

# From tones to accents

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## Abstract

This paper is part of a larger research project on the hypothetical evolution of the prosodic system of Shingazidja, a Bantu language [G44a] of the Comoros, from a tonal system to an accentual system. The first part of the paper describes the tonal properties of the language (e.g. long-distance tone shift) and its accentual properties (e.g. the insertion of a tone on the stressed syllable of an underlying toneless phrase), and briefly discusses tone reduction at the post-lexical level. In the second part of the paper, the acoustic correlates of tone in the variety of Washili are explored. It is shown in particular that the interplay of tone, stress and vowel aperture can lead to a shift of the metrical prominence that blurs the distinction between tone and accent in the language. Consequences of this process on the prosodic system of Shingazidja, and on our knowledge of *tone loss* in general, are addressed in a brief discussion.

**Index Terms:** tone, accent, tone loss, Shingazidja, Bantu.

## 1. Introduction

Several studies have been conducted on *tonogenesis* these last decades, following the seminal studies from [1] and [2] – see [3] for an overview. On the contrary, very few studies have been dedicated to *tone loss* (but see, e.g. [4], [5]), and we lack information on the processes that lead a tonal language to lose its tones – see the brevity of the dedicated section in [6]. In this paper, focusing on the phonetic correlates of tone in the variety spoken in Washili, I will discuss the idea that tones in Shingazidja, a [G44a] Bantu language of the Comoros, are evolving toward accents.

The interest of Shingazidja for this question is twofold: firstly, it has been described both as a tonal language [7] and as an accentual language [8]; secondly, it is closely related to languages that have lost their tones, such as another Comorian language, Shimaore [9]. In Section 2 of this paper (), I will explore the tonal and accentual properties of the prosodic system of Shingazidja, and briefly discuss tone reduction at the post-lexical level. Data in this section come from various speakers recorded between 2006 and 2010. Section 3 focuses on the phonetic properties of the tone in the variety of Washili, which, I claim, are signs of an evolution toward an accentual status. Data in this section come from recordings of a single speaker between 2016 and 2017, analyzed using the software PRAAT [10]. Section 4 is a short discussion.

## 2. Shingazidja: tone or accent?

### 2.1. Tonal properties

According to [11, p. 229], “*a language with tone is one in which an indication of pitch enters into the lexical realisation of at least some morphemes*”. In Shingazidja, several minimal

pairs demonstrate the phonemic nature of the high tone (1 – see the abbreviations in Section 5).

|        |         |     |        |        |     |
|--------|---------|-----|--------|--------|-----|
| /-ɕa-/ | PER.NEG | vs. | /-ɕá/  | ‘come’ | (1) |
| /ha-/  | 1.PER   | vs. | /há/   | ‘for’  |     |
| /tsi-/ | 1SG.PER | vs. | /tsí-/ | NEG    |     |

The prosodic system of Shingazidja is well described (see [12], [13], [14], [15], [7], [16], [9], [17], [18], [19], [20], [21] or [22], among others). Shingazidja has a ‘privative’ tone system in the sense of [23], where /H/ contrasts with  $\emptyset$  [20]. The language is famous for combining an unlimited shift of the tone with a deletion of every even-numbered underlying tone. In (2b), the tone of the noun shifts up to its right, unless an underlying tone blocks it (in this study, an underlying tone is underlined), leading to the deletion of the tone of the determiner. In (2cii), the tone of the noun is deleted, due to the shift of the tone of the verb.

|       |                       |                           |     |
|-------|-----------------------|---------------------------|-----|
| a.    | wa-leví               | ‘2-drunkards’             | (2) |
| b. i. | wa-leví wá-raru       | ‘three drunkards’         |     |
| ii.   | wa-leví wa- <u>lí</u> | ‘two drunkards’           |     |
| iii.  | wa-leví pja           | ‘all (the) drunkards’     |     |
| c.    | ha-wono wa-léví       | ‘he saw (some) drunkards’ |     |

To my knowledge, no accentual system displays such a long-distance shifting phenomenon.

It is worth noting that nouns containing three syllables or more, and many verbal forms, have several surface tones (3), a characteristic that distances Shingazidja from accentual systems.

|    |                          |                     |     |
|----|--------------------------|---------------------|-----|
| a. | mwávu <u>lí</u>          | ‘umbrella’          | (3) |
|    | há <u>kuú</u>            | ‘many’              |     |
| b. | ngari <u>ɕó</u> upíha    | ‘he will cook’      |     |
|    | wá <u>ká</u> fú <u>á</u> | ‘they were washing’ |     |

### 2.2. Accentual properties

While dissyllabic nouns can underlyingly be /H.H/, H.Ø/, /Ø.H/ or /Ø.Ø/, they only surface with a high on their penult or their final syllable. The deletion of the second tone of any two successive high tones results from the OCP rule that was addressed in the previous section (4a). Nouns that are toneless at the underlying level surface with a high on the penult (of the phrase), which is the stressed syllable in Shingazidja.

- a. ndróvǐ                    ‘banana’                    (4)  
       ŋkúǎde                    ‘beans’
- b. púzi                    ‘feather’                    < /puzi/  
       máha                    ‘year’                    < /maha/

As explained by [13, p. 46]: “One notable fact about Shingazidja is that there is no independent words/expressions that are appropriately analyzed at the surface level as lacking a High tone”. In addition, monosyllabic words are either high-toned (e.g. *bá* ‘because’, *fú* ‘if’, *mí* ‘I’) or they cliticize to the following words. Thus, Shingazidja applies one of the two properties of a stress-accent system according to [11, p. 231], [24, p. 217], namely *Obligatoriness* (every lexical word has at least one syllable marked for the highest degree of prominence – N.B. Hyman says ‘metrical prominence’). The other property, *Culminativity* (every lexical word has at most one syllable marked for the highest degree of prominence) is also applicable to monosyllabic and dissyllabic words.

Among other accentual properties, tone is capable of preventing the deletion or the gliding of vowels in Shingazidja, as demonstrated in [25]. The application of a rule that deletes a final vowel preceded by a fricative is blocked when the vowel surfaces with a high tone (5).

- a. /Ndevu/ > [déf]                    ‘beard’                    (5)  
       /páha/ > [páh]                    ‘cat’
- b. /paʃé/ > [paʃé]                    ‘pen’  
       /kafá/ > [kafá]                    ‘accident’

Another example is the fact that the absence of a tone weakens an initial rhotic, as explained in [26]: the rhotic emerges as a trill when the vowel that follows is high-toned (e.g. [r]áŋgi ‘color’, [r]áha ‘game (type)’), and as a flap when the vowel is low (e.g. [r]aŋgú ‘since’, [r]andú ‘deal!’).

Thus, the prosodic system of Shingazidja has both, tonal properties (contrast on morphemes, long-distance tone shift, etc.) and accentual properties (the insertion of a tone on the stressed syllable of a word/phrase lacking a tone at the underlying level). This is not uncommon. For instance, [27, p. 197] reminds that Korean has one prominence per word (applying both *Obligatoriness* and *Culminativity*) but also tone spread rules and floating tones, and [11, p. 237] mentions several languages that have both tone and stress-accent, such as Ayutla Mixtec or Swedish.

### 2.3. A transitional system

I recently proposed, in an unpublished work, the hypothesis that Shingazidja is evolving toward a system in which what are now lexical high tones will be reinterpreted as phrasal tones [28]. Due to space limitations, I will not develop the argumentation in detail here, but only provide some of its insights.

The hypothesis is built upon the observation that several post-lexical rules conspire in order to avoid tones surfacing elsewhere than on the two last syllables of a phrase. To achieve this goal, an underlying tone can be deleted (another way to understand this rule is to consider that a toneless

allomorph is selected): in (6b), vs. (6a), the verbal root is not associated with a tone that would block the tone of the object prefix to surface on the final syllable of the phrase.

- a. ha-zí-níka                    ‘He gave them (the cups).’                    (6)  
       1.PER-OM<sub>10</sub>-give
- b. ha-zi-niká /                    ze = zi-kómó  
       1.PER-OM<sub>10</sub>-give                    AUG<sub>10</sub> = 10-cup  
       ‘He gave them, the cups.’

Conversely, an underlying tone can be inserted (/a toned allomorph can be selected). The word *ndóvu* ‘elephant’ usually belongs to the /Ø.Ø/ class of words, for instance, but the same word can emerge with an underlying tone on its penult in order to avoid the surfacing of a tone on a non-final syllable (7).

- ze = n-dóvú                    mfú’káre                    (7)  
       AUG<sub>10</sub> = 10-*elephant*                    *seven*  
       ‘the seven elephants’

The property of some of the Shingazidja nouns to alternate between a tonal and a non-tonal form was first discovered by [13], [14], and later confirmed by [9], although they did not link it to the constraint I mentioned. In addition to several other rules, the insertion or deletion of underlying tones leads to neutralization of tonal oppositions, and results in the surfacing of tones before phrasal boundaries. A similar process may have led to patterns that can be observed in other Comorian languages. In Shimaore, for instance, rules similar in nature to those of Shingazidja apply to nouns or short phrases in isolation (*bawá* ‘wing’ > *bawá pána* ‘broad wing’, *bawá dzidú* ‘black wing’ – [9, p. 213]), but not at the utterance level, where only one tone emerges on the antepenult (8 – [9, p. 212]).

- Shimaore                    riúdzu maʒwaj máíli                    (8)  
       ‘We bought two eggs.’

A restructuring of the tones thus occurs at the phrasal level, gradually transforming Shingazidja into a more prototypical accentual language. In Section 3, we will see that this evolution is supported by a change of the tone itself.

## 3. Tone and stress in Washili Shingazidja

In this part of the paper, I discuss the interaction of tone, stress and vowel aperture in the Washili dialect of Shingazidja. The subtle relationship between the three objects in this dialect indicates that the tone, in addition to pitch, has intensity and length correlates that are signs of a shift in its nature. In the first section (3.1), I will briefly present the case where the tone is aligned with the stressed vowel, i.e. the penult. Section 3.2 is dedicated to situations where the tone is aligned with the final syllable, when the vowels are identical in nature; it will be demonstrated that the phonetic features of the tone are similar in nature to those of the stress. The final section explores the various cases where the tone emerges on the final

of a word whose vowels are different, revealing the role the vowels play in the determination of metrical prominence.

### 3.1. When the tone is stress-aligned

As mentioned in Section 2.2, stress is aligned with the penult of the phrase in Shingazidja, as in most of the Bantu languages (see [29] for details).

When the tone is aligned with the penult (note that a tone cannot shift up to the final syllable of an Intonation Phrase due to a Non-finality constraint – see [22], [20]), the stress vowel is metrically strong and lengthened, while the final vowel is significantly reduced (sometimes deleted), as illustrated in (9) and in Figure 1.

- |    |          |                        |             |
|----|----------|------------------------|-------------|
| a. | /háɲwá/  | [há:ɲw <sup>a</sup> ]  | ‘mouth’ (9) |
| b. | /tsám6u/ | [tsá:m6 <sup>u</sup> ] | ‘fruit’     |
| c. | /pó1e/   | [pó:l <sup>e</sup> ]   | ‘slowly’    |
| d. | /Nbé6e/  | [mbé:6 <sup>e</sup> ]  | ‘side’      |

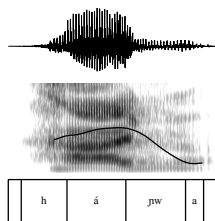


Figure 1: *Signal, spectrogram and F0 curve of (9a)* (produced by a male speaker originating from the Washili).

This surface pattern emerges independently of the nature of the vowels.

### 3.2. The tone is final and the vowels are identical

The situation drastically differs when the tone emerges on the final syllable. In order to understand why and how, I will first consider the cases where the two final vowels are identical. In such a case, as illustrated in (10) and Figure 2, neither of the two syllables is more prominent, or longer, than the other (N.B. the tone on the final syllable is blunted due to a phrasal boundary L% tone – see [22], [20] for details).

- |    |         |          |              |
|----|---------|----------|--------------|
| a. | /lu1ú/  | [lu:lú]  | ‘pearl’ (10) |
| b. | /Ngamá/ | [ŋga:mā] | ‘chasm’      |
| c. | /N6eré/ | [m6e:rē] | ‘ring’       |
| d. | /ɕizi/  | [ɕi:zi]  | ‘honey’      |

The data in (10) indicates that, other things being equal, the tone is associated with the same phonetic cues as stress, in addition to pitch. When the tone emerges on the penult, as in (9), stress and tone combine, resulting in a significant lengthening of the penultimate vowel, which becomes metrically prominent, and an intense reduction of the final vowel. When the tone surfaces on the final vowel, as in (10), the duration and intensity of the two vowels are balanced.

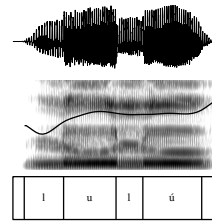


Figure 2: *Signal, spectrogram and F0 curve of (10a)* (produced by a male speaker originating from Washili).

Of course, the fact that a tone has other correlates than F<sub>0</sub> or pitch is not unexpected. It is well known, for instance, that the production and perception of Mandarin tones relies on other acoustic cues such as duration, intensity or voice quality (see [30] for an overview). However, the main acoustic property of tones is usually F<sub>0</sub> [31], in opposition to the multi-parametric nature of accent [32]. In this perspective, the effect that a tone has on the duration and intensity of the vowel in (10) may arguably be considered as an additional step towards a mutation to an accent. An argument supporting this claim is the fact that tone in the conservative dialects does not rely as strongly on duration and intensity as it does in the central dialects. See for instance in Figure 3 the realization of the word *ɲuŋgú* ‘cooking pot’ by a speaker originating from the north of the island, where the final vowel is reduced in comparison to the one of the penult, despite being high-toned.

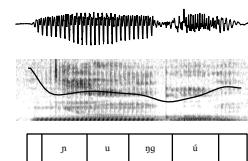


Figure 3: *Signal, spectrogram and F0 curve of ɲuŋgú* ‘cooking pot’ (produced by a male speaker originating from the north of Ngazidja).

We will see in the following section that the role that a tone plays in the duration and intensity of the final vowels is, in the variety of Washili, strengthened in some vowel configurations.

### 3.3. The tone is final and the vowels are different

It is well known that prominence interacts with sonority (see [33] for an overview). A famous example is the New Guinean language Takia, where stress aligns with the rightmost [a] in a word, or the rightmost [e] or [o] if there is no [a], or the rightmost syllable if there is no low or mid vowel [34]. When the two final vowels of a word differ in their aperture, the equilibrium between the stressed penult and the high-toned final is broken. The intensity and duration of the vowels intrinsically vary according to the sonority hierarchy, i.e. the open vowel is longer and more intense than the mid vowels, which in turn are longer and more intense than the closed vowels (N.B. I oversimplify a bit here for clarity purposes, the front vowels being slightly longer and more intense than their

backed counterparts). When the final vowel is less open than the one in the penult, the latter is metrically prominent, as illustrated in (11) and Figure 4.

- |    |         |          |             |
|----|---------|----------|-------------|
| a. | /wafú/  | [wa:fú]  | ‘dead’ (11) |
| b. | /ɓamɓú/ | [ɓa:mɓú] | ‘present’   |
| c. | /harí/  | [ha:rí]  | ‘ring’      |
| d. | /nazí/  | [na:zí]  | ‘coconut’   |

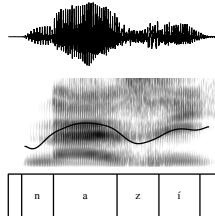


Figure 4: Signal, spectrogram and F0 curve of (11d) (produced by a male speaker originating from the Washili).

Note that there is also a difference in length and intensity when only one level of height separates the two vowels, but that it is then less marked: /Nɓatsé/ [mɓa:tsé] ‘sweet potato’, /pefú/ [pefú] ‘asthma’, etc.

In the reverse situation, strikingly, the association of tone with sonority leads to a shift in the prominence, as illustrated in (12) and Figure 5, where the final vowel outranks the penult in length and intensity.

- |    |         |          |              |
|----|---------|----------|--------------|
| a. | /ɗuká/  | [ɗukā:]  | ‘store’ (12) |
| b. | /ɲumɓá/ | [ɲumɓā:] | ‘house’      |
| c. | /Nɗiwá/ | [ɗiwā:]  | ‘pigeon’     |
| d. | /ɲifá/  | [ɲifā:]  | ‘house’      |

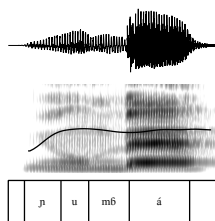


Figure 5: Signal, spectrogram and F0 curve of (12b) (produced by a male speaker originating from the Washili).

Due to the role of stress, the vowel of the penult is not as reduced in (12) as the final vowel is in (9). However, the salience of the final vowel in (12) is clearly perceptible. Again, the difference, while smaller, remains when only one level of height separates the two vowels: /miró/ [mirō] ‘rivers’, /mezá/ [mezā] ‘table’.

## 4. Discussion

It is a well-known fact that the vast majority of Niger-Congo languages are tonal [35], and Proto-Niger-Congo was much probably tonal [36], [37], [38]. However, several languages of the phylum have now lost their tones, e.g. Wolof, Serer in Senegal (in the latter case, maybe because of contacts with Afro-Asiatic [39]). A famous example is Swahili [40], but many of Eastern Bantu languages have reduced tonal systems [4]. As [41, p. 81] explains, “Swahili simply represents an endpoint of an areal development that other Sabaki languages are continuing today”. Shingazidja and the other Comorian languages, which belong to the Sabaki group, bear witness to this evolution, as demonstrated in Section 2.

The conditions under which gradual disappearance of tones applies have been explored with success in the past by researchers who explored the reduction of tonal categories in the lexicon [42] and/or the consequences of rules operating at the post-lexical level [8]. The aim of this paper was to show, or confirm, that it is necessary to address other dimensions of the problem than tone neutralization. As for Shingazidja, and much probably for other (Bantu) languages, the expression *tone loss* is misleading, even if some patterns were lost: [9] explains that Shingazidja is the only language that kept the /H.H/ pattern in nouns, for instance. *Tone transformation* reflects more accurately the ongoing process in Shingazidja.

As it was briefly explained in Section 2.3, the tones tend to behave like phrasal accents at the post-lexical level. However, in addition, tones of Shingazidja undergo a shift in their nature. As explained in Section 3, the high tone has several acoustic correlates, adding duration and intensity to F<sub>0</sub>/pitch. As a result, high-toned vowels, especially when they are more open than the ones that surround them, may be associated with the highest degree of metrical prominence, overlooking the stressed vowel. My hypothesis is that this distribution is a first step towards the development of a more canonical accentual system. In order to confirm it, an extended research on the various dialects of the language is necessary.

## 5. Abbreviations

Numbers refer to classes. AUG = augment, NEG = negation, OM = object marker, PER = perfective.

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