Effects of consonant reduction on adjacent vowels in Meru dialects

Conceição Cunha[1], Franziska Muck[1], Fridah Kanana[2]

[1]Ludwig Maximilian University of Munich, Germany
[2]Kenyatta University, Kenya

https://doi.org/10.36505/TheLinguisticProceedings/2025/16/01/004/000664

Abstract

This paper investigates the influence of fricative reduction on adjacent vowels in three Meru dialects. The voiced fricative /β/ is retained in Chuka but deleted in Imenti, creating vowel sequences (hiatus). Since Bantu languages generally avoid hiatus, three repair strategies have been described for these vowel sequences in Imenti: (1) merger of two vowels with the same quality, (2) shortening of the prefix vowel, and (3) lengthening of the stem vowel to compensate for fricative deletion. Audio data were recorded from 75 speakers across three dialects: Imenti, Chuka, and Tiania, an unstudied dialect. The results show consistent /β/ deletion in Imenti and Tiania, as well as some evidence of compensatory lengthening of the merged vowels in both dialects compared to Chuka.

Keywords: Bantu languages, dialects, sound change, deletion, compensatory lengthening

Introduction

The Ameru people are a Bantu-speaking group in Kenya who reside on the northeastern slopes of Mount Kenya (Fadiman, 1973; Guthrie 1967-71). The dialects within the Meru group belong to the larger genealogical Bantu language family, which traces back to Proto-Bantu. Linguistically, the Ameru are composed of nine sub-ethnic groups who speak closely related and mutually intelligible dialects (Kanana 2011a, 2011b, Cunha et al., 2023). Speakers of these varieties are aware of the subtle differences among the dialects they speak but identify as belonging to a related group.

In a morpho-phonological and lexical analysis, Kanana (2011a, 2011b, 2015) classified these dialects as lying on opposite ends of a spectrum of innovativeness, with Chuka being more conservative and Imenti showing greater morpho-phonological change in its consonantal system. Among other differences, the Meru dialects Chuka and Imenti diverge in the presence or absence of the bilabial fricative /β/ (Kanana, 2015). Since Bantu languages tend to avoid hiatus, the following repair strategies has been suggested and will be investigated:

1. Vowel merger when the prefix vowel is identical to the first stem vowel, or when deletion occurs stem-medially and both stem vowels merge, e.g. /ɣo.taβa, ɣo.taː/, *to draw water* (Kanana, 2015, p. 156).

2. Shortening of the prefix vowel (V1) and lengthening of the stem vowel / koβanda, kwaːnda, *to plant* (Kanana, 2015, p. 157). In a few cases, the vowel does not lengthen.
3. Lengthening of the first stem vowel (V1), e.g. /ɣotuβa, ɣotuːa/ (Kanana, 2015, p. 156).

The third dialect, Tiania, is included in the analysis to examine the position of Tiania within the continuum.

Methods

The recordings were carried out in the villages of residence, where two interviews were recorded simultaneously in two separate rooms, one interview being conducted by a native speaker of Imenti and the other by a team of a native speaker of the local dialect and a trained phonetician. The participants were tasked with producing local dialectal equivalents of words presented on a computer monitor in both English and Swahili. 96 words were presented randomized and repeated two to three times. The speech was recorded with a Beyerdynamic TG H54c head-mounted microphone at 44.1 kHz onto a Tascam US-2x2 interface connected to a laptop using SpeechRecorder 3.12.0 (Draxler and Jänsch, 2004).

Audio data and statistical analysis

The speech signals were forced-aligned using the WebMAUS (Jochim et al., 2017) application for German, as it yielded the best results. These results were corrected manually by trained phoneticians and student assistants using Praat (Boersma and Weenink, 2025). Making use of the emuR-package (Jochim et al., 2023) in R, the segment lists for the segments of interest were extracted from a Emu-SDMS-database (Winkelmann et al., 20179. Extracted data included words together with their /β/ - adjacent vowels in Chuka and the vowels in hiatus after the deletion in Imenti and Tiania. The final corpus consisted of tokens of the 13 target lexemes:

merger: /ɣota(β)a/, /ko(β)ɔra/, /ko(β)ɔria/

prefix V1: /ro(β)ɛni/, /ko(β)ɔria/, /ko(β)anda/, /ŋko(β)anda/, /ko(β)iða/, /ko(β)iŋga/

stem V1: /ɣotu(β)a/, /ɣɔku(β)e/, /ɛŋ|ŋku(β)e/, /kaβɛβɔ|kapiɔ/, /mβɛβɔ|mpiɔ/.

initial deletion: /ro(β)ɛni/, /ko(β)ɔria/, /ko(β)anda/, /ŋko(β)anda/, /ko(β)iða/, /ko(β)iŋga/

Mixed effects linear regression models were fitted for this analysis. They allow to factor out possible variation introduced into the data through random factors (Winter, 2020). These random factors were speakers and lexemes. The models were carried out on the duration of vowels as the dependent variable.

Results

The bilabial voiced fricative /β/ was completely deleted in the analysed contexts in Imenti and Tiania, but not in Chuka, as previously reported (Kanana 2011a, 2011b, 2015). Because all conditions predict lengthening of the stem vowels to compensate for the fricative deletion, Figure 1 shows the $\log_{10}$-transformed duration of the two vowels, normalized by word duration, so that both V1 and V2 can be compared across all analysed lexemes in the three dialects. The general prediction is that this interval should be greater in Imenti than in Chuka.

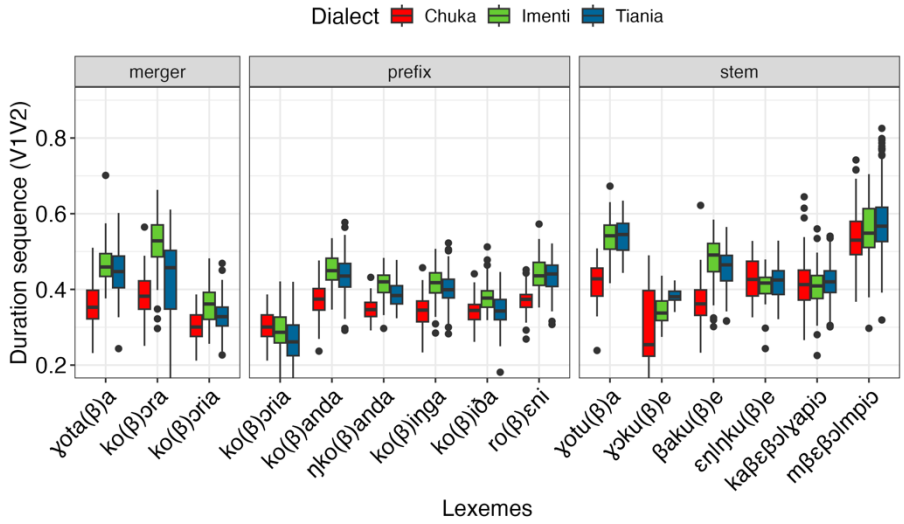

Figure 1. Duration of the sequence between beginning of V1 and end of V2.

Overall, the vowel sequences following the deletion of /β/ are longer in the merger and prefix conditions for Imenti/Tiania than the combined duration of V1 and V2 in Chuka. The form /ko(β)ɔria/ showed two possible realisations: a single long vowel (merger) or a glide followed by an open vowel (prefix V1). In the stem-V1 condition, only the sequences in /ɣotuβa ~ ɣotuːa/ and /βakuβe ~ βakuːe/ were longer, whereas the remaining words did not show this pattern.

The statistical model revealed a significant effect of dialect ($F[2,16.80] = 13.51$, $p < 0.001$) and of condition ($F[2,24.30] = 61.25$, $p < 0.001$), as well as a significant interaction between the two factors ($F[4,33.50] = 94.79$, $p < 0.001$). Pairwise post hoc tests with Bonferroni correction indicated that the duration difference was significant between Chuka and Imenti ($p < 0.001$) and between Chuka and Tiania ($p < 0.001$), but not between Imenti and Tiania.

Discussion

This paper investigates the effects of consonant retention versus deletion in three related dialects. Tiania patterns with Imenti, exhibiting more innovation than Chuka. For reasons of space, only one analysis is presented here. In examining the duration of the interval containing V1 and V2, some evidence for compensatory lengthening was found. The mixed results for stem V1 may have morphological explanations (verb vs. noun), which warrant further study.

Acknowledgements

The research was funded by the project SoundAct which has received funding from the European Research Council (ERC) under the European Union's Horizon Europe research and innovation programme (grant agreement No. 101053194).

References

Cunha, C, Kanana, F.E., Harrington, J. 2023. Variation and palatalisation in the production of the plural prefixes in Meru: A study of three dialects, in Radek Skarnitzl, R. and Violín, J. (ed.), Proceedings of the 20th International Congress of Phonetic Sciences: Guarant International, 3397–3401.

Draxler C., Jänsch, K. 2004. SpeechRecorder – a Universal Platform Independent Multi-Channel Audio Recording Software," Proceedings of the Fourth International Conference on Language Resources and Evaluation (LREC'04. [Online]. Available: https://aclanthology.org/L04-1125/

Fadiman, J.A. 1973. Early History of the Meru of Mt Kenya, The Journal of African History 14: 1, 9–27, doi: 10.1017/S0021853700012147.

Guthrie, M. 1967-71. Comparative Bantu: an introduction to the comparative linguistics and pre-history of the Bantu languages. Farnborough, Gregg.

Jochim, M., Winkelmann, R., Jaensch, K. Cassidy, S., Harrington, J. 2023. emuR: Main Package of the EMU Speech Database Management System, 2023. [Online]. Available: https://cran.r-project.org/package=emuR

Kanana, F.E. 2011a. Dialect Convergence and Divergence: A Case of Chuka and Imenti, in Selected proceedings of the 40. Annual conference on African linguistics: African languages and linguistics today, 190–205.

Kanana, F.E. 2011b. Meru Dialects: The Linguistic Evidence, NJAS 20: 4, 28

Kanana, F. E. 2015. Lexico-Phonological Comparative Analysis of Selected Dialects of the Meru-Tharaka Group, [Online]. Available: https:/www.peterlang.com/document/1044341.

Kisler, T, Reichel, U., Schiel, F. 2017. Multilingual processing of speech via web services, Computer Speech & Language 45, 326–347. doi:10.1016/j.csl.2017.01.005.

Winkelmann, R. Harrington, J., Jänsch, K. 2017. EMU-SDMS: Advanced speech database management and analysis in R, Computer Speech & Language 45, 392–410, doi: 10.1016/j.csl.2017.01.002.

Winter, B. 2020. Statistics for linguists: An introduction using R. New York, London: Routledge Taylor & Francis Group.