**Abstract**

**Where is the boundary? Perception of voicing distinction in word-initial stops by multilingual learners**

Zuzanna Cal

Adam Mickiewicz University, Poznań, Poland

Perception of word-initial stops have been an object of research for a few decades now. Yet, the majority of studies concern the field of L2 acquisition (e.g., Kong 2019, García-Sierra et al. 2021, Pan et al. 2022) leaving multilingual perception of Voice Onset Time (VOT) largely unexplored. As being multilingual has become the standard in the present-day world, it seems vital to throw more light on possible processes and cross-linguistic interactions that are behind speech perception in multilinguals. The previously published studies on VOT perception in multilinguals provide rather inconsistent results pointing to either possible progressive and regressive cross-linguistic interactions (Liu et al. 2019) or separate patterns of VOT categorisation across languages (Cal and Wrembel 2023).

This study seeks to provide more insight into the field of multilingual perception of VOT and consolidate previous findings by exploring how trilingual speakers perceive word-initial stops in their three languages. The specific aim is to answer the following RQs:

1. How are the stops categorised in a multilingual mind? Are the patterns of VOT categorisation in multilinguals language- and/or place of articulation-specific?
2. Are the perceptual boundary locations between voiced and voiceless stops influenced by the interactions between L1, L2 and/or L3?

The experiment was conducted on a group of 30 trilingual speakers of L1 Polish-L2 English-L3 Norwegian. The study design involved preparation of VOT continua separately for the three places of articulation (labial/coronal/velar) and languages (Polish/English/Norwegian) that ranged from -100 to 100ms and consisted of 21 steps, each of 10ms. The obtained tokens were then applied in a two-alternative forced-choice task that was administered in three separate language blocks preceded by an introduction into a respective language mode. The obtained data included accuracy scores that allowed to calculate perceptual boundary locations.

A Linear Mixed Model was run to compare the main effects of language, stop continuum and their interaction on perceptual boundary locations. The results pointed to the main effect of continuum (F=127.32, p<.001) and the interaction effect of continuum\*language (F=2.96, p=.021), but no main effect of language (F=2.19, p=.113). Pairwise comparisons revealed significant differences between L1-L2 (t=2.16, p=.032) in the d-t continuum as well as between L1-L2 (t=2.36, p=.019) and L1-L3 (t=2.53, p=.012) in the g-k continuum, which suggest separate categorisation of native vs. non-native languages in the two continua. The ongoing analysis further investigates the role of L2/L3 proficiency, individual variation and native speakers’ comparisons to further inform the findings.

References

Cal, Z., Wrembel, M. (2023). Perception of voicing distinction in syllable-initial stops by multilingual speakers. In: Radek Skarnitzl & Jan Volín (Eds.), *Proceedings of the 20th International Congress of Phonetic Sciences* (pp. 451–455). Guarant International.

García-Sierra, A., Schifano, E., Duncan, G. M., Fish, M. S. (2021). An analysis of the perception of stop consonants in bilinguals and monolinguals in different phonetic contexts: A range-based language cueing approach. *Attention, perception & psychophysics 83*, 1878–1896.

Kong, E. (2019). Individual differences in categorical perception: L1 English learners’ L2 perception of Korean stops. *Phonetics and Speech Sciences 11*, 63–70.

Liu, Z., Gorba, C., Cebrian, J. (2019). Effects of learning an additional language on VOT perception. In: Sasha Calhoun, Paola Escudero, Marija Tabain & Paul Warren (eds.) *Proceedings of the 19th International Congress of Phonetic Sciences, Melbourne, Australia 2019* (pp. 260-264). Canberra, Australia: Australasian Speech Science and Technology Association Inc.

Pan, L., Ke, H., Styles, S. J. (2022). Early linguistic experience shapes bilingual adults’ hearing for phonemes in both languages*. Scientific Reports 12*.