

Interlanguage variation through a single acoustic cue: lateral alveolar affricates in Southern Bantu

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Introduction Southern Bantu languages have lateral alveolar affricates where a coronal plosive is followed by a lateral release: Sesotho (SOT) and Northern Sotho (NSO) has voiceless only ‘tɬ’, and Southern Ndebele (NBL) and Siswati (SSW) has only the voiced ‘dɬ’ version. Interlanguage variation is observed when the duration of acoustic cues of ‘tɬ’ and ‘dɬ’ are compared.

Evidence that phonetic realizations of phonological categories vary has been well documented. Voiced plosives in Spanish are realized with voicing before the burst, whereas voiced plosives in English are produced with a short voice onset time (vot) [1]. [2] argue that the centre of gravity (cog) of lateral fricatives is not identical in Ndebele and Siswati because of the difference in the fricative inventory.

Our analysis demonstrates that lateral affricates are realized with interlanguage variation. The durational cue of vot (in voiceless ones) and lateral (in voiced ones) differs between the languages, but not within each language group, suggesting that speakers may actively control the production of acoustic cues in the lateral affricates.

Methods: The voiceless lateral affricate ‘tɬ’ occurs in Sesotho (SOT, n=280) and Northern Sotho (NSO, n=317); these languages do not have the voiced counterpart. The voiced lateral affricate ‘dɬ’ data is taken from Siswati (SSW, n=120) and Southern isiNdebele (NBL, n=192) because they don't have a voiceless lateral affricate. The recordings of 37 speakers were collected in Limpopo (8 NSO, 8 SSW) and Mbombela (12 NBL) in South Africa as well as in Lesotho (9 SOT). Three intervals of voiceless lateral affricates were annotated: closure (clo), voice onset time (vot) and lateral (lat). Voiced lateral affricates had two intervals: closure voicing (cvo) and lat. Durational cues were extracted using a Praat script, and the results were analyzed using R.

Results: Figure 1 shows the duration differences of the three intervals in voiceless lateral affricates of SOT and NSO. A linear mixed model with language and intervals as fixed factors reveal that the interaction between language and vot is highly significant ($\beta = -15.22$, $p < 2e-11$) due to the reverse duration in vot. The language effect is similar for lat ($\beta = -1.64$, $p = 0.47$). Items and Speaker variables were set as random factors. Modest variability across items were also observed: 19.27 (SD = 4.39). Figure 2 shows the results of a linear mixed model in tokens with voiced lateral affricates in SSW and NBL. The interaction effect of interval type and language was significant ($\beta = 25.81$, $p < 2e-16$), suggesting that the lateral part is longer in Siswati.

Discussion: Our data has demonstrated that the speakers actively manipulate the duration of a single interval (voice onset time in voiceless, lateral in voiced) in the production of lateral affricates while keeping the duration of other intervals relatively constant (closure and lateral in voiceless, and closure in voiced). The results suggest that interlanguage variation arises from a difference of a single acoustic cue rather than differences in multiple acoustic cues.

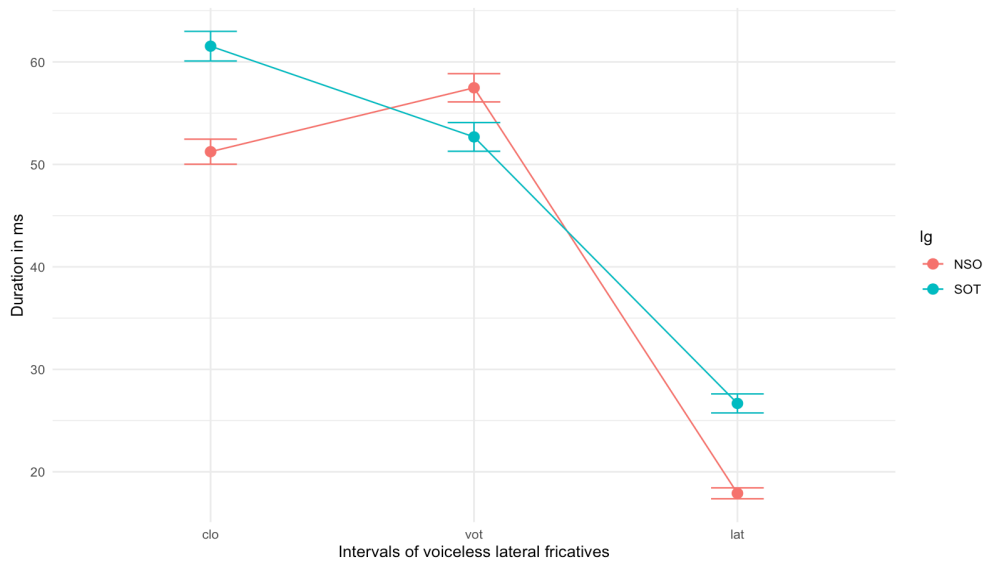


Fig. 1. The duration of three intervals in voiceless lateral affricates in Northern Sotho (NSO) and Sesotho (SOT): *clo*(sure), *vot* (voice onset time) and *lat*(eral)

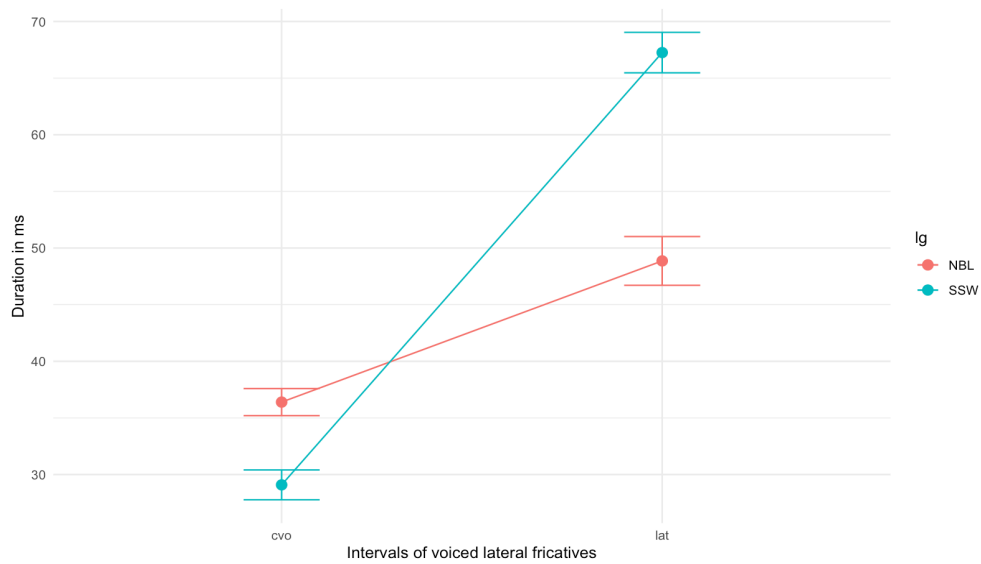


Fig. 2. The duration of two intervals in voiced lateral affricates in Southern Ndebele (NBL) and Siswati (SSW): *c*(losure) *vo*(icing) and *lat*(eral)

References

- [1] Lisker, L. & A.S. Abramson. 1964. A cross-language study of voicing in initial stops: acoustical measurements. *Word* 20: 384-422
- [2] Lee, S. J. & D. Shinagawa. 2025. Phonetics of voiceless laterals in five Southern Bantu languages. *Gengo Kenkyu* 168: 57-76.