

Clear speech, not phonological contrast, constrains imitation of English sibilants

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Introduction: Phonetic imitation is constrained by social and linguistic factors, including phonological category boundaries. In particular, English speakers have been shown to imitate enhanced voice onset time on /p/ but not reduced voice onset time on /p/ (Nielsen, 2011). However, using English /p/ as a test case confounds imitation with tendency towards clear speech in laboratory settings. Reduced /p/ may not be imitated because participants do not hypoarticulate in laboratory experiments. We use English sibilants as a test case to de-couple clear speech and phonological contrast as constraints on imitation.

Predictions: If clear speech constrains imitation, we expect imitation of enhanced sibilants and no imitation of reduced sibilants. This is because English speakers tend to enhance frequencies of /s/ and /ʃ/ when speaking clearly (Maniwa et al., 2009). If phonological contrast constrains imitation, only enhanced /s/ and reduced /ʃ/ will be imitated as these do not approach phonological category boundaries.

Methods: The experiment was a delayed shadowing task. Participants first produced /s/ or /ʃ/ initial words (balanced for lexical frequency and following vowel rounding), then were exposed to model speech with either enhanced or reduced sibilant center of gravity (CoG), then produced the same words again with no instruction to imitate. The stimuli were recorded by a female native American English speaker. The model speech was constructed by increasing or decreasing CoG by 15%. The vowels in the stimuli were not manipulated, providing perceptual information that CoG is enhanced or reduced for the model. The participants were 60 monolingual English speakers in a between-subjects design with each participant exposed to one of: enhanced /s/, reduced /s/, enhanced /ʃ/, reduced /ʃ/.

Results: At the group level, participants exposed to enhanced /s/ significantly increased CoG post-exposure, but participants exposed to reduced /s/ did not (Fig. 1). These results are expected under both hypotheses. The crucial results are from /ʃ/ (Fig. 2). Participants exposed to enhanced /ʃ/ significantly increased CoG, in line with clear speech predictions. Participants exposed to reduced /ʃ/ also significantly increased CoG, which may have been due to the relatively high raw CoG of the model. There were also more individual differences in direction and degree of shift after exposure among the participants exposed to reduced stimuli than those exposed to enhanced stimuli for both /s/ and /ʃ/.

Conclusion: These results are in line with the clear speech hypothesis as convergence was not constrained by phonological category boundaries. This is shown through the significant imitation of enhanced /ʃ/, which approaches the boundary with /s/. Imitation was constrained by clear speech as reduction of /s/ and /ʃ/ was not significantly imitated at the group level. Shifts which constitute clear speech (enhanced /s/ and /ʃ/) were more robustly and consistently imitated overall, regardless of whether they approached a category boundary. This has implications for design of future laboratory imitation studies and models of phonological representation in phonetic imitation.

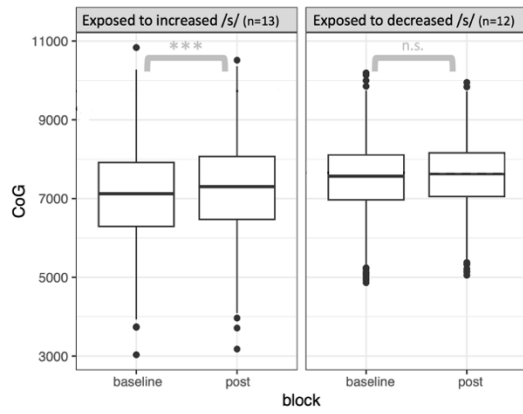


Fig. 1. Group results for /s/

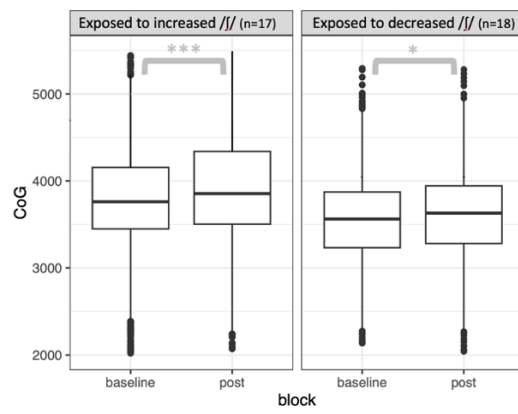


Fig. 2. Group results for /ʃ/

References

- [1] Maniwa, K., Jongman, A., & Wade, T. (2009). Acoustic characteristics of clearly spoken English fricatives. *The Journal of the Acoustical Society of America*, 125(6), 3962-3973.
- [2] Nielsen, K. (2011). Specificity and abstractness of VOT imitation. *Journal of Phonetics*, 39(2), 132-142.