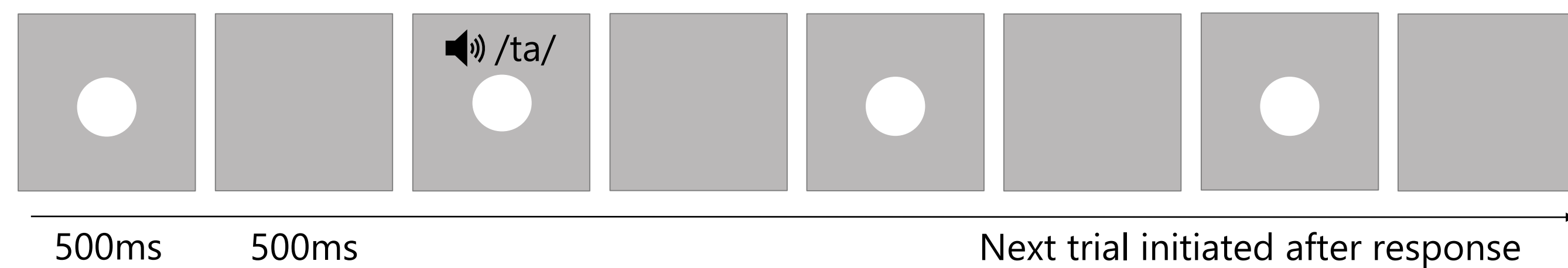
EXP 3
(n=24)

Auditory task

- Syllables embedded in white noise
- Staircase design (VD: intensity of syllables in decibels)
- Identify /pa/ or /ta/ → bilabial or lingual syllable
- Identify /ka/ or /ta/ → two lingual syllables

Dual-task procedure

White noise (constant)

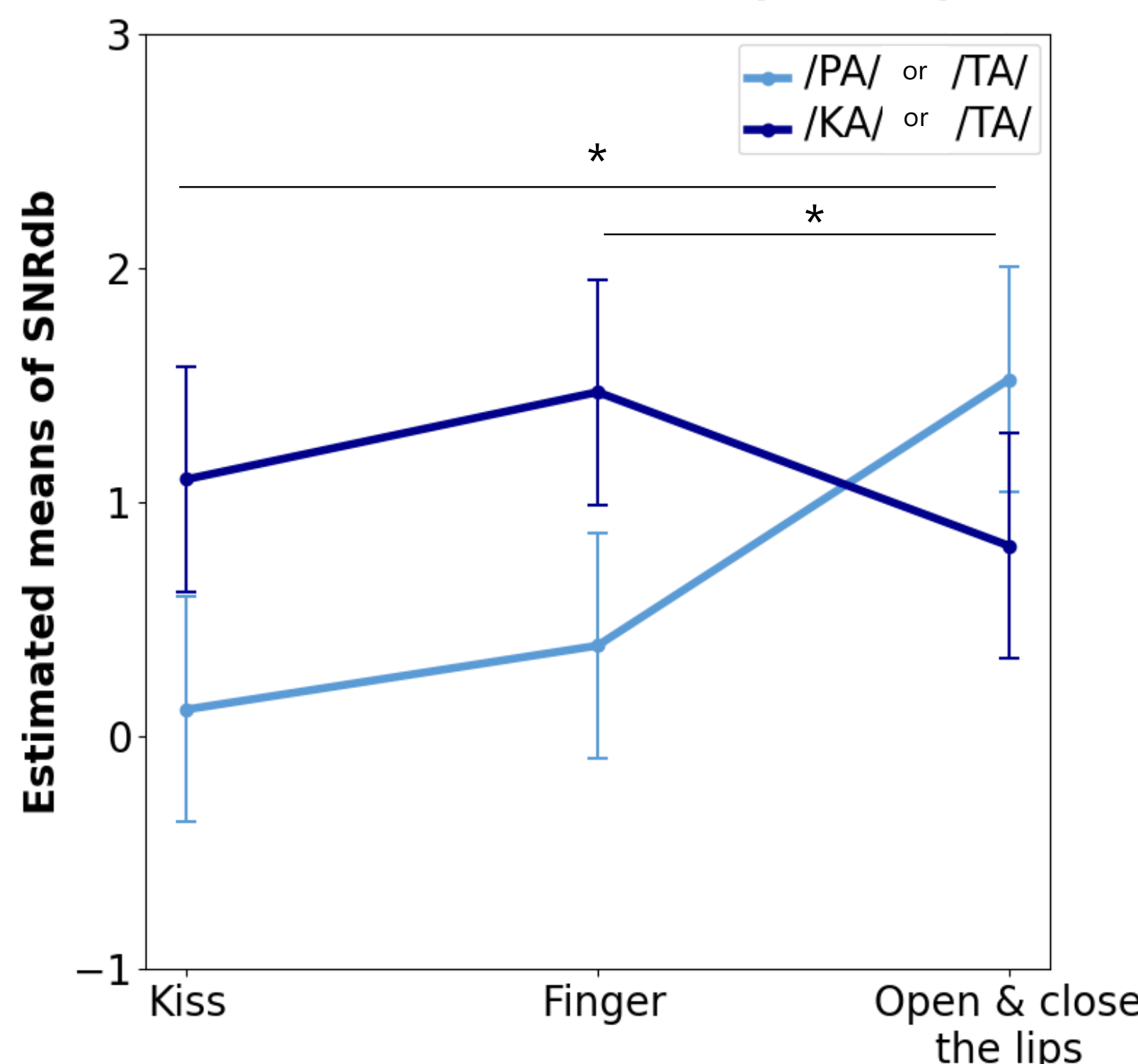


RESULTS : Motor effect on auditory task

Does the motor task influence the identification of the /pa/ ?

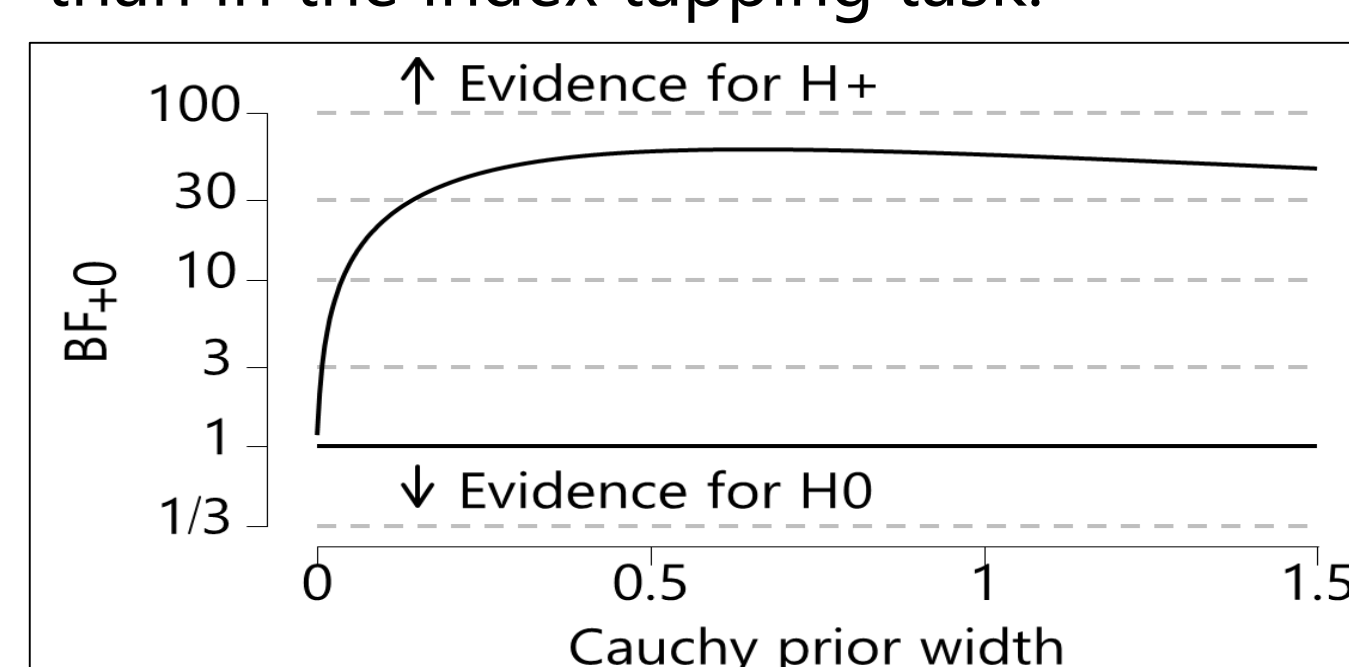
- VD: identification threshold (Signal/noise ratio; in db).
- Test for an interaction between the type of motor and auditory tasks.
- LMM & Bayesian t-tests.

EXPERIMENT 1 (n=24)

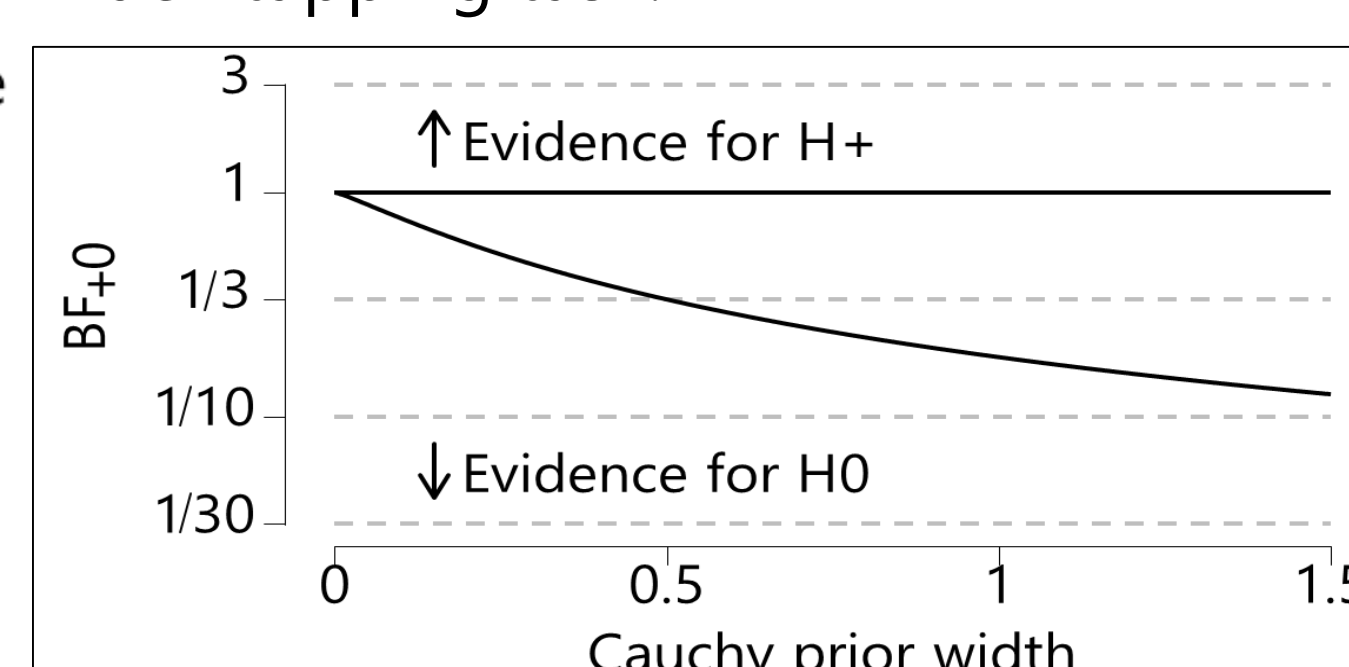


Motor task*Auditory task
($F_{2,426} = 5.789$, $p=0.001$).

H+: the difference of identification threshold between /PA/or/TA/ and /KA/or/TA/ is larger in the lips opening than in the index tapping task.



H+: the difference of identification threshold /PA/or/TA/ and /KA/or/TA/ is larger in the lips protrusion than in the index tapping task.

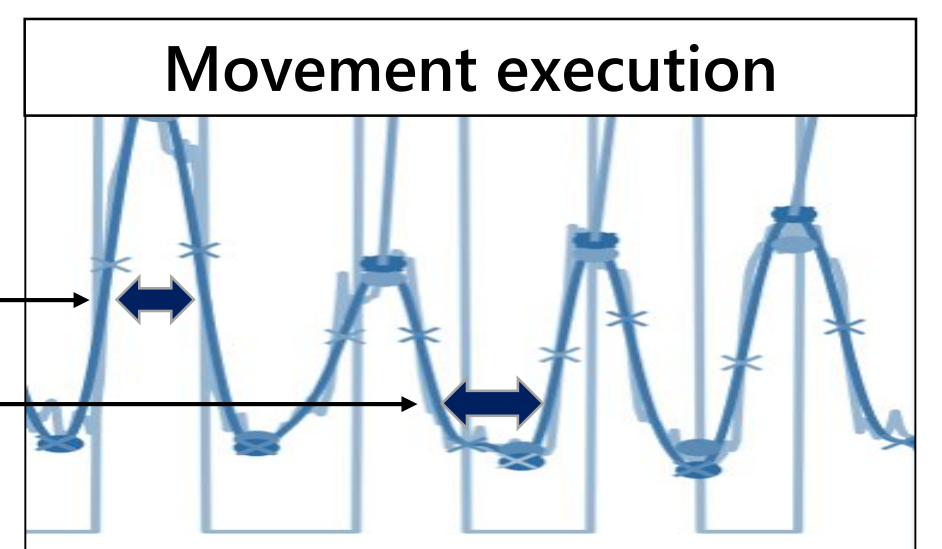


RESULTS : Auditory effect on motor task

Does hearing a /pa/ influence the lip-related motor task?

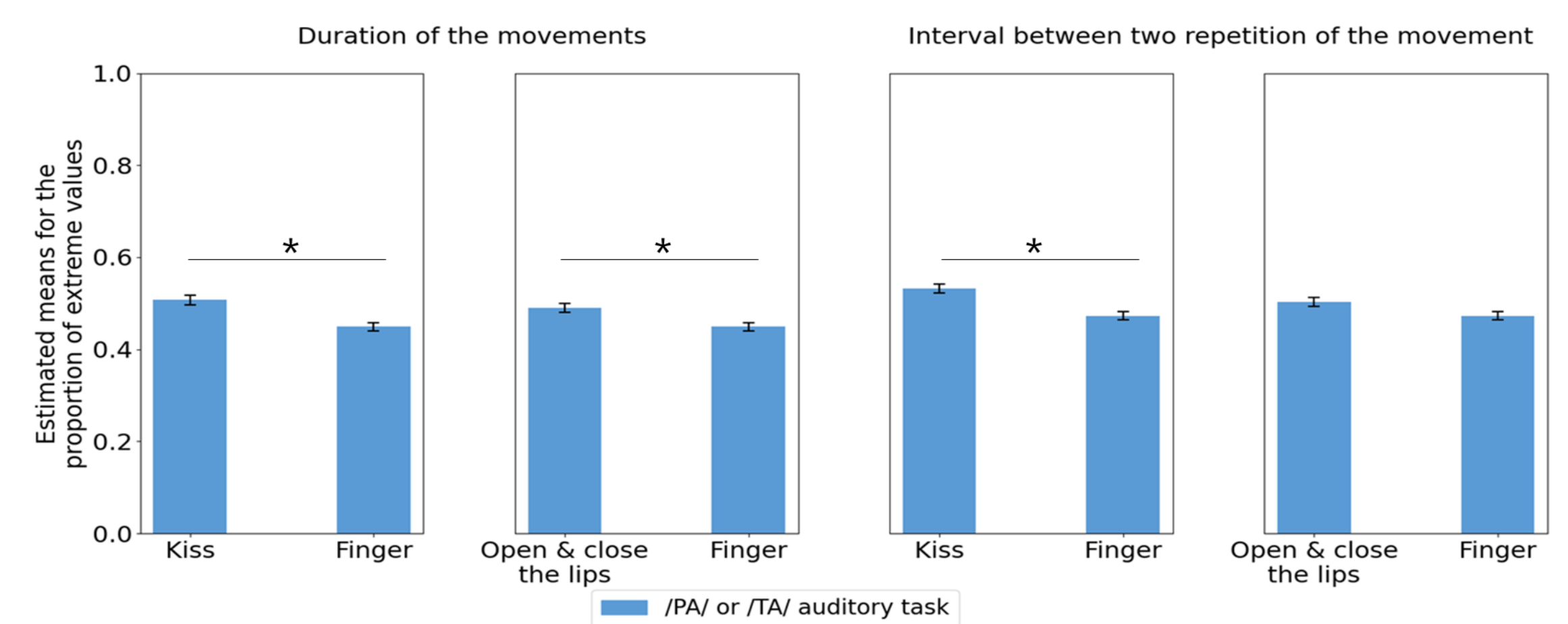
- Identify the 5% most-extreme trials for each motor task across auditory tasks.

- Duration
- Interval inter movement



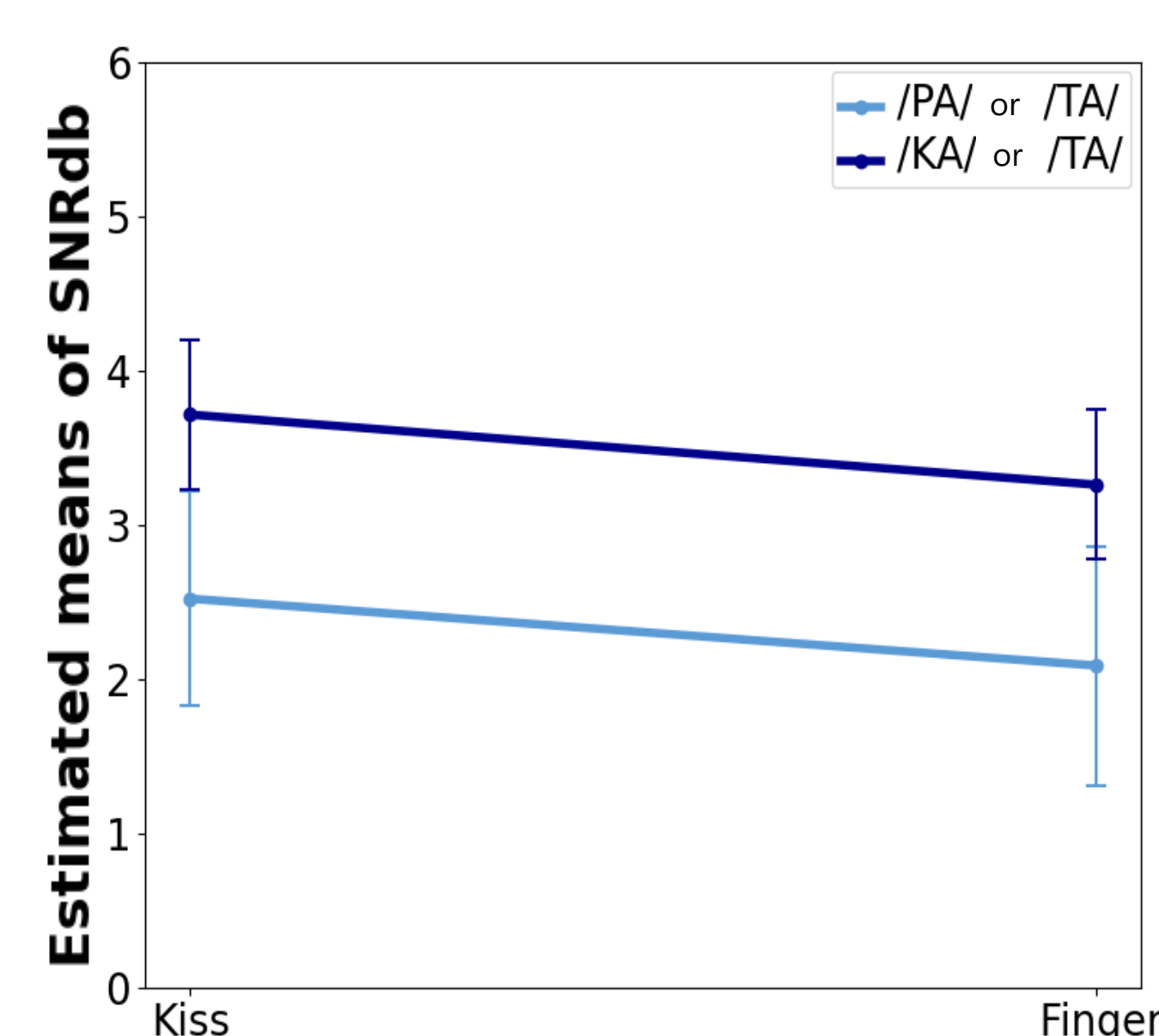
- Test whether the type of motor task influences the distribution of extreme values across the two auditory tasks (GLMM(binomial)).

Proportion of extreme values for /pa/or/ta/ auditory task



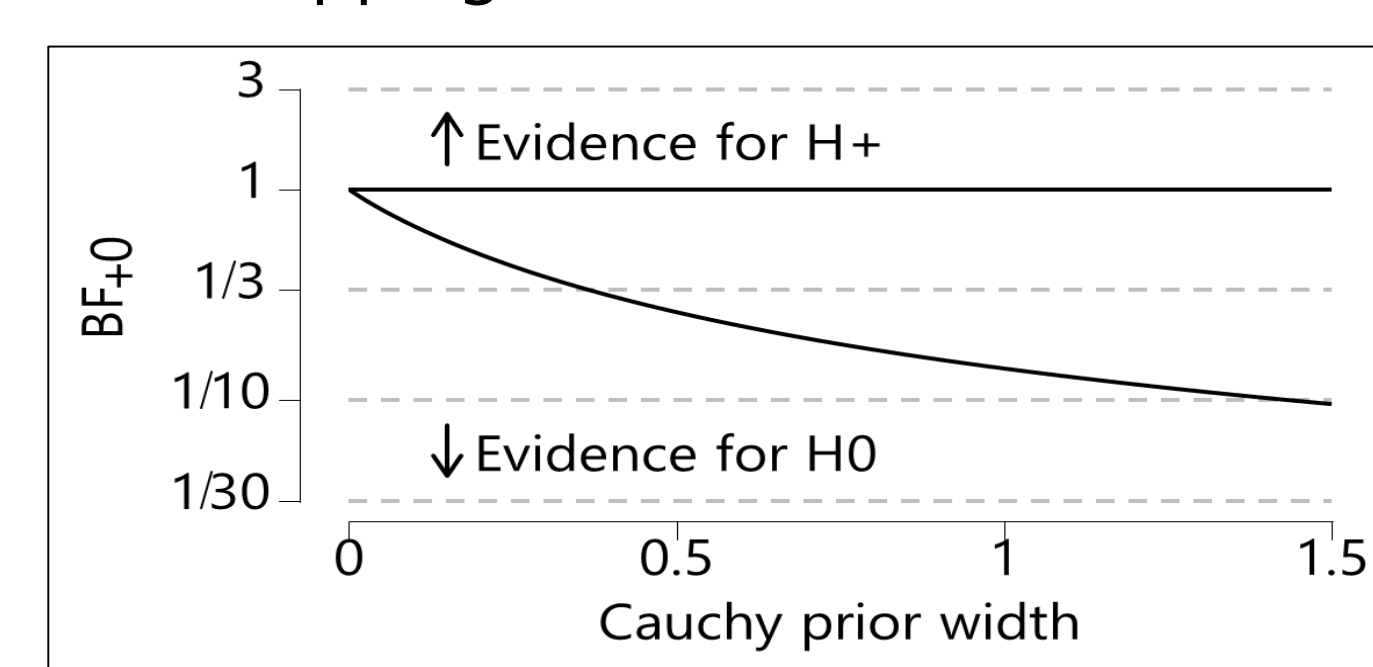
RESULTS : Replication studies

EXPERIMENT 2 (n=24)

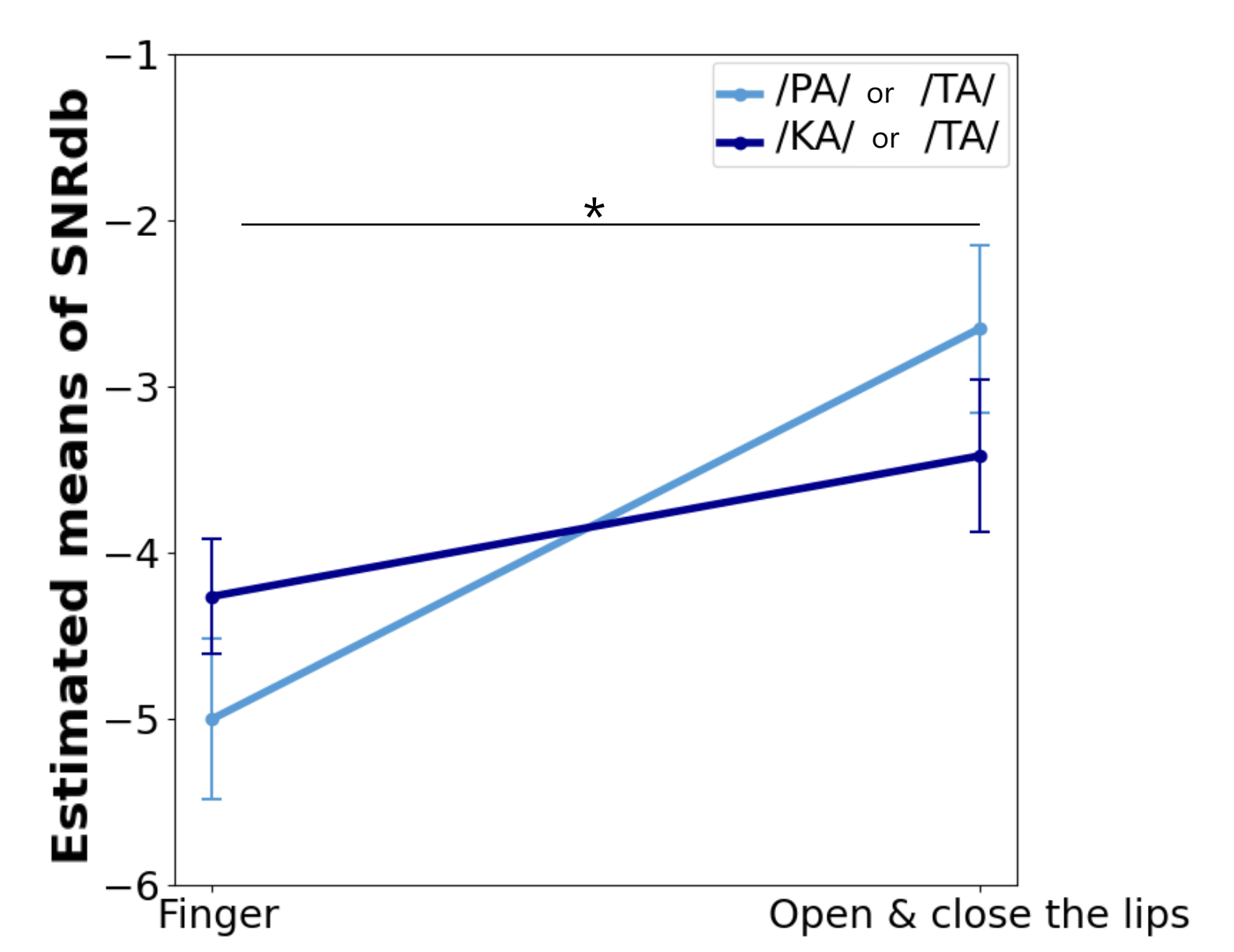


Motor task*Auditory task
($F_{1,283} = 0.001$, $p=0.490$)

H+: the difference of identification threshold /PA/or/TA/ and /KA/or/TA/ is larger in the lips protrusion than in the index tapping task.

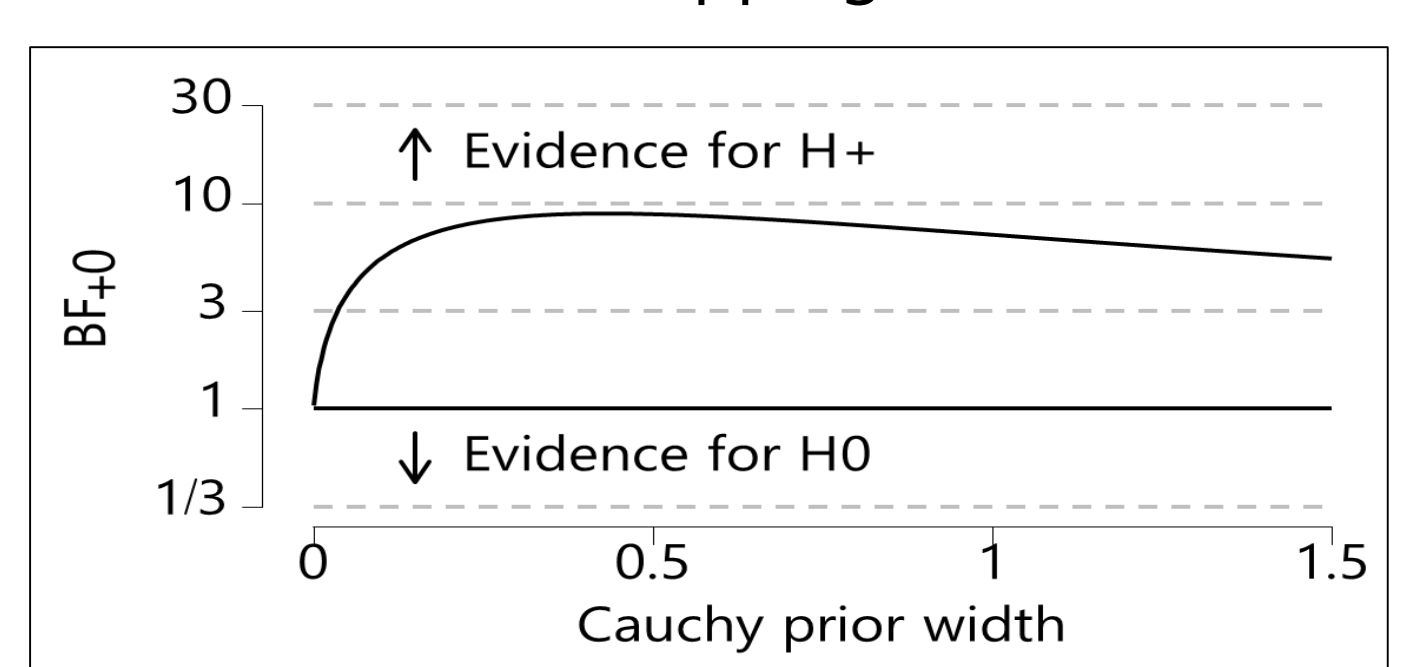


EXPERIMENT 3 (n=24)



Motor task*Auditory task
($F_{1,282} = 7.495$, $p=0.003$)

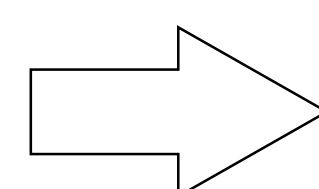
H+: the difference of identification threshold between /PA/or/TA/ and /KA/or/TA/ is larger in the lips opening than in the index tapping task.



DISCUSSION

Frequentists + Bayesians statistical analyses indicated that :

- The identification of lip-related speech sounds influences the execution of lip-related movements.
- However, only the execution of the speech-related lip movement interfered significantly with the perception of lip-related speech sounds.



- Our findings suggest that the effect of articulatory suppression originates from phonological interference.
- The effect of articulatory suppression should not be taken as evidence in favor of the motor theory of speech perception.

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