

The interaction between phonological neighborhood density, lexical status, and lexical competitors on production of Italian stops

Concu Valentina & Bruno Staszkievicz Garcia
Purdue University

In recent decades, the studies on how the speakers' knowledge of the lexicon influences the phonetic realizations of consonants and vowels have brought forth broad interest in the effects of lexical neighbors and phonological neighborhood density (PND) on production. The latter refers to the number of words in the lexicon that show phonological similarities to a given word in a specific language. According to Gahl, Yao, and Johnson (2012), for instance, words with higher phonological neighborhood density tend to be phonetically reduced. Such reduction has been shown to affect the articulation of both vowels and consonants. For what concerns voiced and voiceless consonants, studies showed that it had a significant effect on the voiced onset time of stops in initial position, shortening its duration (Baese-Berk & Goldrick, 2009; Peramunage, Blumstein, Myers, Goldrick, & Baese-Berk, 2010).

In this study, we investigate whether phonological neighborhood density has an effect on the acoustic realization of voiced and voiceless stops in word initial position, focusing however on a language other than English. We also investigate the effects of phonological neighborhood density and other factors such as the lexical status of a word (real and non-real words) and the presence or absence of lexical competitors (words with and without minimal pair neighbors) on VOT.

To achieve this goal, we analyzed 74 stimuli (real and non-real words) beginning with /p b t d k g/ of 30 native speakers of Tuscan Italian, previously analyzed using Praat (Boersma & Weenink, 2008). For each voiced stimulus, we considered the duration of prevoicing and release, whereas for voiceless stimuli, we considered only release duration. ANOVA models were conducted with lexical status (real vs. non-word), competitor (with vs. without minimal pair neighbors), place of articulation (dorsal vs alveolar vs. labial), phonological neighborhood density as fixed factors, and intercept for participants as a random factor. Voiced and voiceless stops were analyzed separately.

The results of the ANOVA show two main effects. Firstly, PND had an effect on VOT, showing a shorter VOT in voiced and voiceless consonants as phonological neighborhood increased. Secondly, PND had a statically significant interaction with the presence of a competitor. Words with no competitors showed to have longer VOT as the phonological neighborhood density increased.

The data show that the phonological neighborhood density affects the realization of voiced and voiceless consonants and the presence of minimal pair neighbors among Italian speakers. Overall, our results seem to confirm what the scholarly community has found for English: Phonological neighborhood density facilitates production (Gahl, Yao, and Johnson, 2012), as VOT decreased with words with high phonological neighborhood density. Further, this data suggests that facilitation in production caused by high values of phonological neighborhood density is not language-specific and could be related to common cognitive mechanisms used by the speakers to access the lexicon and facilitate production.

References

- Baese-Berk, M., & Goldrick, M. (2009). Mechanisms of interaction in speech production. *Language and Cognitive Processes*, 24, 527–554.
- Boersma, P., & Weenink, D. 2008. Praat: doing phonetics by computer. Computer program.
- Gahl, Yao, & Johnson. (2012). Why reduce? Phonological neighborhood density and phonetic reduction in spontaneous speech. *Journal of Memory and Language*, 66(4), 789-806.
- Peramunage, D., Blumstein, S. E., Myers, E. B., Goldrick, M., & Baese-Berk, M. (2010). Phonological neighborhood effects in spoken word production: An fMRI study. *Journal of Cognitive Neuroscience*, 23, 593–603