

/r/ in Washili Shingazidja

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Abstract

In this paper, the distribution of the various allophones of /r/ in the Washili variety of Shingazidja, a Bantu language spoken on Grande Comore, is discussed in detail. /r/ appears as a *trill* ([r]) in absolute initial position (except before [i]) and after a consonant, and as a *tap* ([ɾ]) in intervocalic position. Complications arise since /r/ undergoes fortition to [ɽ] in some classes but undergoes lenition in initial position when the following vowel is low-toned. An analysis is sketched in the CVCV framework (Lowenstamm 1996; Scheer 2004), claiming that the [r] allophone is underlyingly a geminate.

1. Introduction

In this paper, I discuss in detail the distribution of the various allophones of /r/ (e.g. the *trill* [r] and the *tap* [ɾ]) in the Washili variety of Shingazidja. Shingazidja is a Bantu language (G44a) spoken on Grande Comore, an island belonging to Comoros (Shingazidja is one of the five Comorian languages). This is to my knowledge the first account of the distribution of rhotics in the language, and one of the very few discussions on rhotics in Bantu languages. A CVCV analysis of the distribution of the allophones of /r/ in Washili Shingazidja is also provided.

One speaker of this variety, Said Mohamed (34; in France for approximately 10 years), has been recorded (specifically for /r/) up to the present, with most of the recordings taking place in August 2010 and April 2011. The corpus consists of around 100 words and 20 phrases and sentences, each associated with several iterations, which were recorded twice: at Université Lille 3 (Villeneuve d'Ascq, France), in a closed office, with an Edirol R1 (microphone) and at ILPGA, Université Paris 3 (Paris, France), in an anechoic room.

In Section 2, I will provide some background information on Shingazidja, i.e. its phoneme inventory and previous mentions of /r/ in the literature. In Section

3, the basic distribution of the different allophones of /r/ is presented. I point out some complications, i.e. the role of consonants and tones in the distribution, in Section 4. In Section 5, I will defend the hypothesis, sketched in the CVCV framework, that the trill is associated with two skeletal positions (while the tap and the [ɾ] allophone are associated with one skeletal position).

2. Background

In this section, I provide some necessary background on Shingazidja as a language. All the information in this section may be applied to any of the varieties of Shingazidja. The first subsection is dedicated to the vowels and prosodic system of the language, while the second subsection focuses on consonants. In 2.1.3, I briefly discuss previous discussions of /r/ in Shingazidja.

2.1 Vowel inventory and the prosodic system

Shingazidja has a classic 5-vowel system:

i		u
	e	o
	a	

There are also nasal vowels in some Arabic loans (1-a), mostly when the Arabic word contains a pharyngeal or a glottal (a phenomenon known as ‘rhinoglottophilia’, a term that comes from Matisoff 1975), or in ideophones (1-b).

- (1) a. áda ‘custom’ (< Ar. *ʔadab*)
 b. ǎhá ‘no’

Shingazidja has a word-group stress that falls on the penult of the phonological phrase. The language is also characterized by a reduced tone system (similar to a pitch-accent system) with complex manifestations such as unlimited shift of the tone – see Cassimjee & Kisseberth (1998), Patin (2007).

2.2 Consonants

Table 1 shows the consonant inventory of Shingazidja, following Ahmed-Chamanga (2010), Full (2006), Lafon (1987), Rombi & Alexandre (1982) and my own observations.

	LABIALS	LABIO-DENTALS	DENTALS	RETRO-FLEXES	PALATALS	VELARS	GLOTTALS
STOPS	p b		(ɸ) (ɓ)	t ɗ		k g	(ʔ)
AFFRICATES			ts dz		tʃ dʒ		
IMPLOSIVES	ɓ			ɗ			
FRICATIVES	β	f v	(θ) (ð)	s z	ʃ (ʒ)	(x) (ɣ)	h
NASALS	m			n	ɲ		
LATERAL				l			
TRILL				r			
GLIDES	w				j		

Table 1 – Shingazidja consonants.

A large portion of the Shingazidja lexicon was borrowed from Arabic some centuries ago, and more recently but to a lesser extent from French. As a consequence, many consonants (namely those indicated in parentheses) generally surface only in (Arabic or French) loanwords. This is the case for the voiced labial and dental stops (2, 3) and [ʒ] (cf. the word *zandarmu* ‘gendarme’).

- (2) **bwáti**¹ ‘box’ (< Fr. *boîte*)
ɟaribó ‘charcoal’ (< Fr. *charbon*)
- (3) **dúnja** ‘world’ (< Ar. *dunyā* ‘world’)
ɗukutéra ‘doctor’ (< Fr. *docteur*)

The interdental and velar fricatives and the glottal stop only appear in Arabic loanwords in formal speech (Ahmed-Chamanga 2010; Rombi & Alexandre 1982).

- (4) **ḏahábu** ‘gold’ (< Ar. *ḏahab* ‘gold’)
xatwári ‘danger’ (< Ar. *Xaṭar* ‘danger’)
luḡá ‘tongue’ (< Ar. *luḡah* ‘tongue’)

According to Rombi and Alexandre (1982), many speakers replace interdentalals by [d], and velars by [h] (5).

- (5) **hatwári** ‘danger’
luhá ‘tongue’

¹ In this paper, underlining indicates that the *tone bearing unit* is lexically associated with a tone. Surface tones are signaled by acute accents.

On the other hand, the voiced implosives /b/ et /d/ (6-a, 6-b) and the retroflexes (6-c) essentially occur in the Bantu lexicon (but not only – there are variations among speakers).

- | | | | |
|--------|-------------------|--------------|----------------------------|
| (6) a. | m bwá | ‘dog’ | (vs. m bwá ‘ocean’) |
| | b á | ‘misfortune’ | (vs. b á ‘bench’) |
| b. | d ú dʒa | ‘wave’ | |
| | d á o | ‘plait’ | |
| c. | ha ʃa máre | ‘he spat’ | |

It is not clear if prenasalized consonants in Shingazidja (i.e. /mb, mb, nt, nd, nts, ndz, nd, nd, nʃ, ndʒ, ŋk, ŋg/) correspond to one or two phonemes. They will thus not be discussed in detail here, and they are not included in Table 1.

2.3 Previous accounts of /r/ in Shingazidja

No specific study has focused on /r/ in Shingazidja, and very few words have been written on the subject in studies with a broader purpose.

All authors who mention /r/ agree on its realization as a trill (e.g. “Das Phonem /r/ wird realisiert als stimmhafter alveolar Vibrant ([r])” Full 2006:114). Ahmed-Chamanga (2010), for instance, claims that “La consonne vibrante r du comorien est une consonne produite avec une vibration du bout de la langue au niveau des alvéoles. Elle ressemble au ‘r’ de l’italien ou de l’espagnol” (Ahmed-Chamanga 2010:24).

However, I rarely observed a clear trill realization when I worked with my previous informants, who came from various locations on the island. In my data, /r/ mostly appears as a tap. As we shall see in the following sections, the situation is different in Washili.

3. Basic distribution of rhotics in Washili Shingazidja

In this section, I examine the basic distribution of the trill [r] and tap [ɾ] allophones of /r/ in Washili Shingazidja. Section 3.1 discusses the trill realization that is associated with the absolute initial position. Section 3.2 deals with the tap allophone that emerges when /r/ is placed between two vowels inside the prosodic word, and section 3.3 shows that the tap is also selected when the intervocalic /r/ occurs at a word boundary.

3.1 Absolute initial position

In absolute initial position, /r/ mostly appears as a trill [r] in Washili Shingazidja, especially before [+back] vowels (7). It is important to note that

many of the words that exhibit an initial [r] are of Arabic origin (for instance ruhúsa ‘permission’ < Ar. *ruṣṣa*)². However, this is not always the case (see some imperatives, where [r] appears initially: rēma ‘beat!’, ruká ‘jump!’).

- | | | | |
|--------|------------|----------|------------------|
| (7) a. | before [a] | [r]áha | ‘joy, happiness’ |
| | | [r]áŋgi | ‘color’ |
| | | [r]áðǝ | ‘blessing’ |
| b. | before [o] | [r]óho | ‘heart’ |
| | | [r]óha | ‘get out!’ |
| c. | before [u] | [r]úŋga | ‘pinch!’ |
| | | [r]uhúsa | ‘permission’ |

Almost all the trills in my data consist of two periods of vibration. The trill realization of the initial /r/ is illustrated in Figure 1.

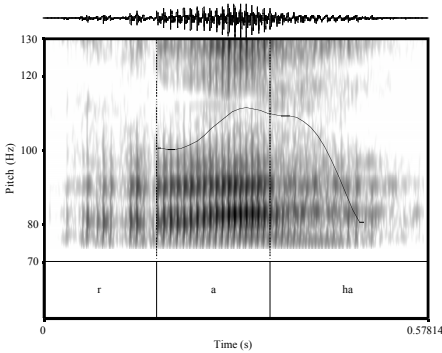


Figure 1 – Spectrogram of [r]áha ‘joy, happiness’.

Before [i], however, the trill (almost) never appears. Most of the time, a tap [r] (sometimes an approximant [ɹ]) is realized (8).

- | | | |
|----------------|-------------|-----------|
| (8) Before [i] | [r]iyáli | ‘money’ |
| | [r]i[r]éŋge | ‘we took’ |
| | [r]ínika | ‘we gave’ |

² It is not clear to what extent the words in (7) are of Arabic or Bantu origin. The interdental [ð] indicates that ráðǝ ‘blessing’ most probably comes from Arabic (according to researchers such as Ahmed-Chamanga 2010:22, interdental and velar fricatives only appear in Arabic loanwords). One reviewer has suggested that rúŋga ‘pitch’ may come from the Proto-Bantu *tung- ‘to sew, thread’, or *túŋ ‘to tie up’; I cannot offer a better hypothesis. Rábo ‘heart’ may correspond to the Proto-Bantu *jòjò ‘heart, life’ (Tervuren BLR3 database [<http://www.africamuseum.be/collections/browsecollections/humansciences/blr3>]).

Before [e], the trill is possible (9-a), though not frequent: [e] is usually preceded by a tap (9-b).

- (9) Before [e] a. [r]ehéma ‘blessing’
 b. [r]engá ‘take!’
 [r]edžéi ‘come back!’

3.2 /r/ in intervocalic position

In intervocalic position, /r/ usually emerges as a tap [ɾ] (10), sometimes as an approximant [ɹ] (the two sounds seem to be in free distribution, perhaps partly depending on parameters such as the delivery or the style of speech), never as a trill.

- (10) [ɾ]i[ɾ]ánganyá ‘we were destroyed’
 ma[ɾ]ávũ ‘cheeks’
 ma[ɾ]á(ŋg)ŋ ‘pumpkins’
 mi[ɾ]ú(n)dá ‘orange tree’
 ma[ɾ]ú(m)bŋ ‘insides’

The tap realization of the intervocalic /r/, which consists of a single closure, is illustrated in Figure 2.

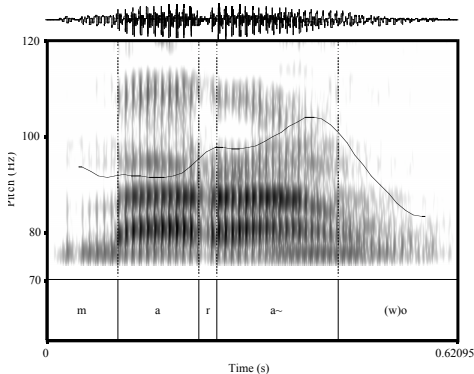


Figure 2 – Spectrogram of ma[ɾ]á(ŋg)ŋ ‘pumpkins’.

The tap realization occurs before and after all vowels and especially, as expected, before front vowels (11).

- (11) mi[r]éma ‘cultivated field’
ma[r]ind(i) ‘banana tree’

However, some rare items in my corpus, generally the first members of sequences of iterations (or when the speakers overarticulate), involve a trill in this position.

3.3 Intervocalic position across a word boundary

Since the /r/ appears as a trill in the absolute initial position and as a tap in intervocalic position, one may wonder how a word-initial /r/ would emerge.

When /r/ appears between two vowels that belong to two different prosodic words belonging to the same prosodic phrase, the tap is selected (12-14). This is true no matter which vowels are involved, and regardless of whether the words are of Bantu or Arabic origin.

- (12) (ts(i)onó [r]ah(a))_φ ‘I saw joy’
cf. [r]áhā ‘joy, happiness’
- (13) (tsimbá [r]aǎ(i))_φ ‘I gave him (a) blessing’
cf. [r]áǎǎ ‘blessing’
- (14) ((ŋ)gamníko [r]úhúsá)_φ ‘I gave permission’
cf. [r]uhúsa ‘permission’

The tap realization of the intervocalic /r/ occurring at a word boundary is illustrated in Figure 3.

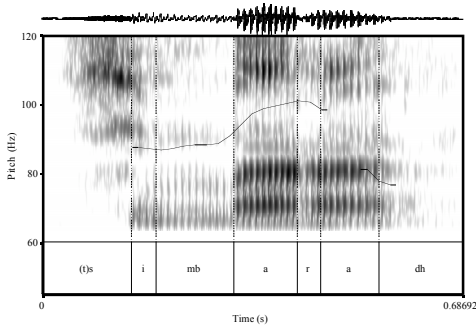


Figure 3 – Spectrogram of (tsimbá [r]aǎ(i))_φ ‘I gave him (a) blessing’.

At the beginning of a non-initial prosodic phrase, /r/ also emerges as a tap (15).

- (15) [(nda=mí)_φ (na=wé)_φ]_I [([r]endʒez'=[é] ndej)_φ]_I
 stab=1sg and=2g 1pl(pas). raise=the prices
 'that's I and you who raised the prices'

The distribution of rhotics in Washili Shingazidja thus seems to be quite simple: the trill realization is restricted to the absolute initial position, except before front vowels, while the tap (or its approximant variant) is selected in intervocalic position, whenever the intervocalic position occurs inside the word or between two words. In Section 4, I will show that the picture is a bit more complicated.

4. Complications

In this section, I discuss the distribution of rhotics in Washili Shingazidja as a function of the presence of consonants before /r/ and the absence of high tones on a following vowel when /r/ occurs in word-initial position. In the former case, discussed in Section 4.1, a trill is selected. In the latter, discussed in section 4.2, /r/ may be realized as a tap, or even be deleted.

4.1 After a consonant

Washili Shingazidja clearly differs from the other Shingazidja varieties in the behavior of /r/ after a consonant. In this situation, /r/ emerges as a trill (16, 17).³

- (16) a. nd[r]avɿ 'branch(es)'
 nd[r]óvɿ 'banana(s)'
 b. m-be[r]é n-d[r]a[t̪](u) 'three rings'
 10-ring 10-three
- (17) m[r]áhə 'game (specific)'
 ṁ[r]ámɓuwa 'you (pl) recognized'

In the variety of Shingazidja that is spoken in Moroni, and to a lesser extent in other varieties, the sequence /d/d + r/ emerges as a retroflex [ɖ] ('lies' is realized *nɖabɔ* in Moroni, *nɖrabɔ* in Washili).

The trill realization of the /r/ occurring after a consonant is illustrated in Figure 4.

³ I have no evidence for or against an analysis where [dr] synchronically corresponds to a single affricate consonant, a hypothesis suggested by a reviewer. This idea receives support from Proto-Bantu (WS *m-drí* 'tree' < PB *mu-ti) and the fact that the implosion come from post-nasal fortition – cf. *n-dráru* 'cl.10-three' vs. *mi-ráru* 'cl.4-three'.

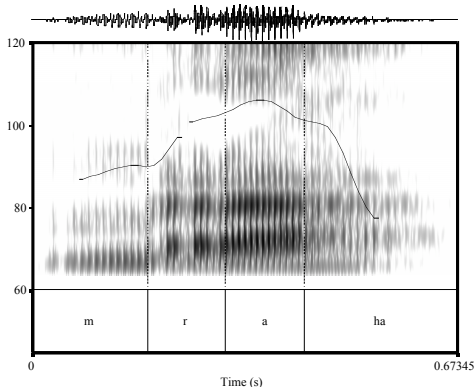


Figure 4 – Spectrogram of m[r]áha ‘game (specific)’.

Interestingly, the post-consonantic rhotic also emerges as a trill when the vowel that follows is [i] (18).

(18) m̩d[r]í ‘tree’

Between [m] and [i], the rhotic does not appear as a single tap either, since two closures are clearly perceptible. /r/, in this case, is realized as [ʳr].

(19) m̩[ʳr]íma ‘African (coast)’
 m̩[ʳr]ísizá ‘you (pl) frightened’

In classes 3⁴ (or 1) and 4, there is thus an alternation between [r], occurring in class 4 (between two vowels, the class 4 prefix being *mi-*, the class 2 one *wa-*), and [r], occurring in classes 1 and 3 (the prefix in classes 1 and 3 is *m-*) (20).

(20) a. m-[r]ó ‘river’ vs. mi-[r]ó ‘rivers’
 b. m-[r]éma ‘field’ vs. mi-[r]éma ‘fields’
 c. m-[r]únda ‘orange tree’ vs. mi-[r]únda ‘orange trees’

These alternations also occur after the 1st and 2nd plural prefixes of the past (perfective) (21).

⁴ Like the other Bantu languages (see Katamba 2003 for details), Shingazidja has a gender class system, where singular nouns belong to classes 1, 3, 5, 7, etc. while plural nouns belong to classes 2, 4, 6, 8, etc.

- (21) \underline{m} -[r]ámbuwá ‘you (pl.) – recognized’
 vs.
 [r]i-[r]ámbuwá ‘we – recognized’

4.2 /r/ and tones

In absolute initial position, when the vowel that follows /r/ is not associated with a high tone, there is usually no trill (there are some rare exceptions in my corpus)⁵. Most of the time, /r/ then appears as an approximant (22), and can even be deleted.

- (22) [ɹ]ahísǽ ‘inexpensive’
 [ɹ]angú ‘from’
 [ɹ]aǽli ‘as long as’
 [ɹ]uká ‘jump!’

When the /r/ occurs in intervocalic position, however, the tone does not play a role – compare (23-a) to (23-b).

- (23) a. bá[r]áká ‘blessing’
 b. bá[r]ázá ‘jury, committee’

5. Analysis

5.1 Background

Allophonic situations where a trill appears in the initial position and a tap (or a flap) occurs in the intervocalic position are far from rare (see Bradley 2001; Inouye 1995; Lindau 1985; Recasens 1991; Walsh Dickey 1997; Wiese 2001, 2011, among many others). This is for instance the case in Romanian (Chitoran 2001), Northern Italian (Recasens 2002) and Farsi (“In Farsi, /r/, which is a trill in initial position⁶, has a tap allophone in intervocalic position and a voiceless trill variant in word-final position” Ladefoged & Maddieson 1996:216).

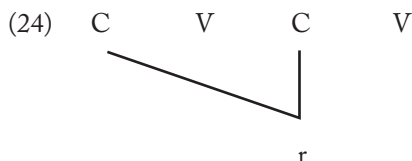
However, such a distribution, to my knowledge, has never been identified in any Bantu language. Nevertheless, according to Gérard Philippson (*personal communication*), it also appears in Chaga (Tanzania), a language that possesses another phonemic rhotic. In Davey et al. (1982), a paper concerning liquids in Chaga, this distribution is not explicitly discussed. However, the figures that illustrate the paper seem to attest its existence.

⁵ In Shingazidja, the presence of a tone may also prevent vowels from gliding and from deletion (Patin 2009).

⁶ The trill is voiceless in this position according to Majidi (1986, mentioned by Wiese 2011).

5.2 Analysis

How can we account for the allophonic distribution of /r/ in Washili Shingazidja? I will assume that the trill realization that occurs in the absolute initial position corresponds to a geminate association (25).



I adopt in (24) a CVCV representation. The idea behind CVCV (Lowenstamm 1996; Scheer 2004), a theory that emerges from Government Phonology (Kaye et al. 1985, 1990), is that constituent structure can be reduced to a strict sequence of non-branching Onsets and non-branching Nuclei.

Three arguments support the structure in (24). First, it must be noted that many words involving a trill in the initial position are Arabic loanwords (25).

- (25) [r]uhúsa ‘permission’ (< Ar. *ruxsa*)
 [r]áďi ‘blessing’

A geminate, in Arabic, results from assimilation of the article *al* when it is followed by ‘r’ (Classical Arabic: **al-ra*’s → *ar-ra*’s ‘the head’, Alfozan 1989).

- (26) a[r]uh < (a)l-ruḥ ‘the soul’⁷

One could suggest that combinations of (a)l+word or the forms where a geminate appears were borrowed⁸. An argument supporting this idea is the fact that several French loans were borrowed *with* the definite article.

⁷ Rachid Ridouane, *personal communication*.

⁸ If this idea is borne out, one might expect similar effects to be observed at least on some of the other consonants that are implicated in the assimilation process that involve the article in Arabic, especially the other coronals (/s/, /n/, etc.). A systematic exam of the Arabic loanwords, which has not yet been conducted, is thus necessary. Thanks to Jean-Marc Beltzung for this suggestion.

- | | | |
|------------------------------------|-----------|----------------------------|
| (27) labi <u>é</u> ra | ‘beer’ | (< Fr. <i>la bière</i>) |
| lat <u>á</u> bu | ‘table’ | (< Fr. <i>la table</i>) |
| lagil <u>í</u> zi | ‘church’ | (< Fr. <i>l’église</i>) |
| láv <u>a</u> ni | ‘vanilla’ | (< Fr. <i>la vanille</i>) |
| lakó <u>l</u> i | ‘glue’ | (< Fr. <i>la colle</i>) |
| Cassimjee & Kisseberth (to appear) | | |

The result would involve an initial CV site⁹ in the first position of the prosodic word (28).

- (28)
- | | | | | | |
|---|---|---|---|---|---|
| C | V | C | V | C | V |
| | | | | | |
| | | | | | |
| | | r | a | h | a |

Washili Shingazidja, in this respect, would be more conservative than other varieties, where the trill is rare in initial position.

The second argument that supports the structure in (24) is the fact that the initial trill cannot be considered the fortis counterpart of the tap. Fortition involves a (voiceless) retroflex, which is generally associated with clear friction in Washili Shingazidja: [tʰ]. In classes 5 and 6, there is an alternation between [r], which appears in class 6 (between two vowels, the class 4 prefix being *ma-*), and [tʰ], which appears in class 5 (the main class 5 allomorph being Ø-).

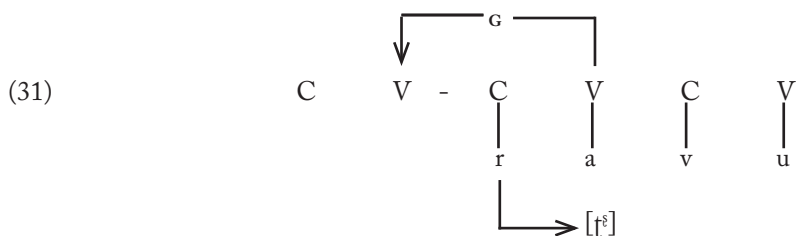
- | | | |
|---------|--------------|--------------------------|
| (29) a. | ma-[r]índ(i) | ‘banana trees (class 6)’ |
| | vs. | |
| | Ø-[tʰ]índ(i) | ‘banana tree (class 5)’ |
| b. | ma-[r]ávu | ‘cheeks (class 6)’ |
| | vs. | |
| | Ø-[tʰ]ávu | ‘cheek (class 5)’ |
| c. | ma-[r]óne | ‘drops (class 6)’ |
| | vs. | |
| | Ø-[tʰ]óne | ‘drop (class 5)’ |

Other alternations in this gender involve the transformation of [β] (class 6) to [p] (class 5) (30a), [h] (class 6) to [k] (class 5) or [l] (class 6) to [d] (class 5) (30b).

⁹ A lexical one, distinct from that which was proposed in Lowenstamm (1999).

- (30) a. Ø-[p]áha 'cat (class 5)'
 vs.
 ma-[β]áha 'cats (class 6)'
 b. Ø-[d]íngo 'back (class 5)'
 vs.
 ma-[l]íngo 'backs (class 6)'

In the CVCV framework, it will be assumed that fortition here involves an initial empty 'CV-' slot (a hypothesis originally discussed in Mohamed-Soyir 2005).



In (31), the second V slot governs and thus strengthens the first V position, leading to the fortition of the second consonant slot. The same configuration, usually referred to as *coda-mirror*, also explains the fortition of a post-coda consonant, according to Ségéral & Scheer (2001, 2005, 2008, among others). Gemination, if the analysis is retained, would thus differ from fortition in Shingazidja.

The final argument in favor of the analysis derives from the synchronic alternation between casual and formal speech. Consider, for instance, the verbal form in (32).

- (32) [r]í[r]i ‘we played / we feared’

In casual speech, the first vowel can be dropped, leading to the realization of a trill (33).

- (33) a. [r]í mpi[ɪ]á 'we played a game'
 b. (nda=mí)_ϕ (na=wé)_ϕ ([r]í mhyó)_ϕ
 '(that's) me and you who feared God'

The trill realization in (33-a) is illustrated in Figure 5.

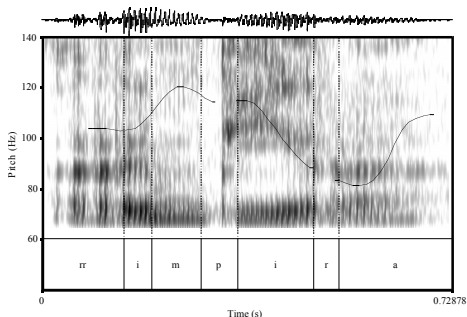
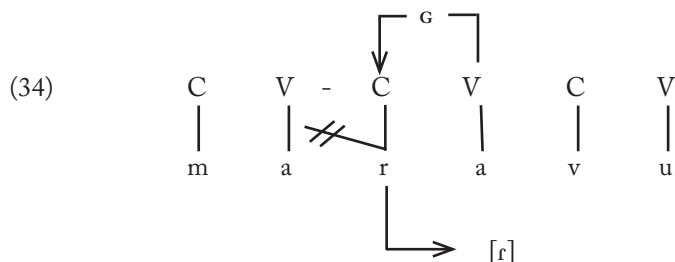


Figure 5 – Spectrogram of ([r])[r]_i mpi_i[ɪ]_a ‘we played a game’.

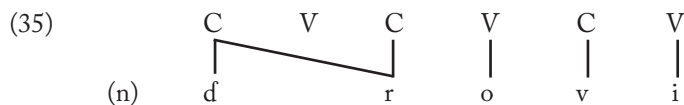
In intervocalic position, /r/ is not able to spread through a vocalic association (34). Since it is not associated with two skeletal positions, it cannot emerge as a trill.



Because it is governed by the following vowel in the second version of the ‘coda-mirror’ representation (Scheer & Ziková 2011), the consonant cannot undergo fortition either.

5.3 Remaining questions

I propose that the trill realization that appears after a consonant results from a joint association to the first C slot. Such a representation is however excluded by the model – Scheer (2009): “[...] consonants can geminate after floating, but not stable consonants”).



Double association of segments to a single C position is indeed problematic, since it would make the model to be too powerful. However, the idea is still worth considering, since it may account for situations such as the distinction between prenasalized consonants, where two consonant elements would be associated with a single slot, and N+C sequences, where the same consonant elements would be linked to two different slots. This hypothesis, however, needs deeper examination if it is to be retained.

CVCV representations cannot account for the tap realization before [i], nor can they explain why a trill can emerge between a consonant and [i]. As for the absence of the trill before a front vowel in initial position, it should be noted that the trill is characterized by a contact between the tip of the tongue and the alveolar area. Such a configuration hardly corresponds to the position of the tongue through the production of [i]. Other Bantu languages do not allow the sequence [ri], e.g. Simakonde (Sophie Manus, *personal communication*),¹⁰ and several studies have discussed the (relative) incompatibility of trills with (high) front vowels and/or palatalization: among others, Hall & Hamann (2009); Kavitskaya (1997); Żygis (2005). Recasens (2002:346), for instance, claims that “the occasional simplification of the trill before a high front vowel is rather associated with the difficulty involved in performing two successive antagonistic tongue dorsum gestures, i.e. tongue dorsum lowering and retraction for [r] and tongue dorsum raising and fronting for [i]”.

This explanation alone fails to account for the emergence of the trill before [i] when the rhotic follows another consonant. The energy provided by the closure may explain this distinction¹¹.

6. Conclusions

This paper is the first discussion of the allophonic variation of /r/ in the Washili variety of Shingazidja, a Bantu language. It is claimed that /r/ has two main allophones: (i) a trill [r], which occurs in the absolute initial position – whenever the following vowel bears a high tone – and after a consonant; and (ii) a tap [ɾ], which is selected in intervocalic position, within a word and between two words. A CVCV analysis of this distribution has been sketched out, claiming that the trill allophone is underlyingly a geminate. However, the CVCV analysis fails to

¹⁰ A reviewer has pointed out that “there is an occurrence of [d] before [i] vs. a liquid before other vowels in Kikongo and Sotho-Tswana, and that there is dialectal documentation showing an [r]”.

¹¹ Suggestion from Bernard Gautheron, *personal communication*.

account for some facts, such as the alternation of /r/ before front vowels. Further investigations, including a deeper articulatory analysis, are required.

Acknowledgements

For helpful discussion of several aspects of this work, I wish to thank Jean-Marc Beltzung, Kassim Mohamed-Soyir, Kathleen O'Connor, two anonymous reviewers and audiences at RFP 2011 and *r-atics-3*. Many thanks to my informant Said Mohamed: this work could not have been completed without his help.

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