

The role of multilingual language proficiency and speaking mode on sibilants produced by L1 Polish, L2 English, L3 learners of Norwegian

In prior investigations into the effects of speaking mode (spontaneous or read speech) on speech production, it was suggested that spontaneous speech is produced with reduced spectral space when compared with read speech in the L1 (Nakamura, et al., 2008) or in an L2 (Cucchiari et al., 2002). However, the effects of speech mode on phoneme production at various stages of multilingual language proficiency in L3/Ln learners remains vastly understudied.

The present study contributes to this gap of knowledge via spectral analyses of Norwegian, Polish and English sibilants in an L3 acquisition context, produced during spontaneous and read speech. Our primary research questions were: (1) do L2/L3 language proficiencies affect the acoustics characteristics of sibilants produced in an L1, L2, or L3? and (2) does learner production of sibilants differ across speaking mode for each language in the learner's linguistic repertoire?

We predicted that the center of gravity (CoG) of sibilants will display a reduced spectral space in spontaneous speech when compared with read speech. CoG values of higher L2/L3 proficiency participants was predicted to positively correlate with CoG values of native speaker controls for both speaking modes.

Participants consisted of 39 (f=35) L1 Polish, L2 English, L3 Norwegian learners and 10 (f=8) L1 Norwegian controls. Subjects produced three tasks: a story recollection task, a picture description task, and a sentence reading task. The stimuli for the sentence reading task consisted of participant-specific randomized lists. Each list contained an identical set of natural sentences, embedded with intervocalic sibilant tokens ($n = 780$ tokens per sibilant per language, i.e., Polish: /s/, /ʃ~ʂ/, /ɕ/; English: /s/, /ʃ/; Norwegian: /s/, /ʃ~ʂ/, /ç~ʂ~ɕ/). Additionally, these sentences were intermixed randomly with distractor sentences from a parallel experiment.

Stimuli were presented in three ordered language blocks (L3 > L2 > L1). For each block, language mode was primed using a combination of language-specific instructions, video clip exposure, and story retelling in the target language. To quantify the effects of language proficiency on sibilant production patterns in the L1/L2/L3, language history questionnaires and proficiency tests were administered to each participant.

Linear mixed effects regression models were used to contrast the spectral properties of learner sibilant inventories with regards to speaking mode and language proficiency for each language. The spectral moments, i.e. (1) spectral center of gravity (CoG), (2) spread, (3) skewness, and (4) kurtosis, were subjected to pairwise comparison with Bonferroni correction.

The results of this investigation provided novel evidence that speaking mode (spontaneous versus read speech) and learner proficiency (L3 Norwegian, L2 English) correlate with distinct patterns of cross-linguistic influence for sibilant in the language repertoires of L3 learners.

Keywords:

Cross-linguistic influence, multimodal speech, voiceless sibilants, Polish, Norwegian

References

Cucchiarini, C., Strik, H., & Boves, L. (2002). Quantitative assessment of second language learners' fluency: Comparisons between read and spontaneous speech. *the Journal of the Acoustical Society of America*, 111(6), 2862-2873.

Nakamura, M., Iwano, K., & Furui, S. (2008). Differences between acoustic characteristics of spontaneous and read speech and their effects on speech recognition performance. *Computer Speech & Language*, 22(2), 171-184.