The role of speech modality on the production of Norwegian, Polish and English sibilants in a multilingual acquisition context

The present study compares the acoustic characteristics of Norwegian, Polish and English sibilants produced during semi-spontaneous and read speech in an L3 acquisition context. Traditionally, Polish and Norwegian maintain a three-place distinction in in their sibilant systems (Polish: /s/, /ʃ~ʂ/, /ɕ/; see Jassem, 2003; Czaplicki et al. 2016; Norwegian: /s/, /ʂ~ ʃ/, /ç/; in Kristoffersen, 2000; van Dommelen, 2019), whereas, English maintains a two-place system (/s/ and /ʃ/).

Our primary research questions were: (1) Do L2/L3 learners' productions of sibilants differ across speaking modes, i.e., semi-spontaneous speech versus read speech and (2) does L2/L3 language proficiency interact with speaking mode to affect the acoustics characteristics of sibilants produced in an L1, L2, or L3?

Participants consisted of 39 (f=35) L1 Polish, L2 English, L3 Norwegian learners and 10 (f=8) L1 Norwegian controls. Subjects produced semi-spontaneous speech during a story recollection task, a picture description task and an informal interview. Read speech data was obtained in a North Wind and the Sun reading task, as well as in a naturalistic sentence reading task across a combined sibilant production experiment and a voicing onset time experiment (n = 780 tokens per sibilant per language, i.e., Polish: /s/, /ʃ~ʂ/, /ɕ/; English: /s/, /ʃ/; Norwegian: /s/, /ʃ~ʂ/, /ç~ʂ~ɕ/).

Stimuli were presented in three ordered language blocks (L3 > L2 > L1) and language mode was calibrated between each block with a variety of methods (e.g., a story-telling task, audio clips in the language, task instructions in the language). To quantify the effects of language proficiency on sibilant production patterns in L1/L2/L3, detailed language background questionnaires and proficiency tests were administered.

The ongoing analysis uses linear mixed effects modeling to contrast the spectral properties of learner sibilant inventories across speaking modality and proficiency level by language. We assess the sibilants according to acoustic measures grounded in previous literature (Jongman, Wayland & Wong, 2000; Nirgianaki, 2014; Lee, 2020), i.e., spectral mean, spectral peaks, and spectral moments: spectral center of gravity (CoG), spread, skewness, and kurtosis.

We predicted that spectral moments of sibilants will display less variance in read speech than in semi-spontaneous speech. Orthography may also influence the variability of certain phonemes in read speech across L2/L3 proficiency levels as observed in Czarnecki-Verner et al. (in prep). Higher L2/L3 proficiency was predicted to positively correlate with sibilant CoG values more similar to those of the L1 controls in both read and spontaneous speech (i.e., higher proficiency L2/L3 speakers will produce more accurate sibilants regardless of the speaking mode). Results of the analysis will determine whether speaking mode (semi-spontaneous versus read speech) and learner proficiency (Norwegian, English) impacted patterns of cross-linguistic influence pertaining to sibilant production in Polish, Norwegian and English.

(360 Words)

Keywords:

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

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