

When tone prevents vowels from gliding (and when it does not)

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Since the mid-1970's it is well known that tone in many languages behaves independently from its tone bearing unit, and conspiracy arguments lead to consider tone as a distinct item. However, tone is commonly sensitive to some specific segments, and is sometimes involved in a specific relationship with its bearing units. Nevertheless, little attention has been paid so far to the fact that, in some languages, tone has a direct effect on the vowel to which it is associated.

In this article, it is demonstrated that a tone may prevent the deletion or the gliding of a vowel resulting from hiatus situations. This assertion is supported by a detailed analysis of similar phenomena in the Bantu language Shingazidja. In a first attempt of an OT analysis, it is proposed that the absence of gliding may result from the high ranking of a constraint $\acute{V}-\mu$, which says that a *tone bearing unit* has to be moraic.

1. Introduction

It is well known since the mid-1970's that tone, in many languages, behaves independently from its tone bearing unit, and conspiracy arguments lead to consider tone as a distinct item.

Despite this, tone is commonly sensitive to some specific segments, such as voiced consonants (e.g. the so-called 'depressor consonants' of the Nguni languages). Moreover, tone and its bearing units are sometimes involved in a specific relationship: in the Mon-Khmer language Rengao, for instance, the higher register is associated to the modal voice and RTR vowels, while the lower register is associated to the breathy voice and ATR vowels (Yip 2002); in the Khoe language Shua, a super-high tone can only appear on the high vowels (Odden 2007).

However, little attention has been paid in the literature to the fact that, in several languages, tone has a direct phonological effect on the vowel to which it is associated. In this article, I will demonstrate that a tone may prevent the deletion or the gliding of a vowel resulting from hiatus situations.

The paper is organised as follows: in section 2, I will remind to the reader some arguments supporting the independence of tone from its bearing units; in section 3, I will provide some data

demonstrating that tone, in several languages, prevents the deletion or the gliding of a vowel; in section 4, I discuss in detail similar phenomena occurring in Shingazidja, a Bantu language of Grande Comore; in section 5, eventually, I will propose a first attempt of an analysis sketched in the Optimality Theory framework (Prince & Smolensky 1993, McCarthy & Prince 1993a;b).

2. *The independence of segments and tone*

In this section, I will discuss some phenomena supporting an analysis of tone as an independent feature, distinct from the vowel to which it is associated. One of the major arguments in favor of the independence of tone vis-à-vis its bearing unit is the possibility for the former to be realised while the latter is deleted.

In many tonal languages (and especially in Benue-Congo), for instance, the deletion of a vowel resulting from the resolution of a hiatus situation does not imply the deletion of its tone. In (1), a famous example extracted from the Edoid language Etsako (Elimelech 1976), a tone is maintained while its tone bearing unit disappear.

(1) ETSAKO; Edoid, Nigeria (Elimelech 1976)

- a. (i) ówà *house*
- (ii) ówǒwà *every house*
- b. (i) ídù *lion*
- (ii) ídwǐdù *every lion*

In (1aii) and (1bii), the reduplication of a VCV word creates a hiatus situation that is resolved by the deletion of the first vowel (now V_1) of the hiatus. The reduplicated forms of the words ówà ‘house’ and ídù ‘lion’ then lack a vowel (*ówàówà → ówǒwà ‘every house’; *ídùídù → ídwǐdù ‘every lion’). However, the tone that is underlyingly associated to the deleted vowel is maintained (the outputs of these reduplicated forms are not *ówówà nor *ídídù), and is reassocciated to the second vowel (now V_2) of the reduplicated form, which then bears a contour tone. In Ogori, a Benue-Congo language of Nigeria, the same configuration leads to the deletion of the tone of V_2 (2).

(2) OGORI; Benue-Congo, Nigeria (Casali 1997)¹

- a. / òtélé òkèkà / → [òtélókèkà]
 pot big
 big pot
- b. / íjǎ òsúda / → [íjósúda]
 woman old
 old woman

This kind of phenomena is not limited to African languages. In Naxi, a Tibeto-Birman language spoken in China, High-toned grammatical words are deleted in colloquial speech – *tá* in (3a) –, but their tones remain and are realised on the preceding word – *k^hà* in (3b).

¹Following Chumbow (1990).

(3) NAXI; Tibeto-Burman, China (Michaud & Xueguang 2007)

- a. ɲ̃̀ t̚ʰū̃ kʰà tá t̚ʰū̃ lù t̃̄̚ m̃̀
 1stSG DEICT moment only here reach affirm. fin. part.
I've only just arrived (sustained speech)
- b. ɲ̃̀ t̚ʰū̃ kʰǎ t̚ʰū̃ lù t̃̄̚ m̃̀
I've only just arrived (casual speech)

This property of the tone, i.e. its ability to be realised while its *tone bearing unit* disappear, is called *stability*. Along with other properties or manifestations of tone – e.g. the existence of *floating tones*, *tone melodies* or tones that are associated to several vowels –, *stability* constitutes a major argument in favor of the relative independence of tones and vowels.

3. When vowels and tones are linked

Treating tone and segments separately, Autosegmental Phonology (Leben 1973, Goldsmith 1976) deals elegantly with phenomena such as *stability* or *mobility* – the fact that a tone can be parsed in a syllable other than the one which carries it –, and accounts successfully for the widely observed independence of tones and segments. As Liphola & Odden (2000:177) said: "We offer the post-hoc observation, grounded in the descriptive literature covering a variety of tone languages, that tones tend to not interact with other phonological features."

On the other hand, by setting apart tones and segments, Autosegmental Phonology sometimes fails to accommodate the relationship that links the former and the latter. In this section, I will show that *deletion*, *gliding* and other processes that are involved in hiatus resolutions may depend on the tone(s) that are carried by the vowels. As far as I know, no specific study has been dedicated to this subject in the literature.

In this paper, I will only discuss cases in which the tones prevent the occurrence of phenomena such as *vowel deletion* or *gliding*.² I will distinguish between two different situations. The first one involves languages or phenomena in which the tones of both V_1 and V_2 are relevant (section 3.1). The second situation involves languages or processes in which only the tone of only one of the vowels matters (section 3.2).

3.1. When the tones of V_1 and V_2 are relevant

In some languages, the resolution of a hiatus depends on the tones that are carried by the first *and* the second vowels.

In Simakonde, a variety of the Bantu language Makonde spoken in Mozambican communities who have immigrated to Tanzania, an optionnal postlexical rule leads to the realisation of nouns as entirely High when they are followed by a demonstrative (Manus 2003) – compare

²The opposite situation – i.e. phenomena in which the presence of a specific tone will lead to phenomena such as *vowel deletion* or *gliding* – is also reported. In Piro, a Chadic language spoken in Nigeria, "when a morpheme with a final vowel with a low tone is followed by another morpheme beginning with a vowel, the final vowel is deleted along with its tone" (Frajzyngier 1980:69).

for instance the realisations of the noun *ìpòdòsò* ‘present’ in (4ci) and (4cii). A hiatus situation resulting from the co-occurrence of the final vowel of the noun and the initial vowel of the demonstrative is resolved by the gliding³ of V₁ – cf. (4aii), (4bii) and (4cii).

However, the gliding of V₁ is possible *if and only* if the tone of the two involved vowels are *identical*, i.e. are High. In (4aiii), (4biii) and (4cii), the gliding does not occur because the tone of V₂ is Low.

(4) SIMAKONDE; Bantu [P23], Tanzania (Manus 2003:304)

- a. (i) *lìjèémbě hoe*
- (ii) *lǐjémby’ ááli this hoe*
- (iii) *lǐjémbé àlìlálá that hoe*
- b. (i) *sǐjùùlù hat*
- (ii) *sǐjúl’w’ áási this hat*
- (iii) *sǐjúlú àsìlálá that hat*
- c. (i) *ìpòdòsò present*
- (ii) *ípós’w’ áái this present*
- (iii) *ípósó àlìlálá that present*

In the Cross-river language Gokana, a syllabic nasal loses its syllabicity "whenever its tone is identical to the tone of a preceding vowel" (Hyman 2003:35). In (5a), the velar nasal of the word *ǐgà* ‘needle’ is syllabic, because the verbal form *aè tú* ‘he took’ ends with a low-toned vowel. In (5b), this consonant loses its syllabicity since its tone is identical to the tone of the preceding vowel.

(5) GOKANA; Cross-river, Nigeria (Hyman 2003:35)

- a. *aè sà ǐgà he chose a needle*
- b. *aè tú ǐgà → [túǐ.gàʔ] he took a needle*

In NEN (Mous 2003), a Bantu [A44] language of Cameroon, a final vowel is only realised when the underlying tone sequence of the last two syllables is *rising*. For instance, while a /CVCV/ word will be realised [CVC], a /CVCV/ word will be realised [CVCV] (Mous 2003:287). As noted by Mous (2003:286), "the formulation of the tone and vowel reduction rule is cumbersome in any phonological framework that separates tones from vowels and that does not allow vowels and tones to be treated in one statement".

3.2. When the tone of only one of the two vowels matters

In many languages, a hiatus is preserved if only one of the vowels bears a tone. This is for instance the case in Shingazidja, which will be discussed in more detail in section 4. In this section, some other cases are evoked.

In Nupe, a Benue-Congo language of Nigeria, a *falling tone*⁴ on the first of two successive

³Following the ‘africanist’ tradition and author’s choices, I will use the symbol ‘y’ – instead of the API symbol ‘j’ – to represent the palatal glide.

⁴NB: lexically rare in the language.

- (9) KIMATUUMBI; Bantu P13, Tanzania (Odden 1996:112)
- a. kǐ-úkumú *the Ukumu family* *kyúkumú
 - b. wangaǐ-éka *without having laughed* *wangaǐéka
 - c. naatǐ-eká *I laughed* *naatyéeká

Gliding in Kimatuumbi also depends on the interaction between tone and length. A pre-vocalic High-toned vowel, for instance, will glide if and only if V_2 is short. In (10a), the vowel of class prefix *mú* receives a High tone because the preceding verb is low; it is then realised as a plain vowel. In (10b), the verb *aatǐkwǐǐbiiká* ‘he put it in’ ends with a High tone, so the vowel of the prefix of the object *mú-aanjuú* ‘firewood’ does not; the vowel then turns onto a glide.

- (10) KIMATUUMBI; Bantu P13, Tanzania (Odden 1996:122)
- a. njǐbwenǐ mú-aanjuú *I saw it in the firewood*
*njǐbwenǐ mw-áanjuú
 - b. aatǐkwǐǐbiiká mwaanǐú *he put it in the firewood*

4. Case study: Shingazidja

In the preceding section, it has been shown that tone, in some languages, has a role on the syllabic status of vowels.

In this section, I will discuss in detail the role of tone in the preservation of *vowel deletion* or *gliding* in Shingazidja, a Bantu [G44a] language spoken on Grande Comore (Comoros). Except when it is indicated, the Shingazidja data were gathered in Paris between June 2006 and January 2008. In section 4.1, I will demonstrate that the presence of a tone on a vowel prevents its deletion or reduction.⁵ The data demonstrating that tone prevents vowels from gliding will be discussed in section 4.2.

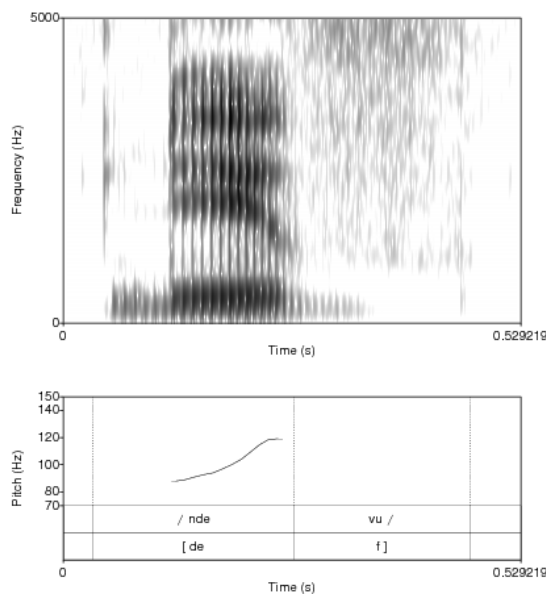
4.1. Tone prevents vowel deletion

Among the situations in which a vowel may be suppressed or reduced in Shingazidja, two will be examined in this section. In section 4.1.1, it will be shown that the deletion of the last vowel of an utterance – here exemplified with isolated nouns – is blocked when it bears a tone. In section 4.1.2, I will provide examples demonstrating that the deletion of a vowel resulting from the resolution of a hiatus situation is blocked when V_1 is High-toned.

4.1.1. Evidence 1: isolated nouns

The Shingazidja nouns which have a disyllabic root are split in four tonal categories. Among them, one is characterised by the presence of a tone on the last syllable of the word – CAT1, e.g. (11a). Two other categories present a tone on their penultimate syllable: nouns which

⁵It is not clear if tone prevents vowel deletion in fast-rate speech – my data are contradictory – or casual speech.

Figure 1: / ndévu / [déf] *beard*

underlyingly⁶ bears a tone on their penultimate syllable – CAT2, e.g. (11bi) – and nouns which do not underlyingly bear any tone – CAT3, e.g. (11bii).

- (11) a. CAT 1: mbu *baobab*, noŋá *horn*, muḃá *house*, etc.
 b. (i) CAT 2: ŋuwo *clothes*, djapíso *curse*, ʃiḃáa *prison(s)*, etc.
 (ii) CAT 3: puzi *feather*, ruḃu *leg*, máha *year*, etc.

When the nouns that belong to the categories 2 and 3 are realised in isolation, their final vowel tends to be deleted, especially after fricatives – cf. (12) and the figure 1, illustrating the realisation of the word *ndévu* ‘beard’.

- (12) a. CAT 2
 (i) djapís’ *curse* (< djapíso)
 (ii) noh’ *snake* (< noha)
 b. CAT 3
 (i) puz’ *feather* (< puzi)
 (ii) ndov’ *elephant* (< ndovu)

When the nouns that belong to CAT1 are realised in isolation, their final vowel is never deleted in normal speech rate – cf. (13) and the figure 2, illustrating the realisation of the word *mleví* ‘drunkard’.

⁶I mark the trigger syllable which underlyingly bears the tone by underlining it.

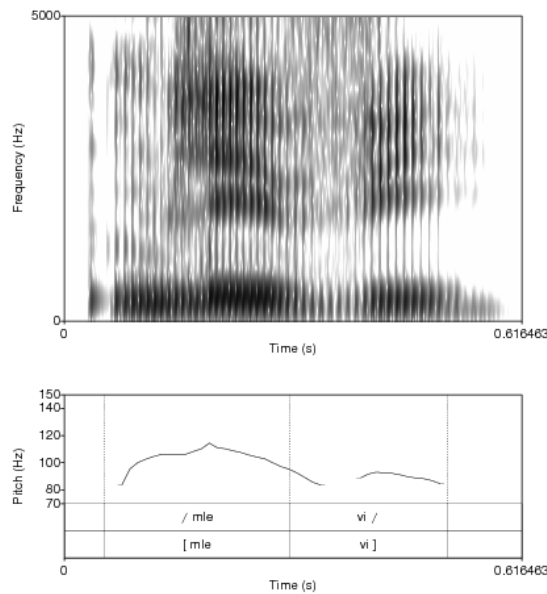


Figure 2: / mlevi / [mle[↓]vɪ] *drunkard*

- (13) CAT 1
- itasá *lock* (*itas'/*itás')
 - kofú *sea snail* (*kof'/*kóf')
 - mezá *table* (*mez'/*méz')

The presence of a tone on the last vowel of a word then prevents its deletion or reduction.

4.1.2. Evidence 2: morpheme boundaries

A second evidence demonstrating that tone prevents vowels from deletion comes from hiatus situations resulting from the co-occurrence of vowels in the verbal forms, at morpheme boundaries. When the morphemes *tsi-* (1sg past) and *rí-* (1pl past) precede a root beginning with /a/ or /e/, their final vowel /i/ tends to be deleted (the rule is optional but occurs frequently in normal speech rate) – cf. (14). In (14b) and (14c), for instance, the tone that is associated to the morpheme *rí-* shifts to the first syllable of the root, allowing the /i/ to disappear.

- (14) Cassimjee & Kisseberth (to appear) and personal data
- tsi-alíka > tsalíka
1sg(past)-invite
I invited
 - rí-ámbuha > rámbuha
1pl(past)-unstuck
We unstuck

- c. $r\bar{i}\text{-}\acute{e}n\bar{d}e > r\acute{e}n\bar{d}e$
 1pl(past)-go
we went

When the first vowel of the root underlyingly bears a tone, the tone of the subject prefix $r\bar{i}$ - cannot shift.⁷ Bearing a tone, the vowel of the prefix then cannot disappear (15b).

(15) Cassimjee & Kisseberth (to appear) and personal data

- a. (i) $r\bar{i}\text{-}(y)\acute{e}le$
 1pl(past)-wash
we washed
 (ii) $r\bar{i}\text{-}(y)\acute{e}ŋge$
 1pl(past)-hate
we hated
 b. (i) $*rele/*r\acute{e}le/*rel\acute{e}$
 (ii) $*reŋge/*r\acute{e}ŋge/*reŋg\acute{e}$

4.2. Tone prevents vowel from gliding

Besides avoiding the deletion of vowels, the presence of a tone also prevents gliding in Shingazidja. In section 4.2.2, some data demonstrating this phenomenon are proposed. Before discussing these examples, a small introduction to the tonology of Shingazidja, necessary for a comprehension of the alternations which will be proposed in section 4.2.2, will be provided (section 4.2.1).

4.2.1. Tone shift & OCP phenomena

The tonal rules and phenomena of Shingazidja were identified and described by Tucker & Bryan (1989) and Cassimjee & Kisseberth (1989; 1992; 1993; 1998).⁸

Shingazidja exhibits an ‘unbounded’ tone shift phenomenon. In (16a), the noun *walev\acute{i}* ‘drunkards’ has a High tone on its final syllable in isolation. In (16bi), however, the tone originally associated to the last syllable of this same noun *walev\acute{i}* shifts to the penultimate syllable of the adjective *wail\acute{i}* ‘two’. In (16ci), however, this noun receives the shifted tone of the verb *haw\acute{o}no* ‘he saw’.

- (16) a. $wa\text{-}lev\acute{i}$
 2-drunkard
drunkards
 b. (i) $wa\text{-}lev\bar{i} \quad wa\text{-}fl\bar{i}$
 2-drunkard 2-two
two drunkards
 (ii) $*walev\acute{i} \quad wail\acute{i}$

⁷See section 4.2.1 for a short description of the tonal rules of Shingazidja.

⁸See also Patin (2007a) for a recent description of Shingazidja tonal phenomena showing similar results, and Philippson (1998; 2005) for a presentation of tonal phenomena in all the Comorian varieties.

- c. (i) ha-wono wa-lévi
 3sg(past)-see 2-drunkard
 he saw drunkards
 (ii) *hawóno waleví

The shift of the first tone leads to the deletion of the second one. In (16ci), the tone of the last syllable of *waleví* ‘drunkards’ is deleted because it is adjacent to the tone of the verb, which surfaces on the penultimate syllable of the noun. This deletion is triggered by the *Obligatory Contour Principle*, which prevents the adjacency of two identical elements – here, two High tones. In a sequence of High tones, then, the first one shifts to the syllable preceding the following one, and every other tone is deleted.

Eventually, it has to be noted that in Shingazidja, as in many other Bantu languages, the last syllable of the utterance is ‘extraprosodic’. In Shingazidja, it means that the final syllable can bear a lexical tone – cf. the nouns that belong to category 1 (11a) – but cannot be the target of tone shift – cf. the nouns that belong to category 2 (11b).

4.2.2. Tones and glides

In Shingazidja, a high vowel may glide when it follows an /a/. In (17), the /i/ turns to its glide counterpart when it is preceded by the low vowel.

- (17) Cassimjee & Kisseberth (to appear) and personal data
- a. tsi-dái > tsidáy
 1sg(past)-claim one’s right
 I defend myself
- b. tsi-fái > tsifáy
 1sg(past)-be useful
 I was useful
- c. ha-i-réŋge > ha-y-réŋge
 3sg(past)-OM9-take
 he took it (the ring)

However, the gliding is avoided in normal speech rate when the high vowel is High-toned. In (18a) and (18b), contrary to the verbal forms that are proposed in (17a) and (17b), the /i/ is the vowel in the hiatus that bears the tone. In this situation, /i/ is realised as a plain vowel, and not as a glide. Similarly, the object marker of class 9 is realised as a plain vowel in (18c) because its tone, blocked by the underlying tone of the root -*ník-*, is not free to shift. In (17c), the shift of the tone allows the object marker to be realised as a glide.

- (18) a. tʃaí *tea* *tʃay/*tʃáy
 b. madjwaí *eggs* *madjway/*madjwáy
 c. ha-í-níka *hayníka
 3sg(past)-OM9-give
 he gave it (the ring)

Evidence in favor of the role of tone in the preservation of the syllabic nature of the high vowels also comes from alternations between plain vowels and glides depending on the tonal shape of the utterance (19). In (19ai), (19bi) and (19ci), a High-tone vowel is realised as a plain vowel. In (19a_{ii}), (19b_{ii}) and (19c_{ii}), however, the deletion of its tone resulting from the shift of a preceding tone leads to the gliding of these vowels. (19d) presents the opposite situation, since a vowel which may glide when the word to which it belongs is isolated has to be realised as a plain vowel when it bears a shifted tone (19d_{ii}).

- (19) a. (i) ndá-í=β̄i
int-CLM9=int. part.
which one (the arm)?
(ii) mi-hono ndá-í > mi-hono ndá-y
4-arm int-4
which arm?
- b. (i) tʃaí tea
(ii) ŋgam-(w)andzo tʃaí > ŋgam(w)andzo tʃáy
1sg(pres)-like tea
I want tea
- c. (i) madjwaí eggs
(ii) ŋgam-lo ma-djwaí > ŋgam-lo ma-djwáy
1sg(pres)-eat 6-egg
I ate eggs
- d. (i) máu > máw almond
(ii) maú ndaru three almonds *máw ndaru/?maw ndáru⁹

The forms proposed in (19bi) and (19b_{ii}) are illustrated, respectively, in the figures 3 and 4. The final vowel of the word tʃaí ‘tea’, since it bears a High tone¹⁰, is realised as a plain vowel when the word is isolated; in the figure 3, the segment that corresponds to this vowel presents intense formants and is introduced by slow formant transitions. The final vowel of the word tʃaí ‘tea’ is realised as a glide when it does not bear a tone (19b_{ii}); in the figure 4, the segment that corresponds to this vowel presents less intense formants and is introduced by fast formant transitions.¹¹

⁹Under certain circumstances, tones can be deleted – see Cassimjee & Kisseberth (to appear), Patin (2007a;b).

¹⁰Which is downstepped because it is the last tone of the utterance.

¹¹Besides these considerations, one can see a difference in duration between the two realisations of this segment.

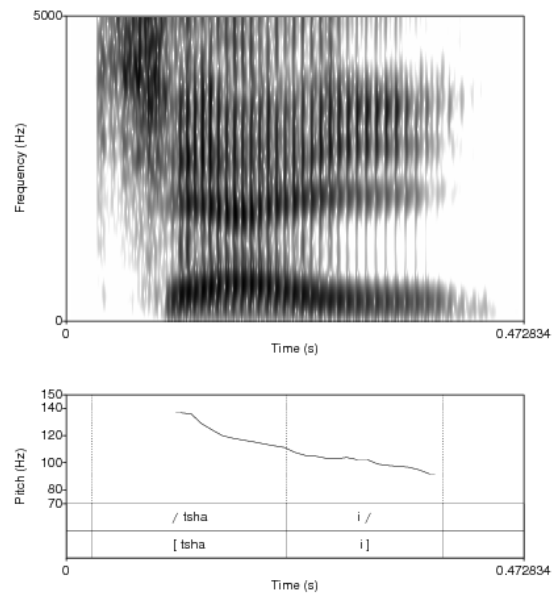


Figure 3: / tʃaí / [tʃa^hí] tea

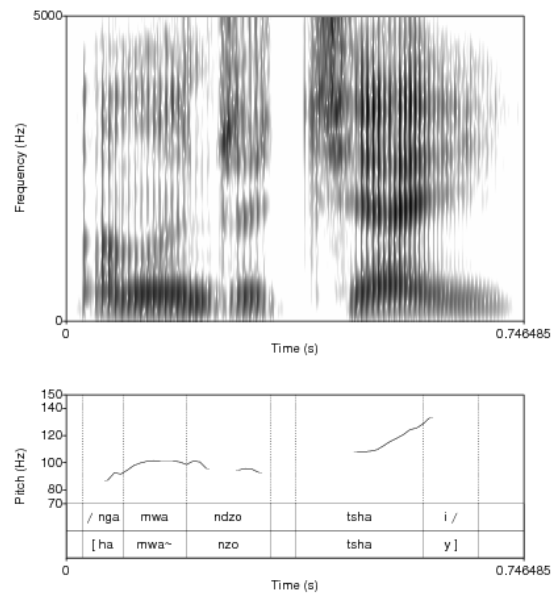


Figure 4: / ŋgamwándzo tʃaí / [hamwānzo tʃáy] I want (like) tea

5. An OT analysis of the tone-vowel interaction in Shingazidja

In this section, I will provide a first attempt of an OT analysis of the data discussed in the previous section. First, I will present an introduction to *Optimal Domains Theory* [ODT] (Cole & Kisseberth 1994; 1995, Cassimjee & Kisseberth 1998) and its application to the analysis of tonal systems, and a basic sketch of an analysis of the tonology of Shingazidja (section 5.1). Then, I will discuss the analysis of the tone-vowel interaction in an OT framework (section 5.2).

5.1. *Optimal Domains Theory*

5.1.1. *An introduction to ODT*

Cassimjee & Kisseberth (1998:38) defines ODT as follows:

"Optimal Domains Theory adopts OT in all its essential aspects, but adds one additional ingredient: it assumes that just as segments are organised into domains (syllables), so features are also organised into domains ('featural domains' or 'F-domains'). Just as a segment that is not in a domain cannot be pronounced, so a feature that is not in a domain cannot be pronounced. The domain 'licences' the feature so to speak."

For instance, in (20a), all the vowels are nasal vowels because they are situated inside the domain of the feature [+nasal]. In (20b), however, only the last syllable of the sequence is a nasal vowel, because the domain of the nasal feature is restricted to the final syllable.

- (20) a. (c̃vc̃vc̃v)_[+nasal]
 b. cvcv(c̃v)_[+nasal]

Just as all the other linguistic items, the domains are associated to specific constraints. In (21), the basic faithfulness constraints that are associated to domains are presented.

- (21) *ODT faithfulness constraints* (Cassimjee & Kisseberth 1998)
- a. DOMCOR (F)
 there is a one-to-one correspondence between input F-specifications and output F-domains
 - b. INCORPORATE (F)
 every F-sponsor is in a domain
 - c. UNIQUENESS (F)
 there is only one sponsor of F in a domain
 - d. EXPRESS (F)
 every element in the F-domain capable of expressing the feature F should realize (express) F
 - e. B(ASIC) A(LIGNMENT) R(IGHT)
 align the Right edge of a Feature domain with the Right edge of the feature-sponsor to which it 'corresponds'

- f. B(ASIC) A(LIGNMENT) L(EFT)
align the Left edge of a Feature domain with the Left edge of the feature-sponsor to which it ‘corresponds’

If the faithfulness constraints are undominated in the hierarchy of a language, the domain is restricted to the syllable or mora to which it is underlyingly associated (the *sponsor*). In the northern dialect of the Bantu language Asu, for instance, the *High-tone domain* corresponds to its *sponsor* – i.e. a High tone is realised on the vowel which underlyingly bears it (22).

- (22) ASU; Bantu [G22], Tanzania (Philippon 1991)
/ku-fín-ik-ir-a/ > ku(fí)nikira to cover

In Bantu languages, this situation is however quite exceptional. In the previous section, it has been demonstrated that the tone in Shingazidja is frequently not realised on the vowel to which it is originally associated. The domain of the tone is thus not, in this language, restricted to the sponsor of the tone.

Cassimjee & Kisseberth (1998) proposed an application of ODT to the analysis of tonal systems. They proposed that the length of the domain depends on the ranking of *alignment constraints* – e.g. BAR (21e) and BAL (21f). In (23), two of these alignment constraints are presented.

- (23) a. *MONOHD
A domain cannot be monomoraic/monosyllabic
b. ALIGN PWD R
Align the right edge of a domain with the right edge of the prosodic word

In (24), three different rankings involving alignment constraints are proposed.

- (24) a. BAR » *MONOHD, ALIGN PWD R
→ (c_́)cvcvcvcv
b. *MONOHD » BAR » ALIGN PWD R
→ (c_́c_́)cvcvcv
c. ALIGN PWD R » BAR
→ (c_́c_́c_́c_́c_́)

If BAR remains undominated (24a), the domain of a tone will be restricted on its right to the right edge of the sponsor – e.g. in Asu (22). If *MONOHD dominates the faithfulness constraint BAR, the optimal domain will be composed of two syllables (24b), since it constitutes the minimal violation of the constraint *MONOHD. If ALIGN PWD R is undominated, the domain will expand up to the end of the word (24c).

5.1.2. An ODT analysis of Shingazidja tonology

In this section, a simplified ODT analysis of the Shingazidja tonology is proposed, largely based on the analysis that was proposed in Cassimjee & Kisseberth (1998). This analysis is necessary to generate the placement of the tone(s) in an utterance, which will determine the

possibility for a vowel to glide. Due to space restrictions, I will not be able to provide a detailed analysis of the system – for further details, the reader may refer to Cassimjee & Kisseberth (1998) and Patin (2007a).

As noted before, Shingazidja presents an ‘unbounded’ tone shift phenomenon, and a rule that deletes every even-numbered tone. In (25) – extracted from (16), the tone of the verb *hawóno* ‘he saw’ shifts to the penultimate syllable of the utterance, and the tone of the noun *waléví* ‘drunkards’ is deleted.

- (25) ha-wono wa-léví
 3sg(past)-see 1-drunkard
he saw drunkards

The optimal candidate that corresponds to (25) is proposed in (26):

- (26) ha(wono waléví)

This candidate involves a domain which expands to its right, up to the end of the group. Then, the faithfulness constraint BAR has to be dominated by another constraint, ALIGN PP R, which is defined in (27).

- (27) ALIGN PP R
 Align the right edge of a domain with the right edge of the phonological phrase¹²

The deletion of the second tone will result from the high ranking of the constraint NO ADJ(ACENT) EDGES (28), which prevents the adjacency of two feature domains.

- (28) NO ADJ(ACENT) EDGES
 *)

The respective rankings of these constraints and some other faithfulness constraints is presented in (29)

- (29) a. ALIGN PP R » BAR (⇐ *ha(wo)no mle(ví)
 b. UNIQUENESS » ALIGN PP R (⇐ *ha(wono mleví)
 c. ALIGN PP R » NAE (⇐ *ha(wonó) mle(ví)
 d. NAE » DOMCOR (⇐ *ha(wono mlé)(ví)

A last issue is the realisation of tones inside the domain. Since Shingazidja presents an unbounded tone shift and not an unbounded tone spread, another constraint, preventing the expression of tones on all the vowels inside the domain except the last one, is necessary.

Cassimjee & Kisseberth (1998) proposed that each domain has a head which is correlated with the direction of the extension of the domain. In Shingazidja, the tone only appears on the last syllable of the domain (*ha(wonó mlé)ví), e.g. on its ‘head’. To account for this restriction, the constraint *(H,nonhead) (30) has to be high-ranked.

¹²Evidences that the *phonological phrase* is the domain of tone shift in Shingazidja are provided in Cassimjee & Kisseberth (1998) and Patin (2007a).

- (30) *(H,nonhead)
do not express a H on a nonhead

A possible, simplified analysis of the example (25) is proposed in the tableau (31).

- (31) Shingazidj

| /hawóno mleví/ | | UNIQUENESS | *(H,nonhead) | ALIGN PP R | NAE | BAR | EXPRESS H |
|----------------|------------------|------------|--------------|------------|-----|-----|-----------|
| a. | ha(wónó mlévī) | | *!* | * | | ** | |
| b. | ha(wó)no mle(vī) | | | **!* | | | |
| c. | ha(wono mlevī) | *! | | | | *** | *** |
| d. | ha(wónó) mle(vī) | | | **! | | * | * |
| e. | ha(wono mlévī) | | | * | | ** | ** |
| f. | ha(wono mlé)(vī) | | | * | *! | ** | ** |

In (31), the optimal candidate is the candidate e, because it minimally violates the constraint ALIGN PP R, and does not violate the high-ranked, unviolalable constraints UNIQUENESS and *(H,nonhead).

5.2. Tone and gliding in Shingazidja

This section is a first attempt of an analysis of the role of tone on the syllabic status of vowels in Shingazidja. The first section (section 5.2.1) discusses the analysis of gliding in OT and motivates a high ranking of the constraint ONSET, which states that a syllable must have an onset, in Shingazidja. Then (section 5.2.2), I will quickly discuss some corresponding phenomena involving *accents* in Romance languages. The last section (section 5.2.3) introduces a new constraint, \acute{V} - μ , and discusses its ranking in Shingazidja and beyond.

5.2.1. Gliding

Many OT scholars who have studied gliding consider that this phenomenon is triggered by the high ranking of the markedness constraint ONSET (Rosenthal 1994, Hamman 2003, de Veer 2006), dominating one or more faithfulness constraint(s). The constraint ONSET is defined in (32).

- (32) ONSET
A syllable must have an onset

Adopting an OT analysis, one has to consider that the constraint ONSET is high-ranked in Shingazidja. In this language, several phenomena are used to prevent hiatus situations (33), e.g.

the deletion of one of the vowels (33a), coalescence (33b), the insertion of a glide between the vowels (33c) or the gliding of one of the vowels (33d).

- (33) a. deletion = tsiendé → tsendé *I went*
 b. coalescence = ma-índji → méndji¹³ *many (cats)*
 c. glide insertion (optional) = tsiono ≈ tsiwono *I saw*
 d. gliding = mu-ána → mwána *child*

I will consider, following Hall (2003)'s account of German, that ONSET dominates the constraint MAX- μ , defined in (34), in Shingazidja.

- (34) MAX- μ
 A mora in the input corresponds to a mora in the output

5.2.2. Gliding and prominence

While the role of tone on the moraicity of vowels has been understudied, it is well known that stress or accent prevents vowels from gliding in Romance languages¹⁴ – e.g. in Catalan (Cabré & Prieto 2004), Italian (de Veer 2006) or Romanian (Steriade 1984). In Spanish (Rosenthal 1994), for instance, the vowel /i/ preceding an /a/ will glide (35a) except if it is a *stressed* vowel.

- (35) SPANISH (Rosenthal 1994:162)
 a. grafía [gra.fía] *written form*
 b. agrafia [a.ɣrá.fja] *agraphia*

Various constraints, whose definitions are roughly similar, have been proposed by scholars to account for the preservation of the syllabic status of vowels in these languages. Some of them are given in (36).

- (36) a. IDENT/ś (de Veer 2006)
 No vowel-to-glide mapping in heads of prosodic words (i.e. syllables which receive main stress)
 b. IDENT-S'(SEG) (Lambert 1999)
 Segments in the stressed syllable must have a one-to-one correspondence with their input segments
 c. Max-T-IO (Komen 2007)
 A vowel that bears lexical tone in the input should be realized in the output

To account for syllabic preservation in Shingazidja, I will propose that a constraint $\check{V}-\sigma/\mu$,

¹³NB: the High-toned vowel is not preserved in this situation. I have no explanation so far to account for this exception.

¹⁴This is also the case in many other languages, such as German (Hall 2003), Chechen (Komen 2007) or Slovenian. This last case has been raised by Alja Ferme, who reviewed this paper and to whom I am grateful. In this language also a stressed vowel is not free to glide. Compare for instance the following variants, where the place of the stress differs: naučil [na'učiw] ≈ [naw'čiw] 'teach, *perfective past participle masculine*' (data: Alja Ferme, p.c.).

which belongs to the same constraint family, dominates the constraint ONSET. This constraint is defined in (37).

- (37) $\check{V}-\mu$
a tone bearing unit has to be moraic

5.2.3. Shingazidja

The forms in (38), extracted from (19), are represented using the notion of domain. In (38a), the final vowel is situated inside a one-syllable domain, and is thus licensed to express its tone. In (38b), there is no domain corresponding to the underlying tone of the word *tʃáí* ‘tea’, because the existence of this domain would constitute a violation of OCP, i.e. here a violation of NAE. (38b) has indeed the same tonal pattern that the sentence *hawono waléví* ‘he saw drunkards’ that was analysed in section 5.1.2. Then, the final vowel cannot express its tone, and thus is able to glide.

- (38) a. tʃa(í) *tea*
b. ŋgam-(w)andzo tʃáí > ŋga(mwandzo tʃá)y
1sg(pres)-like tea
I want tea

The role of the High-ranked constraint $\check{V}-\mu$ in Shingazidja is illustrated in (39).

- (39) Shingazidja

| | | $\check{V}-\mu$ | ONSET | MAX- μ |
|-----|---------------------------|-----------------|-------|------------|
| | /ŋgamwándzo tʃáí/ | | | |
| a. | ŋga(mw <u>andzo</u> tʃá)í | | * ! | |
| b. | ŋga(mw <u>andzo</u> tʃá)y | | | * |
| | /tʃáí/ | | | |
| a'. | tʃa(í) | | * | |
| b'. | tʃa(ý) | * ! | | * |

In this tableau, the constraint ONSET dominates the faithfulness constraint MAX- μ . Then, the candidate *b*, which does not violate the constraint ONSET, is selected, even if it violates the faithfulness constraint. The candidate *b'* also respects the constraint ONSET, but it violates the constraint $\check{V}-\mu$. The candidate *a'* is thus selected.

What is important here is the fact that the position of the tone, which is determined by the constraints that were discussed in section 5.1.2, can determine the syllabic status of the vowels. In (40), extracted from (19), the shift of the tone – i.e. the length of the domain – conditions the realisation of the final vowel of the word *máú* ‘almond’.

- (40) a. máú > máw *almond*
b. maú nɔ́aru *three almonds* *máw nɔ́aru/²máw nɔ́aru

In other languages, however, ONSET will dominate $\check{V}-\mu$. In other words, the gliding will not be conditioned by the fact that the underlying vowel bears or not a tone. In Shimakonde, another dialect of the Makonde language (Liphola & Odden 2000), the presence of a tone on a vowel will not prevent its realisation as a glide. In the imperative forms in (41), a High tone is assigned to the penultimate vowel of the verb – cf. (41a). However, if the penult turns to a glide, the tone will be deleted.

- (41) SHIMAKONDE; Bantu [P23], Mozambique (Liphola & Odden 2000)
- a. (i) liíma *cultivate!*
 - (ii) lim-ífl-a *cultivate for!*
 - (iii) lim-ang-ífl-a *cultivate for! (rep.)*
 - b. (i) loómba *marry!*
 - (ii) loomb-w-a *be married!*
 - c. (i) luúma *bite*
 - (ii) luum-w-a *be eaten*

In (41bii) and (41cii), for instance, the passive morpheme *-u-* turns to a glide before the final vowel /a/¹⁵ and then cannot bear a tone, contrary to the forms in (41bi) and (41ci), which do not incorporate the passive morpheme.

6. Conclusion

In this paper, building on data coming from various languages, I have demonstrated that the presence of a tone may prevent the deletion or the gliding of a vowel. This assertion was notably supported by a detailed analysis of similar phenomena in the Bantu language Shingazidja. In a first attempt of an OT analysis, I proposed that the absence of gliding may result from the high ranking of a constraint $\check{V}-\mu$, which says that a *tone bearing unit* has to be moraic.

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¹⁵Alja Ferme asked me if the passive marker ever emerges as [u] and takes a tone. To my knowledge, the passive marker is always realized as [w] in Shimakonde (I found no example where the passive marker is realized as [u] in Liphola & Odden (2000) nor in Liphola (2001)). In other Bantu languages, however, the passive marker emerges as [u]. This is for instance the case in the Lunyala dialect of the Luluyia language (Marlo 2007) – e.g. *abhukúlúá* ‘he is being taken’ (vs. *abhukúlwá* in the Lumarachi dialect).

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