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Relationships between the effect of orofacial somatosensory stimulation in speech perception and speech production performance

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Introduction

- Orofacial somatosensory inputs modify the perception of speech sounds^{1,2}. This is related to the role of somatosensory system in production, transferred to perception through sensory-motor relationships in the human brain. Thus, somatosensory effect in perception may vary based on production ability.

Aim

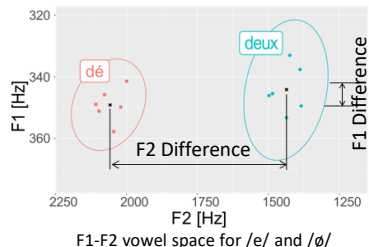
- To investigate the relationships between the somatosensory effect in speech perception and speech production performance.

Methods

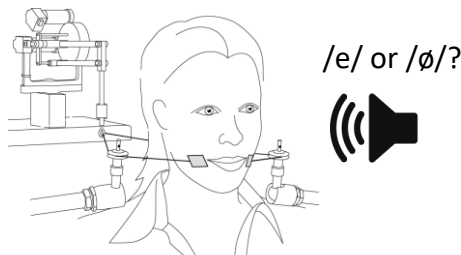
- We examined whether somatosensory effect in speech perception was correlated with production ability in corresponding vowels.
- Participants:** Nineteen French native speakers.
- Speech Production Test:** French words, 'Dé' for /e/ and 'Deux' for /ø/ were recorded.



- Production index:** Difference in the first, second and third formant frequencies (F1, F2 and F3) between /e/ and /ø/.



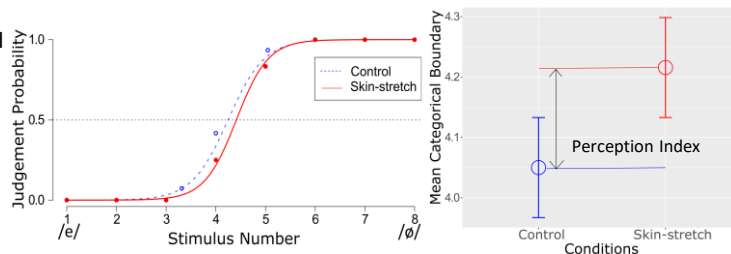
- Somatosensory effect in speech perception:** Vowel identification test with an 8-member /e/-/ø/ continuum was carried out.
 - Somatosensory stimulation associated with facial skin deformation was applied with the presentation of auditory stimulus.
 - Perception index:** Difference in categorical boundary between the conditions with and without somatosensory stimulation (Skin-stretch and Control).



Experimental setup with somatosensory stimulation

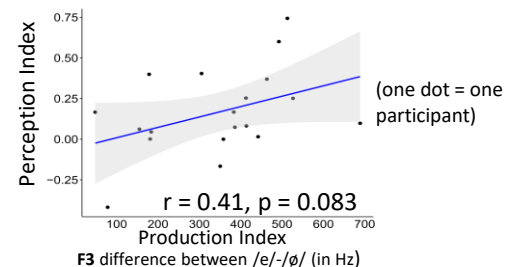
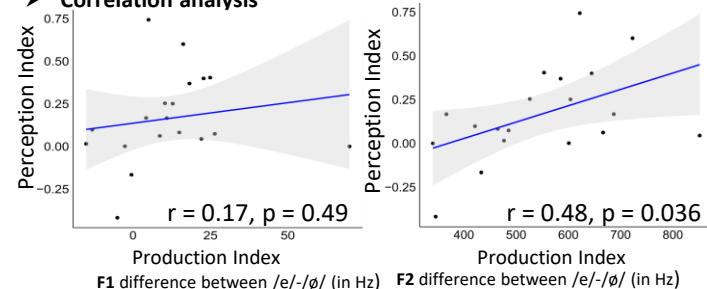
Results

- Somatosensory effect on speech perception**



- Orofacial somatosensory stimulation significantly increased the amount of /e/ responses ($F(1,18) = 7.42, p < 0.05$)

Correlation analysis



- A reliable correlation with F2 ($p < 0.05$) and marginal correlation with F3 ($p = 0.083$) but no correlation with F1 ($p > 0.4$).

Conclusion

- Results indicated that the participants who have a large difference between /e/ and /ø/ showed large somatosensory effect in speech perception.
- Somatosensory effect in speech perception can be ascribed to speech production performance.

Acknowledgement

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