Tonal Atrophy in a Shifting Linguistic Landscape: The Diminishing Role of Tone in Sesotho Amongst Young Speakers

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Abstract

Sesotho language; which is one of the Bantu languages, is an official language in some Southern African countries such as Lesotho, South Africa, and Zimbabwe. Additionally, like most of the Bantu languages, Sesotho is also a prosodic (tonal) language. Therefore, in Sesotho language, tone plays a very important role, as it is used to distinguish the meaning and to mark the grammatical relationships. However, it has recently been observed the language's tonality is changing over time, and this can have implications on whether the language is drifting towards a heritage language or not. Therefore, in this study, we explore whether the tonal shift in Sesotho language implies that the language is emerging as a heritage language. Additionally, audio recordings were collected from Sesotho speakers in two provinces of South Africa, namely Gauteng and Free State. Furthermore, the preliminary results obtained from this study provide insights on how globalization and language contact reshape one of the Bantu languages, namely, the Sesotho language.

1 Introduction

Tone is a fundamental linguistic feature in Bantu languages, serving both lexical and grammatical functions (Hyman, 2011). In Sesotho, a Southern Bantu language primarily spoken in South Africa, Lesotho, and Zimbabwe, tone plays a crucial role in distinguishing meaning and marking grammatical relationships (Demuth, 2003). However, recent research suggests that the tonal system in Sesotho may be undergoing changes, particularly among younger speakers. The study by Wissing and Roux (2017a), examines the ability of young Sesotho speakers to perceive and produce tonal distinctions. Results from this study revealed that these speakers had limited or no functional use of tone, indicating a decline in tonal distinction mastery in their speech and even an emergence of new category of speakers.

Our study investigates whether the observed tonal shifts among young heritage Sesotho speakers signal the emergence of Sesotho as a heritage language in South Africa. Sesotho, a member of the Sotho-Tswana group within the Bantu language family (Doke, 1954), is traditionally characterized by a two-tone system (high and low), where pitch variations distinguish meaning - similar to how stress functions in English (e.g., *PREsent* vs. *preSENT*) (Gussenhoven, 2004).

We adopt Valdés (2006) definition of heritage speakers as "individuals raised in homes where a language other than the dominant societal language is spoken and who are to some degree bilingual". In the South African context, where English holds significant prestige and dominates education and media (Deumert, 2010), many young African language speakers may be perceived as heritage speakers, potentially leading to phonological restructuring (Montrul, 2016). This study explores whether tonal erosion in Sesotho reflects broader patterns of heritage language development, where reduced exposure and dominance of another language lead to structural simplification (Polinsky, 2018). Therefore, our study aims to assess whether tonal shifts align with patterns observed in other heritage language.

By analyzing tonal variation amongst young Sesotho speakers, this study contributes to debates on language change and heritage language phonology (Myers-Scotton, 2002). The findings may also inform language preservation efforts, particularly in the South African setting where languages such as Sesotho are increasingly influenced by dominant languages (Kamwangamalu, 2016).

The remainder of this paper is structured as follows. The next section provides the background information of the work reported in this paper. This is followed by Section 3; which covers the relevant

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literature concerning Sesotho tone prediction. On the other hand, Section 4 covers the motivation of the study while Section 5 discusses the approach used in the study, and the preliminary results obtained.

2 Basis of the Study

Recent research has increasingly recognized the phenomenon of heritage languages, particularly in contexts of migration, urbanization, and language shift (Montrul, 2016). A heritage language is typically defined as a minority language acquired in the home environment but not fully developed due to limited input and the dominance of a majority language (Valdés, 2006). While much of this research has focused on immigrant languages, the concept can be extended to indigenous African languages undergoing shift in their own territories due to urbanization and socioeconomic pressures (Kamwangamalu, 2016). Sesotho presents a compelling case for such investigation. Though not traditionally studied as a heritage language, emerging evidence suggests it may be undergoing changes characteristic of heritage language attrition, particularly in its tonal system (Wissing and Roux, 2017b).

The study of tonal attrition in heritage languages has gained traction through works like Chang and Yao's Chang and Yao (2016) investigation of Mandarin heritage speakers, which revealed that heritage speakers exhibit intermediate tonal production and perception between native and second language speakers. This aligns with theories of incomplete acquisition (Montrul, 2008), where reduced exposure to the heritage language during critical developmental periods leads to phonological and grammatical simplification. Applying this framework to Sesotho is particularly relevant given Wissing and Roux (2017a)'s findings that younger Sesotho speakers show reduced ability to produce and perceive lexical and grammatical tone contrasts. Their work provides a crucial foundation for hypothesizing that Sesotho may be transitioning into a heritage language status among urban, bilingual youth in South Africa.

The socio-linguistic context of South Africa further supports this hypothesis. English dominates as the language of education, media, and economic mobility, creating a pressure toward language shift (de Klerk, 2000). As Alexander (2003) argues, the historical privileging of English in post-apartheid language policy has marginalized African languages in formal domains, accelerating their decline among younger generations. Kamwangamalu (2004) notes that when a language's perceived economic value diminishes, speakers increasingly abandon it in favor of more dominant languages - a pattern observable in urban Sesotho-speaking communities. This mirrors global trends where heritage languages undergo structural changes due to reduced functional use (Polinsky, 2018).

Building on these insights, the proposed study seeks to systematically investigate whether Sesotho is exhibiting characteristics of a heritage language by focusing on tonal attrition. Following Chang and Yao (2016)'s methodology, the study would compare tonal production amongst young Sesotho speakers, while also examining the socio-linguistic factors driving these changes. The findings would contribute not only to theoretical debates on heritage language phonology but also to practical efforts in Sesotho language maintenance and revitalization (Webb, 2002). By situating Sesotho within the broader framework of heritage language research, this study aims to shed light on an understudied but increasingly significant dimension of language shift in Southern Africa.

3 Literature Review

3.1 The Tonal System of Sesotho

Sesotho is a tonal language; it uses pitch variations to convey grammatical or lexical meaning. According to Doke and Mofokeng (1957), the exact pitch of a tone in a word varies from speaker to speaker; it is the relation of the pitch of one syllable to that of the next that is constant with all speakers. Sesotho has only two tonal levels, namely the high tone (H) and the low tone (L)[1].

Sesotho is classified as a grammatical tone language with a restricted tonal system; that is, a system where not every syllable must be encoded for tone in the lexicon (Demuth, 1995). Tone in Sesotho may be used to differentiate meaning on a lexical level as shown in Example 1. The word *bona* has different tonal patterns in Example 1. It is this difference in tonal patterns that affects the meaning of the word.

(1) *bóna* - "see"
boná - "they"

[1] á: the diacritic on the vowel *a* is used to indicate high tone, low tones are not marked.

Tone in Sesotho may also be used to show grammatical relationships. For instance, first person singular subject markers can only be distinguished from similar third person forms by means of tone (Doke and Mofokeng, 1957). The following example from Doke and Mofokeng (1957, p.39) illustrates this grammatical relationship:

(2) *Ké motho* - "It is a person"
Ke motho - "I am a person"

It is, however, important to note that not all words composed of identical phonemes[2] can be distinguished by tone as some are also identical in tone. For such words, only the context in which they are used clarifies the meaning. The following examples from Doke and Mofokeng (1957, p.38) are examples of such words:

(3) *likoto*
"knob-kerries" or "pieces"

(4) hlolo
"hare" or "creation"

It is important to note that it is only the high tones that are explicitly specified on the syllables in the speaker's mental lexicon, and low tones appear when a syllable is tonally under-specified. It is also important to note that nasal sounds in Sesotho (*m, n, ng* and *ny*) form syllables on their own when they are not immediately followed by a vowel such as the first *n* in *monna ("man")*. In that instance, the nasal sounds can carry tone (*mo*ń*na*). Nasal sounds are sounds that are pronounced with breath escaping mainly through the nose.

3.2 Tonal Erosion in Heritage Language Speakers

Studies of tonal heritage languages reveal systematic patterns of tonal erosion, though the linguistic consequences vary depending on whether tone serves lexical or grammatical functions. Chang and Yao (2016)'s investigation of Mandarin heritage speakers employed acoustic and perceptual tasks to analyze tonal production and perception. Their results demonstrated that heritage speakers exhibited higher tonal variability than native speakers, particularly in isolated tones, and intermediate performance in connected speech. For example, Tone 3 (T3), a low-dipping tone, was frequently reduced in non-phrase-final positions, leading to perceptual ambiguities. Native listeners rated heritage speakers' tones as less intelligible than those of native speakers but more intelligible than L2 learners, reflecting a unique "sociolinguistic ambiguity" (Chang and Yao, 2016, 142). In contrast, Vietnamese heritage speakers studied by Pham (2006) showed tonal mergers in a system of six lexical tones, with younger generations neutralizing distinctions between mid-level and falling tones (e.g., ngã vs. hòi), disrupting lexical contrasts like ma ("ghost") vs. mà ("but"). While both Mandarin and Vietnamese studies highlight lexical consequences of tonal attrition, Mandarin's simpler four-tone system appears more resilient than Vietnamese's complex six-tone inventory, suggesting language-specific vulnerability to tonal erosion.

In grammatical tone languages like Yoruba, attrition manifests differently. The Akinlabi (2004)'s work revealed that heritage speakers often simplified grammatical tone, merging high and mid tones that mark tense-aspect distinctions. For instance, the high tone in ó ra ("he buys") and mid tone in ó ra ("he bought") became indistinguishable, collapsing present and past tense markers. This contrasts with Sesotho's tonal attrition, as documented by Wissing and Roux (2017a); where tonal erosion affects subject concord morphology. In their production tasks, young Sesotho speakers showed minimal pitch differences ($\leq$15 Hz) between the low-tone second-person o- ("you") and high-tone third-person u- ("s/he"), compared to robust distinctions ($\geq$35 Hz) in older speakers. This neutralization risks destabilizing Sesotho's agglutinative structure, where tone interacts with prefixes to encode subject agreement and tense (Demuth, 2003). Unlike Yoruba's tense-aspect mergers, Sesotho's tonal erosion threatens its morphosyntactic complexity, potentially triggering broader grammatical simplification (Polinsky, 2018).

Crucially, these studies differ in sociolinguistic context. Mandarin and Vietnamese attrition occurs in diaspora settings with dominant non-tonal languages (English, Spanish), whereas Sesotho's shift unfolds in situ amid urbanization and English dominance in South Africa (Kamwangamalu, 2004). This suggests tonal erosion is not exclusive to migrant communities but can arise wherever a tonal language is subordinated to a dominant one. Together, these cases underscore that tonal attrition follows two trajectories: (1) lexical neutralization in languages like Mandarin and Vietnamese; where

[2] A phoneme is a segmental unit of sound employed to form meaningful contrasts between utterances. An example of a phoneme is the /p/ sound in the words pot and spot.

tone distinguishes words meanings, and (2) grammatical simplification in languages like Yoruba and Sesotho, where tone encodes syntactic relationships. Both pathways align with theories of incomplete acquisition (Montrul, 2016), where reduced input and dominant language interference lead to structural reduction. However, Sesotho's unique position as an indigenous language undergoing heritage-like attrition highlights the pervasive impact of globalization on language vitality, even in a language's traditional homeland.

4 Motivation

The tonal system of Sesotho is undergoing observable changes among younger speakers, as evidenced by recent empirical studies. Wissing (2012) first documented these shifts by comparing tonal production in minimal pairs such as *ke motho* ("I am a person") vs. *ké motho* ("It is a person") across generations. While older speakers adhered to the traditional high-low tonal distinctions described in the literature, younger speakers exhibited reduced tonal contrast, particularly in grammatical contexts. This erosion of tone - a critical feature of Sesotho's morphosyntactic structure - suggests a potential systemic language shift. Roux (2017) expanded on these findings by incorporating perception tests, revealing that young speakers not only produced weaker tonal contrasts but also struggled to perceive them, further supporting the hypothesis of tonal attrition.

However, existing research on heritage languages has predominantly focused on migrant communities, such as heritage Spanish (Au et al., 2002) or Mandarin speakers (Chang and Yao, 2016), leaving a critical gap in understanding how heritage language dynamics manifest within a language's native territory. Sesotho presents a unique case: it is not a migrant language but is increasingly influenced by urbanization and the dominance of English in South Africa's socioeconomic landscape. This study addresses this gap by investigating whether Sesotho is transitioning into a heritage language status in situ, using tonal attrition as a diagnostic marker.

The study is further motivated by the need to reconcile Bantu tonological frameworks with heritage language theory. Sesotho's tonal system, governed by rules such as the Meeussen Rule and Finality Restriction (Khoali, 1991), provides an ideal testing ground for examining how contact-induced changes interact with typologically specific phonological processes. For instance, if tonal neutralization in Sesotho parallels patterns observed in Mandarin heritage speakers (Chang and Yao, 2016), this would suggest cross-linguistic commonalities in tonal attrition, regardless of migration context. Conversely, deviations from these patterns could highlight unique pressures faced by African tonal languages in postcolonial urban environments.

By focusing on the minimal pair *o batlang?* ("What do you want?" - low tone) vs. *ó batlang?* ("What does s/he want?" - high tone), this study bridges production and perception analyses, offering a holistic view of tonal functionality. The high frequency of these constructions in natural speech ensures ecological validity, while their structural simplicity allows for precise acoustic measurement. Furthermore, comparing Sesotho's trajectory to heritage languages like Spanish and Mandarin underscores the universality and variability of language change in multilingual settings.

This research holds implications for both linguistic theory and language revitalization efforts. If tonal erosion in Sesotho aligns with heritage language models, it challenges the assumption that heritage languages arise solely through migration. It also provides actionable insights for preserving tonal distinctions through pedagogical interventions, particularly in educational systems that marginalize African languages (Kamwangamalu, 2004). Ultimately, this study advances our understanding of how globalization and language contact reshape indigenous languages, even within their traditional geographic boundaries. It is worth noting that the work reported in this paper is still in its preliminary phase. Therefore, the results reported in the next section are also preliminary.

5 Research Method

Our study aims to contribute to the evolutionary discourse around Sesotho tone by investigating the change or deviation of the manner in which tone surfaces amongst heritage speakers of Sesotho from standard description of tone. Compare and contrast existing linguistic analyses of tone in Sesotho as described by literature ((Khoali, 1991; Doke and Mofokeng, 1957); against our findings using production data. This study used the already existing corpus which was reported in Raborife et al. (2011).

To achieve this, we plan to test the production of tone amongst young Sesotho speakers. We use 13 minimal pairs to investigate lexical and grammatical use of tone in heritage Sesotho speakers, We have selected frequently used words in our minimal pairs which the surrounding words provide context. This, we believe will assist the participants in disambiguating them by providing context.

We use minimal pairs to investigate the shift in the usage tone in young Sesotho speakers, We have selected frequently used words in our minimal pairs (words) in which the surrounding words provide context. This, we believe will assist the participants in disambiguating them by providing context. In Sesotho, singular subject markers can only be distinguished from similar third person forms by means of tone "*ké motho* - "It is a person" vs "*ke motho* - "I am a person". Wissing (2012) found that amongst the young speakers of Sesotho deviate from the standard description of tone in the production of singular subject markers vs. the third person form. In our study, we include this pair and provide more context. This is also affirmed by Wissing and Roux (2017a). We have also included a similar construction in which the second person form can only be distinguished by tone from the 3^{rd} person singular form; *ó mobe* - "he/she is ugly" vs. *o mobe* - "you are ugly".

1. Phrases 1: 4 - verbs.
2. Phrase 5: distinguish 3SG from 2SG.
3. Phrase 6: distinguish 1SG from 2SG.
4. Phrase 7: distinguish possessive marker from noun.

1. *ho tḗna seaparo*

   "to put on clothes"

   ho tena motho

   "to annoy a person"

2. *ho tshḗla nṓka*

   "to cross a river"
   ho tshela metsi

   "to pour water"

3. *ho baka leratá̲*

   "to cause noise"
   ho bá̲ka sebe

   "to repent from sin"
   "

4. *ho lapá̲ hosḗ̲ng*

   "to be hungry in the morning"
   ho lapa mose

   "to patch a dress"

5. *Yena ó mobe*

   "He/she is ugly"
   Wena o mobe

   "You are ugly"

6. *(Yena) ké ngwana wa há̲e*
   "He/she is his/her child"
   (Nná) ke ngwana wa há̲e
   "I am his/her child"

7. *Ké ngwana wa há̲e*
   "He/she is his/her child"

   Ké etetse haḗ̲
   "I have visited home"

5.1 Speaker Selection and Recording Procedure

Our participants are aged between 18 - 28 years old, with Sesotho as a first language, fluent in more than one language with the second language being introduced to them between ages 6 - 11 years of age. There are 16 speakers, 8 from Gauteng townships (TS) and 8 from the Free State (FS).

To ensure participant consent, individuals were first informed about the purpose of the study and the recording process. They were assured of confidentiality, with data stored using pseudonyms. Participation was voluntary, and those who agreed signed a formal consent form and completed a language profile questionnaire to confirm their status as native or heritage Sesotho speakers.The procedure used to create the corpus used in this study is further discussed in Raborife et al. (2011).

During the recording session, the researcher provided an overview of the study's objectives and explained the recording setup . Each participant first read five sample Sesotho sentences to ensure proper microphone placement. The main recording session involved reading 45 sentences displayed on a screen, with each sentence presented alongside its English meaning for clarity and contextual understanding. Each sentence appeared on a separate slide, and participants were allowed to repeat sentences in cases of mispronunciation or unnatural speech.

5.2 Transcription

Initially, all the sentences were saved in a single sound file. The sound file was then segmented in such a way that each sentence is a single sound file. The forty-five sound files were then sent to three independent labellers for transcription. The labellers selected had some experience in tonal studies and each was tasked to transcribe the sentences independently. Furthermore, the researcher would also transcribe the sentences before looking at the other transcriptions by the transcribers. Additionally, it was ensured that the transcriptions were in the orthography[3] and include tone labels.

Once the sentences have been transcribed, the labellers then forwarded the transcriptions to the researcher. The transcribers were required to submit a brief overview of how they transcribed the sentences including any software they may have used.

Once all the transcriptions have been received from the labellers, they were compared across all the labellers (including the researcher's own transcriptions). If there were disagreements in any of the labels amongst the labellers, the final tone label would be based on the tone label that is agreed upon by the majority of the labellers.

5.3 Inter-Transcriber Reliability Assessment

As stated previously, three labellers transcribed the 45 recorded sentences independently. They reached unanimous agreement on the tone labels in 55.9% of the cases. A reason for such a low agreement between the transcribers might lie in the fact that perception is subjective and that the tone transcribers did not have a training manual. All of our labellers were speakers of tonal Bantu languages and were sensitive to tone. Furthermore, they had different backgrounds and experiences regarding tone in Bantu languages.

Our study relied heavily on the transcriptions since they formed a central part in evaluating the extended algorithm. Thus, it was important to statistically verify the transcriptions since there was a fairly low agreement between our transcribers. To determine the reliability of the transcriptions, we used the kappa (κ) coefficient, which is a statistical measure used for analyzing the reliability of agreement between a number of labellers (raters) during observer reliability studies (Fleiss and Cohen, 1973; Fleiss, 1971; Brennan and Prediger, 1981; Randolph, 2005). This statistical measure was more reliable than a simple percentage agreement calculation since it took into account the agreement occurring by chance between the labellers.

Fleiss' kappa is a well-known multi-rater kappa which assumes that raters are forced to assign a certain number of cases to each category, hence, it is referred to as a fixed-marginal kappa (Brennan and Prediger, 1981). For instance, in our study, it assumes that the labellers are restricted in the number of syllables (cases) they can assign to each of the tone labels (categories). However, this is not the case as the labellers are free to assign any number of the syllables to each of the two tone labels. We thus make use of a free-marginal kappa which assumes that raters are not restricted to assign a specific number of cases to each of the categories as proposed by Brennan and Prediger (1981).

Randolph (2005) defines the free-marginal kappa, κ, as follows:

$$\kappa = \frac{\bar{P} - \bar{P}_e}{1 - \bar{P}_e} \tag{5}$$

$\bar{P}$ is the observed percentage agreement and $\bar{P}_e$ is the percentage of agreement expected by chance alone.

According to Fleiss (1971), the factor $1 - \bar{P}_e$ gives us the measure of agreement that is attainable above what would be predicted by the labellers by chance and $\bar{P} - \bar{P}_e$ is the degree of agreement actually achieved above chance. If κ = 1, then there is complete agreement between the labellers. If $\kappa \leq 0$, then there is no agreement among the labellers other than what would be expected by chance, as if the raters had simply "guessed" every rating.

We used an online kappa calculator which allows us to enter all the necessary variables and then

[3]The alphabetic spelling system used by the language

calculates the κ-value (Randolph, 2008). The free-marginal κ-value between three labellers, assigning 565 syllables to two categories as calculated by Randolph (2008), is as follows: $\kappa = 0.41$.

The positive value of kappa indicates that the agreement is better than what would have been expected by chance. To interpret this value we use Table 1 as described by Landis and Koch (1977). According to the classification by Landis and Koch (1977), the labellers in our study seem to be in moderate agreement on the tone labels they have transcribed, since $\kappa = 0.41$. Recall that a perfect agreement would have a kappa of 1, and chance agreement would have a kappa of 0 or less. Thus these results justify that we can use our transcriptions to evaluate the extended algorithm and test our hypothesis.

κ	**Interpretation**
≤ 0	Poor Agreement
$0.0 - 0.20$	Slight Agreement
$0.21 - 0.40$	Fair Agreement
$0.41 - 0.60$	Moderate Agreement
$0.61 - 0.80$	Substantial Agreement
$0.81 - 1.00$	Almost Perfect Agreement

Table 1: Interpretation of κ values

It is worth highlighting that the results obtained in the work reported in this paper are preliminary. The future work will focus on exploring this research direction further. Additionally, the scope of this study was limited to one low-resource language; namely Sesotho, in South Africa. Future work is envisaged to explore Sesotho's tonal atrophy in other regions of Southern Africa.

6 Conclusion

In this study, we have explored the changing tonality of Sesotho language and investigated whether such a shift implies that Sesotho is transforming into a heritage language. We have therefore observed how globalization and language contact reshapes Sesotho language. It is worth noting that this study is limited in scope, since it focused on South African Sesotho language speakers. Future study will explore Sesotho tonal shift in other geographic areas such as Lesotho and Zimbabwe, where English language is still dominant.

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