Synchronic variation in the articulation and the acoustics of the Polish three-way place distinction in sibilants and its implications for diachronic change

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Aims

1. **Is there a relation between articulatory properties of polish sibilants /s ʂ ɕ/ and a potential neutralization of /ʂ/?**
2. **Is there an indicator for greater instability of /ʂ/ regarding the acoustic and articulatory properties of /s ʂ ɕ/?**

Background

Polish sibilant differentiation in place of articulation (PoA → spectral center of gravity) and in tongue shape (→ F2 transition) (Toda, et al., 2010; Nowak, 2006)

➔ Retroflex /ʂ/ might be neutralized because it differs from dental /s/ and alveolopalatal /ɕ/ only in one cue

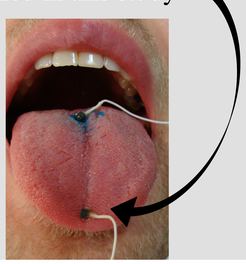
e.g. /s ʂ/ neutralization attested for non-standard varieties of Polish (Nowak, 2006) and for Mandarin (Duanmu, 2002)

Articulatory Analysis

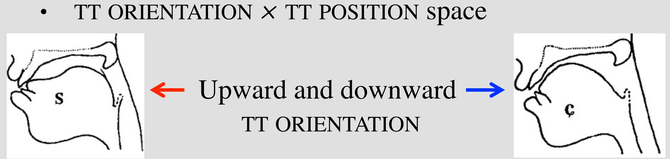
- Four Polish L1-speaker aged between 19 and 28 were recorded with AG501
- Participants produced symmetrical **CVCV** non-words (with **C**=/s ʂ ɕ/ and **V**=/a e o/), which were embedded in the carrier phrase:

  'Ania woła CVCV aktualnie' ('Ania shouted CVCV currently')
- Speech material was produced at a low and a fast speech rate
- **EMA**

Only **tongue tip** (**TT**) sensor analyzed in this study



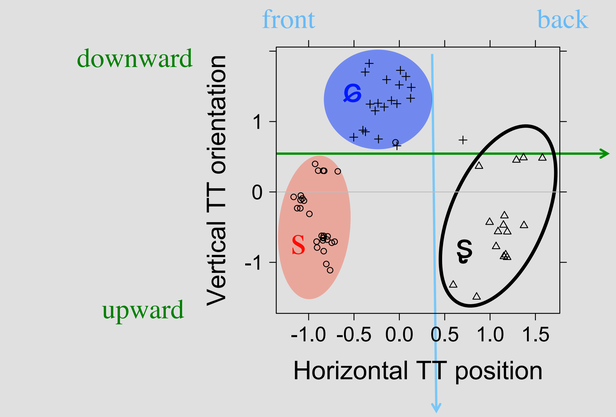
- Quantification **articulatory** distance
  - TT ORIENTATION × TT POSITION space

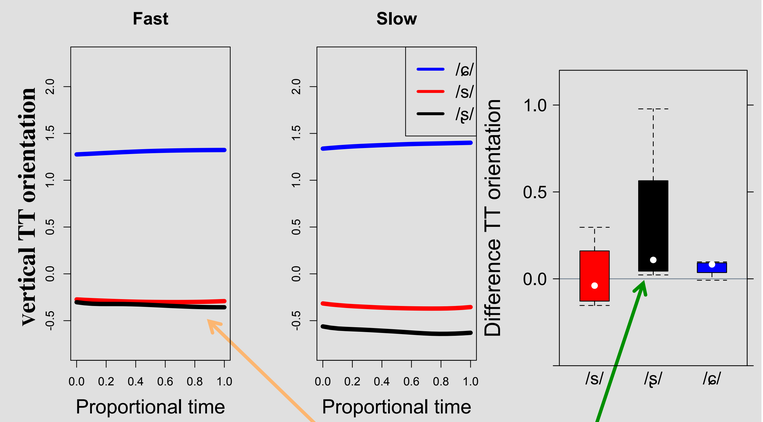


(Ladefoged & Maddieson, 2008)

- Difference in TT orientation between fast and slow speech

Articulatory Results

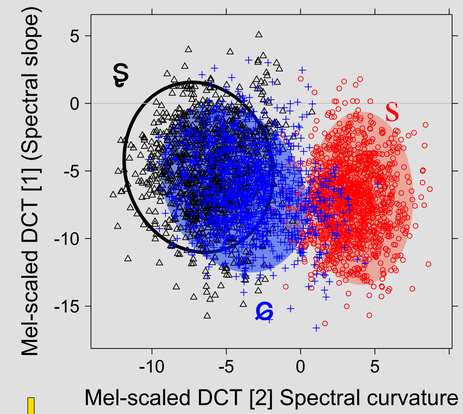




TT orientation of /ʂ/ very often identical (but also variable) with that of /s/ in fast speech

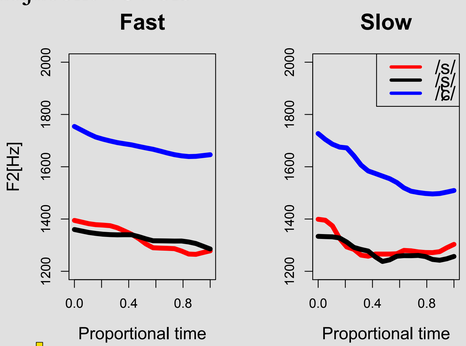
Acoustic Analysis & Results

(1) Fricative noise:
Quantification of **acoustic** distance in sibilants



Acoustic similarity between **/ʂ ɕ/**

(2) F2 transitions:
Measure of the coarticulatory effects of **/s ʂ ɕ/** on adjacent vowels



Acoustic similarity between **/s ʂ/**

Discussion & Conclusion

1. Three-way place contrast in **/s ʂ ɕ/** maintained based on different **tongue shapes** and **positions**
2. /ʂ/ shows acoustic similarities with both **/s/** and **/ɕ/**
3. Greater effect of **speech rate** on transition in **/ʂ/** than in **/s/** and **/ɕ/**
   ➔ indicated by similar TT orientation for /s/ and /ʂ/ in fast speech

Acknowledgements and References

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