

Tel Aviv University  
Faculty of Humanities  
Linguistics Department

# High, low and in between: Giryama tonology

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by:  
Erez Volk

Thesis Supervisor:  
Prof. Charles W. Kisseberth

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# Abstract

This thesis describes the tonal system of Giriyama, a Bantu language spoken in Kenya. As I will show, the principles governing the nature of surface tones in this language are essentially quite simple: a High tone will move to the right within the phonological phrase, stopping before the underlying location of the next High. As this formulation indicates, Giriyama tones are highly mobile, and are often heard on a different word than the one they start out in. This freedom, combined with principles that prohibit tones from surfacing in certain positions, obscure the underlying simplicity of the system. For example, many words can be shown to have an underlying High tone which is never heard in isolation and can only be identified through its interaction with tones from an adjacent word. Another complicating factor is the interaction of tone with segmental phonology, whereby a voiced obstruent usually prevents an immediately following vowel from receiving a High tone (but not always). Finally, a surface High tone will blur the identity of any following Highs, making their identification a matter of analysis rather than mere transcription. Indeed, as will soon become obvious, any attempt to merely transcribe the tonal patterns of Giriyama proves futile without an adequate theory of the underlying forces. In addition to this descriptive work, I will also present an analysis of Giriyama tonology within the framework of Optimality Theory, and show why such a system strongly suggests that the framework may need some modifications.

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# Contents

<b>1</b>	<b>Introduction</b>	<b>7</b>
1.1	Background information . . . . .	7
1.2	Source of the data . . . . .	8
1.3	Goal and scope . . . . .	8
1.4	Layout . . . . .	8
1.5	Prerequisites . . . . .	9
1.5.1	Segmental phonology . . . . .	9
1.5.2	Stress and vowel length . . . . .	11
1.5.3	Tone-bearing units . . . . .	11
<b>2</b>	<b>Verbs: Present tense</b>	<b>12</b>
2.1	Infinitive . . . . .	12
2.2	Present: Low stems . . . . .	13
2.3	Present: High stems . . . . .	14
2.3.1	Stem-initial position . . . . .	15
2.3.2	Intermediate pitch . . . . .	16
2.4	Present: Depressor-initial High stems . . . . .	17
2.5	(Non)-depressor-like behavior . . . . .	19
2.5.1	The two types of [h] . . . . .	19
2.5.2	Other problematic depressors . . . . .	20
2.5.3	Vowel-initial stems . . . . .	20
2.6	A note on object prefixes . . . . .	21
2.6.1	On domains . . . . .	23
2.7	What the present tense has taught us . . . . .	23

<b>3</b>	<b>Verbs: Other tenses</b>	<b>24</b>
3.1	Subjunctive . . . . .	24
3.1.1	Formation of the subjunctive . . . . .	24
3.1.2	An unexpected bonus . . . . .	25
3.2	Imperative . . . . .	25
3.3	Perfect . . . . .	26
3.3.1	Low stems . . . . .	27
3.3.2	Depressor-initial High stems . . . . .	27
3.3.3	Non-depressor-initial bisyllabic High stems . . . . .	27
3.3.4	Non-depressor-initial polysyllabic High stems . . . . .	28
3.3.5	Object prefixes in the perfect . . . . .	30
3.4	Past . . . . .	31
3.5	Negative past . . . . .	32
3.5.1	The grouping . . . . .	32
3.5.2	Why a falling tone? . . . . .	33
3.5.3	Falling vs. rising tone . . . . .	33
3.5.4	Depressing behavior . . . . .	34
3.6	Negative perfect . . . . .	34
3.7	Reduplicated verb stems . . . . .	36
3.8	What the tenses have taught us . . . . .	37
<b>4</b>	<b>Nouns</b>	<b>38</b>
4.1	Introduction . . . . .	38
4.2	A bird's-eye view of noun types . . . . .	39
4.3	Properties of the copula . . . . .	41
4.4	Depressors . . . . .	42
4.5	Sources of ambiguity . . . . .	43
4.5.1	Depressors . . . . .	43
4.5.2	Short nouns . . . . .	44
4.6	Where do domains start? . . . . .	46
4.6.1	Hidden domains in type L3 . . . . .	46
4.6.2	Overt domains in the High types . . . . .	46

4.7	Between the rock and the hard place . . . . .	47
4.7.1	A closer look at the sixth type . . . . .	47
4.7.2	...and a closer look at the fifth type . . . . .	48
4.8	Some misbehaving nouns . . . . .	48
4.9	Reduplicated nouns . . . . .	49
4.10	Back to verbs: reflexives . . . . .	50
4.11	A taste of phrases . . . . .	51
4.12	Summary . . . . .	52
<b>5</b>	<b>Generating Giryama</b>	<b>54</b>
5.1	Theoretical background . . . . .	54
5.1.1	Optimality, domains and spans . . . . .	54
5.1.2	Getting directionality . . . . .	57
5.1.3	Getting surface Highs . . . . .	58
5.1.4	More faithfulness . . . . .	59
5.2	Derivations and rankings . . . . .	60
5.2.1	The starting point: High Shift . . . . .	60
5.2.2	Domain boundaries . . . . .	62
5.2.3	Sponsor overlap . . . . .	62
5.2.4	Depressors . . . . .	64
5.2.5	The perfect tense . . . . .	66
5.2.6	Additional cases . . . . .	69
5.3	Summary . . . . .	70
<b>6</b>	<b>Conclusions</b>	<b>71</b>
	<b>Bibliography</b>	<b>72</b>
<b>A</b>	<b>Constraints</b>	<b>75</b>
A.1	Constraint catalog . . . . .	75
A.2	Ranking diagram . . . . .	78
<b>B</b>	<b>Why (classic) OT is not enough</b>	<b>79</b>

# Chapter 1

## Introduction

### 1.1 Background information

Giryama (ki-girjama) is a Bantu language spoken in Kenya, E72a in Guthrie's (1971) classification. It is one of the nine closely related Mijikenda languages. According to (Gordon 2005), it was spoken in 1994 by 623,000 speakers, making it the largest of the Mijikenda tribes.

All of the Mijikenda languages are tonal languages, and quite interesting ones at that, but surprisingly little has been published about their tonology. To the best of my knowledge, the tonology of Giryama has received little acknowledgement. The only published work dealing specifically with Giryama seems to be (Lax 1996), which I have not been able to obtain, and which deals with the verbal system of Giryama, primarily from a morphological standpoint but with reference to tone. Apart from that, some comparative works like (Philippson 1991; Philippson 1998) have addressed Mijikenda tonology. Also worth mentioning is (Kisseberth 1984), a treatment of Digo, another Mijikenda language.

In fact, given the proximity of Giryama to Swahili (some dialects of which are mutually intelligible with Giryama), very little has been published on the language itself, tone or otherwise. Some collections of proverbs and word lists have been compiled by missionaries since the mid 19th century, e.g. (Krapf 1850; Taylor 1891; Werner 1914; Hollis and Werner 1916), and the most comprehensive source remains (Deed 1964), a small dictionary which ignores tone as well as some phonological details like aspiration; this is actually quite surprising as all of the earlier works, especially (Taylor 1891), are very precise in their phonetic description.

## 1.2 Source of the data

The present work is based on one source of data, which is a series of tape recordings collected by Charles W. Kisseberth. The recordings document mainly the speech of the late Mr. Ndenge Kazungu, who has painstakingly read through the entire dictionary (Deed 1964), conjugating the verbs and creating sample sentences. In addition, the recordings contain a number of tapes of different speakers recorded in Kenya. These recordings, transcribed and compared with the data in (Deed 1940; Deed 1964) — not to mention invaluable guidance from Dr. Kisseberth — have enabled me to describe the workings of Giriyama tone.

## 1.3 Goal and scope

The purpose of the present work is twofold. First, I aim to provide a description of the facts of Giriyama tonology, covering both nouns and verbs, and an analysis of these facts within phonological theory. However, I cannot provide, within the confines of this work, a full treatment of the system. Perhaps the most striking feature of Giriyama tone is the high mobility of tones, which can often surface on a word different than their word of origin. However, I will mostly limit myself to a description of tone within the Giriyama word. My second goal is to present a derivation of these facts within a theoretical framework, and to indicate what properties such a framework would need to have.

## 1.4 Layout

This work is divided into two unequal parts: chapters 2 through 4 provide a description and analysis of Giriyama tone. Chapter 5 then presents a derivation of these facts within the framework of Optimality Theory. This chapter also contains a discussion of the different approaches suggested in the literature for the representation of tone.



## 1.5 Prerequisites

### 1.5.1 Segmental phonology

#### Phoneme inventory

The phoneme inventory of Giryama is very similar to that of Standard Swahili (Polomé 1967). There is a common five-vowel system (i e a o u) with no length contrast. Table 1.1 shows the consonants, basically those found in Swahili with the addition of the voiced palatal fricative ʒ and the labiovelars  $\widehat{kp}$ ,  $\widehat{gb}$  and  $\widehat{\eta m}$ . The table shows my (IPA) transcription as well as the Swahili-based orthography as used by (Deed 1964). Differences are **highlighted**.

IPA	Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar	Labiovelar	Glottal	
Stop	p	b	$\underset{\sim}{t}$	$\underset{\sim}{d}$	t	d	$\widehat{kp}$	$\widehat{gb}$	ʔ
Fricative		$\beta$	f	v	s	z			h
Affricate					ts	dz	$\underset{\sim}{tʃ}$	$\underset{\sim}{dʒ}$	
Nasal					n		$\widehat{\eta m}$		
Liquid	m				l	r			
Semivowel					j		w		

(Deed 1964)	Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar	Labiovelar	Glottal	
Stop	p	b	<i>(Ignored)</i>	t	d	k	g	ʔ	
Fricative		$\underline{v}$	<b>dh</b>	s	z		<b>kw</b>	<b>gw</b>	h
Affricate				ts	dz	<b>sh</b>	<b>zh</b>		
Nasal	m			n		<b>ch</b>	<b>j</b>		
Liquid				l	r	<b>ny</b>	<b>ng'</b>	<b>mw</b>	
Semivowel						<b>y</b>		<b>w</b>	

Table 1.1: Giryama consonants

#### Notes

- The table represents what I have identified from the recordings, and may be inaccurate.
- /r/ is usually a flap [r], sometimes a trill [r], occasionally an approximant [ɹ]. All of these are allophones of the same phoneme and used interchangeably.
- ʔ is sometimes used to break up a sequence of two vowels; it does not have phonemic status.

**The dental stops** It is very hard to identify  $\underset{\sim}{d}$  and  $\underset{\sim}{t}$  in the recordings; as (Taylor 1891) noted, “[t]hey are not so ‘dental’ as the Swahili dental *d* and *t*” (p. xi). I have indicated the difference in the few cases where it was unmistakable.

**Breathy voice** Another curious feature mentioned in (Taylor 1891) is the rare use of breathy voice on *m*, *n* and *v*. This is easy to hear on some words, notably *m̥ăma* ‘mother’ and does bear somewhat on the tonology; again, I have transcribed this where audible.

**Aspiration and prenasalisation** All of the voiceless stops and affricates have aspirated counterparts. Although the earlier works, especially (Taylor 1891), are very clear about aspiration, (Deed 1964) neglects to transcribe it, following standard Swahili orthography. As the following minimal and near-minimal pairs show, aspiration is clearly contrastive in Giriyama: *pala* ‘cleared space for club feasts’ — *p<sup>h</sup>ala* ‘gazelle’, *ŋgăta* ‘a type of charm’ — *ndăt<sup>h</sup>a* ‘walking stick’, *tsandzu* ‘fence’ — *ts<sup>h</sup>andzi* ‘collection, offering’, *kima* ‘value’ — *k<sup>h</sup>ima* ‘a type of monkey’, *kpaha* ‘armpit’ — *kp<sup>h</sup>ahe* ‘a sort of partridge’.

In addition, we find prenasalized versions of the voiceless stops and affricates: *mb*, *nd*, *ŋg*, *ŋg<sup>b</sup>*, *ndz* and *ndz̥*. It is better to consider these as prenasalized consonants, as opposed to homorganic nasal-consonant sequences, due to their interaction with tone (or lack thereof), as I will show.

**Double articulation** The status of the labiovelar stops is somewhat problematic. In virtually all cases (other than stem-internally), *kp̥*, *g<sup>b</sup>* and *ŋm̥* can be shown to be underlyingly *k<sup>w</sup>*, *g<sup>w</sup>* and *m<sup>w</sup>* respectively, and indeed this is how they are treated in (Taylor 1891) and (Deed 1964). However, I believe that such a transcription loses some information, since this process does not always take place, e.g. *mpwĕkwe* ‘a tree’, *kiteŋgwe* ‘folded frond’ and *mwĕri* ‘a holy person’. At the very least, this process is optional, and not always a matter of free variation. We see this most of all in the infinitive (*ku-*) of vowel-initial verb stems: we find cases like *ku-aďa* ‘to exhort’, *kw-enda* ‘to go’ or *kp̥-adĭma* ‘to be able to’. It is beyond the scope of this work to investigate how /*kw*/, /*gw*/ and /*mw*/ surface, so I will transcribe the surface forms, bearing in mind that they are in all likelihood underlyingly a labialized stop. Furthermore, as (Batibo 2000) writes, “[i]n some Bantu languages, such as Kirundi and Kinyarwanda, labialized consonants like [k<sup>w</sup>] and [g<sup>w</sup>] are changing into [kp] and [gb] respectively.” (p. 150). Giriyama seems to be quite far along in such a transition. This hypothesis is strengthened further when we consider the detailed phonetic description in (Taylor 1891), who writes that “[w] after a *k* or *g* becomes the labial fricative. . . after an aspirated *k*’ it nearly amounts to a *p*. . .” (p. xiii).

### 1.5.2 Stress and vowel length

Giryama has a very predictable stress system: the penultimate syllable in an intonational phrase is lengthened. This is crucial for the tone system, since only long vowels can bear contour tones (allowing us to treat a contour as two “plain” tones, one on each mora); beyond that, as I will show, common principles seem to be at work in the placement of stress and surface tone. Since penult lengthening is so predictable and common in Giryama, I will usually refrain from transcribing it, except when a special point is to be made. It is also interesting to note that, while the lengthening is in many cases quite subtle, sometimes almost inaudible, it nevertheless always plays a crucial role for the tonology. This seems to be common in many Eastern Bantu languages in which, as (Philippon 1998) writes, “[t]he penult enjoys a special status... even in the absence of audible demarcative stress.”

### 1.5.3 Tone-bearing units

The tone-bearing unit (TBU) in Giryama is the mora, which can be a vowel or a syllabic nasal.

## Chapter 2

# Verbs: Present tense

I will begin my treatment of Giriyama tone with the present tense, which exemplifies many of the phenomena in an almost didactic manner. But the very first place to start is the infinitive.

### 2.1 Infinitive

Table 2.1 below shows the basic state of affairs for Giriyama verb stems (reflexive verbs behave somewhat differently — I will only be able to present the facts in §4.10)<sup>1</sup>. Following common practice, I will use diacritics to transcribe tone:  $\acute{V}$  High,  $\grave{V}$  Low,  $\check{V}$  Rising,  $\hat{V}$  Falling.

*Low stems:*

ku:-fwa	‘to die’
ku:-dza	‘to come’
ku-la:ga	‘to promise’
ku-gu:la	‘to buy’
ku-ŋalirwa	‘to understand’
ku-bok <sup>h</sup> o:la	‘to split open a ripe fruit’
ku-zazigiri:ka	‘to be capable of playing’
ku-oŋgola-oŋgo:la	‘to soothe’

*High stems:*

ku-ně:na	‘to speak’
ku-ǎ:ma	‘to overcome’
ku-kamŭ:ka	‘to deny’
ku-bodǒ:la	‘to stretch and crack joints’
ku-kanairǎ:na	‘to contend with one another’
ku-dengerekě:ra	‘to go round’

Table 2.1: Infinitives

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<sup>1</sup>Also missing from the table are a handful of monosyllabic High stems; these have a complication which will only allow me to present them when we get to nominal tonology.

As the table clearly shows, verbs in the infinitive can be divided neatly into two groups: Low and High (indeed, I am aware of only one exception — *ku-kelesi* ‘to sit’ — which also has a nonstandard suffix and which I will be able to address later on, when we get to nominal tonology). Regardless of stem length, Low stems are pronounced low whereas High stems have a rising penult. Obviously, it is too soon to venture any kind of analysis at this stage, but I would like to direct the reader’s attention to two points: one is that the penult is always lengthened due to stress, hence we can consider this rising tone to actually be a Low-High sequence on the two morae of that vowel, e.g. *ku-ne:na* is *ku-neéna*. This point will become more relevant as we go on.

The second point to note is that the High tone in High stems is always realized on the penult; if that were its point of origin we would have expected to find verbs with a High tone on any of the stem’s tone-bearing units (TBUs), which leads us to suspect that the High tone actually *shifts* to that position. Now, it is definitely not uncommon for High tone to be drawn to stress (or to length), see for example (Hyman and Schuh 1974; Kisseberth 1992; Philippson 1998). But still, it would be hasty to jump to such a conclusion from the infinitive data, and indeed as I will show, attraction to stress is not the best analysis for Giriyama. Based on the infinitives alone, we cannot tell whether the High tone originates in its surface location, on some other segment, or in no position at all (attached to the stem, as one sometimes finds in autosegmental analyses).

## 2.2 Present: Low stems

The present tense in Giriyama is SP-na-(OP)-VS-a, where SP stands for Subject Prefix, OP for Object Prefix and VS for Verb Stem. We shall start with the present tense of Low verbs in the first (ni-) and third (a-) person singular, as shown in table 2.2. The underlined vowels in the table below indicate the underlying location of the High tone, as I will discuss shortly.

<b>Infinitive</b>	<b>Present 1sg.</b>	<b>Present 3sg.</b>	
ku:-fwa	ni-na:-fwa	<u>a</u> -ná:-fwa	‘to die’
ku:-dza	ni-na:-dza	<u>a</u> -ná:-dza	‘to come’
ku-la:ga	ni-na-la:ga	<u>a</u> -na-lǎ:ga	‘to promise’
ku-gu:la	ni-na-gu:la	<u>a</u> -na-gǔ:la	‘to buy’
ku-ŋali:rwa	ni-na-ŋalirwa	<u>a</u> -na-ŋalí:rwa	‘to understand’
ku-bok <sup>h</sup> o:la	ni-na-bok <sup>h</sup> o:la	<u>a</u> -na-bok <sup>h</sup> ǒ:la	‘to split open a ripe fruit’
ku-zazigiri:ka	ni-na-zazigiri:ka	<u>a</u> -na-zazigiri:ka	‘to be capable of playing’
ku-ŋgola-ŋgo:la	ni-na-ŋgola-ŋgo:la	<u>a</u> -na-ŋgola-ŋgǒ:la	‘to go round’

Table 2.2: Present tense: Low stems

What we see here is pretty simple: the third-person forms have a rising penult, just like High stems. Clearly, since neither the stem nor the tense marker (-na-) have changed, the origin of the new High tone is the 3sg. subject prefix a-. And, since we only hear the High on the penult, it must have moved there. Note that stem length is irrelevant: the High tone is just as happy moving one syllable forward in a-nǎ:-fwa as it is travelling 6 syllables (actually 7 TBUs) in a-na-onggola-onggö:la.

**Implication for High stems** Since a High tone can move any distance to reach the penult, it seems somewhat more economic to assume that for High verb stems it always originates in the stem-initial position; this would make the mental lexicon less complicated, but obviously we still have no actual proof for it (unless we consider theoretical elegance stronger proof than empirical evidence).

**Motivation** It is very tempting at this point to suspect that High tone in Giriyama is attracted to the stressed syllable. There is, however, an alternative, which is that High tone “tries” to move as far to the right as possible (i.e. to the end of the word) but is barred from actually reaching the final TBU by a non-finality constraint. As the data stand now, this is just a different, slightly more cumbersome way of deriving the same result, but evidence which I shall present later on will show that it is indeed a better explanation.

I would only like to note at this stage that unbounded rightward movement is no less common in languages than attraction to stress. Indeed, as (Hyman 2004) puts it, “if you leave tones to their own devices, they will spread to the right” (p. 7). And on that note, non-finality is an extremely well-motivated constraint, which is used in Optimality Theory (Prince and Smolensky 2004) to account for penultimate stress like that of Giriyama, so in a sense doubly motivated here.

## 2.3 Present: High stems

When we examine the present tense of High verb stems, things become more interesting; now we can see the interaction of two High tones in a word. In fact, High verbs stems must be divided into two groups in the present tense, and I will start with one of them. As I will show, even transcribing the tone patterns in these words requires some kind of an analysis.

Table 2.3 on page 15 shows the behavior of these High stems; the superscripts on the vowels indicate relative pitch ranging from 1 (lowest) to 5 (highest).

Infinitive	Present 1sg.	Present 3sg.	
ku-kǎ:ma	ni-na-kǎ:ma	$\underline{a}^3$ -na <sup>3</sup> -ka <sup>53</sup> :ma <sup>2</sup>	‘to milk’
ku-fǔ:ga	ni-na-fǔ:ga	$\underline{a}^3$ -na <sup>3</sup> -fu <sup>53</sup> :ga <sup>2</sup>	‘to rear’
ku-lǒ:ha	ni-na-lǒ:ha	$\underline{a}^3$ -na <sup>3</sup> -lo <sup>53</sup> :ha <sup>2</sup>	‘to dream’
ku-tungǎ:na	ni-na-tungǎ:na	$\underline{a}^3$ -na <sup>3</sup> -tu <sup>5</sup> nga <sup>3</sup> :na <sup>2</sup>	‘to meet each other’
ka-kalǎ:ŋga	ni-na-kalǎ:ŋga	$\underline{a}^3$ -na <sup>3</sup> -ka <sup>5</sup> la <sup>3</sup> :ŋga <sup>2</sup>	‘to fry’
ku-patikǎ:na	ni-na-patikǎ:na	$\underline{a}^3$ -na <sup>3</sup> -pa <sup>5</sup> ti <sup>4</sup> ka <sup>3</sup> :na <sup>2</sup>	‘to be obtainable’
ku-sindikizǐ:za	ni-na-sindikizǐ:za	$\underline{a}^3$ -na <sup>3</sup> -si <sup>5</sup> ndi <sup>4</sup> ki <sup>4</sup> zi <sup>3</sup> :za <sup>2</sup>	‘to bring to an end’
ku-sumuriri:ka	ni-na-sumuriri:ka	$\underline{a}^3$ -na <sup>3</sup> -su <sup>5</sup> mu <sup>4</sup> ri <sup>4</sup> ri <sup>3</sup> :ka <sup>2</sup>	‘to be mentionable’

Table 2.3: Present tense: High stems

The generalization of the 3rd. person forms is the following: the stem-initial TBU is clearly High, followed by a drop in pitch and (on the longer stems) another drop on the penult. As always, the final syllable has the lowest pitch. The bisyllabic stems can be seen as a special case where the penult drop takes place inside the long (stressed) vowel to yield a falling contour tone. The question is what to make of this. Looking at a word like  $a^3$ -na<sup>3</sup>-pa<sup>5</sup>ti<sup>4</sup>ka<sup>3</sup>na<sup>2</sup>, we see four levels of pitch starting with the stem-initial High. Now, the final vowel is always the lowest one in the word, so we don’t need to worry about explaining that, but even so we could conceivably transcribe this as a-na-pátíkàna (High-Mid-Low), a-na-pát<sup>4</sup>ík<sup>4</sup>ána (High-Downstep-Downstep), a-na-pát<sup>4</sup>íkana (High-Downstep-Toneless) or a number of other choices. The problem is, most of these do not make sense given our understanding of the tone system.

What we do expect to find in this word are *two* High tones: one from the Subject Prefix and one from the stem. We also know that a single High tone in a word will move to the penultimate TBU (the second mora of the penult). Now, one of the High tones is obviously heard on the stem-initial TBU; we can choose to transcribe the second High either on the second stem mora, which would give us a-na-pát<sup>4</sup>íkana, or on the penult, as in a-na-pátik<sup>4</sup>ána. The pitch on the other TBUs in the stem would be (in both cases) some sort of an extension of the (surface) High tone. Evidence which can only be presented later on compels me to choose the second alternative, i.e. one High in stem-initial position, another on the penult.

### 2.3.1 Stem-initial position

The first question that comes to mind is, why should the High tone from the subject prefix surface stem-initially? From what we’ve seen so far, words with one High tone in them appear with a rising penult. To explain this new behavior, we have two choices:

- The “morphological” explanation: In a verb form with two underlying High tones, one will surface stem-initially and one on the penult. This explanation makes no reference to the underlying location of the tones.
- The “phonological” explanation: The High tone from the subject prefix stops at the *underlying* location of the stem tone. This implies that in High verb stems, the underlying location of the High tone is stem-initial.

At this stage it is impossible to prove which of the explanations is the correct one, but evidence from other tenses and from nouns will support the phonological explanation. In my notation, this means that High verb stems should be transcribed along the model of  $\text{ku-}\underline{\text{oŋgola-oŋg}\ddot{\text{o}}\text{:la}}$ .

### 2.3.2 Intermediate pitch

We still have to explain the pitch of the intermediate TBUs. As we see from the longer stems like  $\underline{\text{a}}^3\text{-na}^3\text{-}\underline{\text{a}}^5\text{mba}^4\text{!a}^4\text{-a}^4\text{mba}^3\text{!a}^2$  ‘(s)he is passing along the outskirts of [...]’, these intermediate morae seem to have a steady pitch, lower than the first High tone and higher than the second one. It would seem reasonable to assume these to be a sort of “bridge” between the two Highs. However, further evidence which I will present shortly shows that this cannot be the case: they are rather an “extension” of the High tone, regardless of the existence of an additional High later in the word. To show the supporting evidence we need to look at depressors first.

#### On notation

Given my explanation of the facts, throughout this work whenever I transcribe a High tone ( $\acute{V}$ ), TBUs following it will be understood to have this intermediate pitch. If the sequence of intermediate-pitched TBUs stops, I will transcribe a Low tone ( $\grave{V}$ ), but this is not to be taken as an *actual* Low tone, only as a notation for a sudden drop in pitch. (I will also address the question of privative tone in Giryama when I present the relevant evidence).

#### Downstep

The downstep notation ( $^{\downarrow}\acute{V}$ ) I have been using needs some further elaboration. Generally speaking, a downstep is a High tone which is lower than an immediately preceding High. In many analyses, this is attributed to a “floating” Low tone between the two Highs. If we assume only High tone, like I have been doing, we get a case of “H-induced downstep”. The theoretical discussion lies



beyond the scope of this work, and is largely inconsequential for it: for my analysis, I will assume that in Giriyama two adjacent High tones (which can be separated by an arbitrary number of toneless TBUs) trigger a downstep, which is the approach of (Cassimjee and Kisseberth 1998).

## 2.4 Present: Depressor-initial High stems

As I mentioned above, High verb stems in Giriyama can be divided into two groups. We shall now look at the second one. But first, a little background is in order.

It is not rare in Bantu tonology (or indeed, generally in languages) for consonants to affect pitch. Specifically, voiced obstruents (stops, fricatives and affricates), usually called *depressors* or *blockers*, tend to be associated with a lowered pitch. This also happens in Giriyama, as we shall see now. Note that the depressors in Giriyama include the voiced obstruents *b*, *v*, *ḏ*, *d*, *dz*, *ʒ*, *dʒ*, *g* and *ḡb*, but not their prenasalized counterparts like *mb*, *ndz* or *ḡḡb*. In the rare cases where there is breathy voice (e.g. *m̃ama* ‘mother’), the affected consonant also acts as a depressor. The voiced bilabial fricative *β* is not a depressor. Some consonants can be both depressors and non-depressors, and I shall discuss those later.

Looking at depressor-initial High verb stems, we see the situation in table 2.4.

Infinitive	Present 3sg.	
ku-bǎra	ǎ-ná-bǎra	‘to be accustomed to’
ku-zǐma	ǎ-ná-zǐma	‘to be extinguished’
ku-bǐmbǐnda	ǎ-ná-bǐmbǐnda	‘to knock down and beat’
ku-ḏǎiwa	ǎ-ná-ḏǎiwa	‘to be fastened with rope’
ku-vǐrǐŋga	ǎ-ná-vǐrǐŋga	‘to be round’
ku-dzǎrigǐza	ǎ-ná-dzǎrigǐza	‘to fill up’
ku-ʒuwa-ʒúwa	ǎ-ná-ʒuwa-ʒúwa	‘to skip’
ku-ḡbǐḡbelǐka	ǎ-ná-ḡbǐḡbelǐka	‘to skip’
ku-gumbuhizǐka	ǎ-ná-gumbuhizǐka	‘to be wiped out by utter destruction’

Table 2.4: Present: Depressor-initial High stems

Now, unlike non-depressor-initial stems, there is no question about where the two High tones end up: the stem High reaches its usual place, and the Subject Prefix High stops on the Tense Marker. This is obviously related to the fact that the stem starts with a depressor. But note that there are at least two ways of explaining this:

- The “blocker” analysis: We could say that all High tones just aim to expand as far to the right as possible (recall that this is commonly the case in Bantu tonology). The voiced obstruent would block this movement, possibly by having a Low tone attached to it.

- The “depressor” analysis: On this analysis, the High tone from the Subject Prefix is only “trying” to get to the stem-initial TBU, and the voiced obstruent cannot be the onset of a High mora, restricting the movement in this way. Crucially, the depressor doesn’t affect the *movement* of the High tone, only its *surface location*.

Each analysis has its merits and problems. The blocker analysis seems at first glance to be more “phonological”, in that depressors simply act as a type of barrier in Giriyama phonology. In fact, this view seems to be common in the literature, and depressor consonants are usually described as blocking High spread; for example, (McCarthy 2004) describes depressor consonants as associated with a Low tone. However, on closer examination of the Giriyama data, we see that such an explanation would not do here (at least not without some modification), since voiced obstruents do nothing to block the advance of a *single* High tone in Low stems like a-na-zazigirika ‘(s)he is willing to play’ — where the High tone is free to move past three depressors. To maintain this explanation in Giriyama, then, we would need to somehow assume that voiced obstruents only block when they are *between* two High tones: not an impossible explanation, but one which is much harder to motivate cross-linguistically.

We are thus left with the depressor analysis as the more reasonable one. It also gives us a uniform treatment of depressor-initial and non-depressor-initial High verb stems: for whatever reason (recall §2.3.1) the subject prefix High “wants” to surface on the stem initial TBU, which would yield for example \*a-na-dèngerek’éra ‘(s)he is turning around’; the depressor, instead of providing an actual Low tone, simply rejects the High from surfacing on its “target” TBU, forcing it to surface one mora to the left; we get a-ná-dèngerekěra (see below for a discussion of the pitch drop). So in essence, instead of having McCarthy’s “constraint that requires voiced obstruents... to head low-tone spans” (p. 8) we would have a constraint against a surface form with a High depressor-initial syllable.

One fact that might seem to contradict the depressor analysis is this: High tones have no problem surfacing on depressor-initial penults, for example in the infinitive of High stems like ku-dzariǵ:za ‘to fill up’ or in the present 3sg. of low stems like a-na-barabǎ:ta ‘(s)he is doing a thing on chance’. But this apparent problem is soon dismissed when we note that a rising tone is only seen on lengthened (stressed) vowels, so in a sense the depressor is only the onset of the first mora; put differently, the constraint in question bars depressor-initial syllables from having a High on their first mora (whether or not they have a second one).

## Intermediate pitch revisited

Our knowledge of depressors will now shed light on a question raised in §2.3.2 above: is the intermediate pitch between two Highs a “bridge” between the two or an extension of the first? The key lies in the 3rd. person form of depressor-initial High stems. We’ve seen that a depressor can prevent the subject marker High from surfacing stem-initially, but why don’t we get the “intermediate pitch” contour on the following syllables? If intermediate pitch links two High tones we would expect it here as well.

The correct explanation is that the intermediate pitch is in fact an extension of the first High tone, *unrelated to the second one*, which extends up to the first depressor. Of course, the evidence presented so far is hardly enough to prove this: we’ve only seen the intermediate pitch extend either up to the second High or not at all. What we need to prove this hypothesis is a non-depressor-initial High verb stem which is long enough to have a depressor in between the two Highs; this will show us that the drop in pitch is unrelated to the fact that the depressor is stem-initial (and consequently pushes back the subject marker High). Now, although such evidence is plentiful in other verb tenses and in nouns, they are only a handful of stems which satisfy the condition in the present tense, but they all fit the analysis:  $\underline{a}$ -na-fwéðèðě:ka ‘(s)he is ashamed’,  $\underline{m}\underline{a}$ -na-hégèzǎ:na ‘they are not seeing each other for a long time’,  $\underline{a}$ -na-ógèrě:ra ‘(s)he is swimming’ and especially examples like  $\underline{a}$ -na-hókezǎ:na ‘(s)he is taking turns’ where the [ke] has intermediate pitch and the [za] drops to low pitch, or the even longer  $\underline{m}\underline{a}$ -na-érekezǎ:na ‘they are coming to an agreement’, with two syllables of intermediate pitch before a depressor-induced drop.

## 2.5 (Non)-depressor-like behavior

Things are not entirely as simple as outlined above, as regards what exactly is a depressor. The connection between voicing and low pitch is, as I said, a known phenomenon cross-linguistically (Beach 1924; House and Fairbanks 1953), but some consonants behave differently than they should.

### 2.5.1 The two types of [h]

First of all, the data soon suggests that [h] behaves like a non-depressor in certain stems, and unexpectedly like a depressor in others. For example, while we get as expected  $\underline{a}$ -na-héh<sup>+</sup>éra for ku-héhěra ‘to defend, champion’ or  $\underline{a}$ -na-hêka for ku-hěka ‘to draw up water’, we also find  $\underline{a}$ -ná-h<sup>+</sup>úla ‘(s)he is setting down a load’ and  $\underline{a}$ -ná-hoh<sup>+</sup>ósa ‘(s)he is perverting (someone)’, where we would

expect \* $\underline{a}$ -na-h $\hat{u}$ la and \* $\underline{a}$ -na-h $\acute{o}$ h $\acute{o}$ sa, respectively. What makes these words even stranger is that, while the [h] seems to prevent the Subject Prefix High from reaching its goal, it does not stop the post-High intermediate pitch (otherwise we would have \* $\underline{a}$ -ná-h $\check{u}$ la and \* $\underline{a}$ -ná-h $\grave{o}$ h $\acute{o}$ sa). So in a sense, this variety of [h] is phonologically but not phonetically a depressor, refusing a High tone but not inducing a Low. I would also like to point out that I have not been able to find any phonetic difference between the two types of [h] (that is, the depressor [h] doesn't seem to be a voiced [h]); even if it were true, such an explanation wouldn't be able to salvage the cases below.

### 2.5.2 Other problematic depressors

The dental fricatives [ð] and [f] also display the dual nature of [h]. Alongside the expected cases like  $\underline{a}$ -ná-ð $\check{a}$ wa 'to be fastened with a string' (depressor [ð]) or  $\underline{a}$ -na-f $\acute{u}$ ts $\acute{u}$ la 'to pluck feathers' (non-depressor [f]), we find a significant number of cases like  $\underline{a}$ -na-ð $\acute{e}$ ð $\acute{e}$ dza 'to coax' (non-depressor [ð]) or  $\underline{a}$ -ná-f $\grave{u}$ nik $\acute{í}$ ra 'to cover' (depressor [f]). And while in the case of [h] we might have hoped for a voiced [h] (at least underlyingly), there is no mistaking an [f] for a voiced consonant or a [ð] for a voiceless one. An interesting observation, and one which further demonstrates the surface identity of these consonants, is that there is some variation. For example, in different recordings (of the same speaker) we find both  $\underline{a}$ -ná-f $\check{u}$ kuh $\acute{u}$ la and  $\underline{a}$ -na-f $\acute{u}$ kuh $\acute{u}$ la '(s)he is shaking soil off grass', and so on. Also relevant is the fact that the depressor-like [h] and [f] do not usually seem to affect an intermediate pitch run, i.e. they do not lower the pitch after a surface High. Please note that such behavior is not unprecedented in Bantu tonology. For a discussion of the voiceless depressors in Botswana Kalang'a and Nambya (including a depressor [f]), see (Downing and Gick 2001).

**Notation** In transcribing, I will use the IPA diacritics normally used for voicing to write these unexpected cases, i.e.  $\underset{h}{h}$  and  $\underset{f}{f}$  are the depressor h and f, and  $\underset{\check{d}}{d}$  the non-depressor ð, respectively. I would like to stress, though, that this is not to be taken as a statement that these consonants are actually voiced (voiceless); their voicing is identical to the normal variants, they only behave differently.

### 2.5.3 Vowel-initial stems

Vowel-initial verb stems also display a surprising behavior. Here, too, we find the expected cases like  $\underline{a}$ -na- $\acute{a}$ mb $\acute{í}$ ra '(s)he is saying',  $\underline{a}$ -na- $\acute{í}$ f $\acute{í}$ mu '(s)he is honoring' or  $\underline{a}$ -na- $\acute{u}$ n $\acute{í}$ za '(s)he is binding' but also cases where the prefix High is unable to reach the stem, e.g.  $\underline{a}$ -ná- $\acute{a}$ ng $\acute{á}$ ma '(s)he is

caught up’ or  $\underline{a}$ - $\underline{n\grave{a}}$ - $\underline{e}$ rek<sup>↓</sup>éza ‘(s)he is thinking’. As these examples show, this does not depend on the consonant following the initial vowel (i.e. it doesn’t have to be a depressor). There doesn’t seem to be any special separation between the prefix and the stem (i.e. a glottal stop) in any of the groups. The only thing which seems to have some bearing on this phenomenon is the actual vowel quality involved. Table 2.5 shows the distribution of behavior by initial vowel.

Vowel	High heard on stem	High heard before stem
a	12	11
e	0	9
o	18	0
i	21	(3)
u	14	0

Table 2.5: Present: Vowel-initial High stems

Now, the distribution here doesn’t seem to make any phonological sense. Even disregarding the three depressor-like i-stems, we get the strange result that all e-stems and half of the a-stems behave like depressors. Now, since a is identical to the Tense Marker vowel (-na-), we might suspect that it can be reanalyzed as part of that; there is some evidence that this can happen, for example  $\underline{a}$ -na- $\underline{a}$ lam<sup>↓</sup>úla ‘(s)he is judging’ where we would expect \* $\underline{a}$ -na- $\underline{a}$ lam<sup>↓</sup>úla. However, as this example shows, such a reanalysis would predict the High to surface on the *second* stem TBU, which is not what happens.

I must admit that I cannot find any convincing explanation for this; vowel-initial syllable are prone to exhibit unusual behavior, but what exactly is going on here is unclear. I will say that from the evidence I have this seems to only happen in the present tense; evidence which I will only present later on indicates that the present tense is unique in other respects, which may help shed some light on this phenomenon.

## 2.6 A note on object prefixes

In the examples above (and throughout this work) I have focused primarily on examples without an object prefix. This is mostly due to the nature of the recordings at my disposal. I will now present a brief rundown of the facts related to object prefixes in the present tense.

First of all, object prefixes carry no underlying High tone (at least in the present tense). We learn this from Low verb stems, in which the 3sg. High encounters no obstacle on its way to the penult; table 2.6 on page 22 presents the evidence.

Infinitive	SP	SP+OP	
ku-gula	ni-na-gula a-na-gŭla	ni-na-ki-gula a-na-ki-gŭla	‘to buy’
ku-tsukula	ni-na-tsukula a-na-tsukŭla	ni-na-vi-tsukula a-na-vi-tsukŭla	‘to carry’
ku-songgerera	ni-na-songgerera a-na-songgerera	ni-na-ŋ-songgerera a-na-ŋ-songgerera	‘to approach’

Table 2.6: Present: Object prefixes with Low stems

The question is, what happens in High verb stems. Given what we’ve seen so far, we would expect no change, since the SP High needs to surface stem-initially. Table 2.7 shows that this is not exactly the case (unfortunately the selection of such examples recorded is rather thin, and all but one of the stems recorded were bisyllabic).

Infinitive	SP	SP+OP	
ku-rěha	a-na-rěha	a-na-rí-r <sup>+</sup> ěha	‘to bring’
ku-lǎza	a-na-lǎza	a-na-rí-l <sup>+</sup> ǎza	‘to exact’
ku-pǎta	a-na-pǎta	a-na-í-p <sup>+</sup> ǎta	‘to get’
ku-dŭŋga	a-ná-dŭŋga	a-na-mú-dŭŋga	‘to stab’
ku-hiríka	a-ná-hir <sup>+</sup> íka	a-na-á-hir <sup>+</sup> íka	‘to send’

Table 2.7: Present: Object prefixes with High stems

This is not exactly as expected: it seems that in these cases the SP High ends up on the object prefix and not the stem. Accordingly, as a-na-mú-dŭŋga and a-na-rí-l<sup>+</sup>ǎza show, whether or not the stem starts with a depressor is irrelevant. What does become relevant is the onset of the OP, and table 2.8 shows this. As we might expect, a depressor-initial OP pushes the High one slot back, just like a depressor-initial stem when there is not OP.

Infinitive	Present 3sg.
ku-ga-rěha	a-ná-gà-rěha
ku-ga-lǎza	a-ná-gà-lǎza
ku-vi-dŭŋga	a-ná-vi-dŭŋga
ku-vi-hiríka	a-ná-vi-hiríka

Table 2.8: Present: Depressor-initial OPs

Now, the facts are clear. What isn’t clear is how this relates to the usual forms, where the SP High winds up stem-initially. There can be two explanations for this, both plausible: The first option is to consider the OP as part of the stem. This is not unusual in Bantu morphology, and evidence can even be seen in table 2.8, where the infinitive forms can contain the object prefix, e.g. “to bring [class 2]” or “to send [class 8]”. In this case, we need no change in our analysis of tone movement — the SP High surfaces stem-initially, and the stem includes the object prefix.

However, I believe that the correct explanation is different, and it is that the High tone from the SP actually stops on the TBU before the stem; if we mark the tonal “domains” (Kisseberth 1994) or “spans” (McCarthy 2004) with parentheses we get (a-na-rí)-(r<sup>↓</sup>éha) etc. Movement is then constrained by domain boundaries and nothing else. Of course, this now poses a problem to our previous analysis, since when there is no OP we normally get a-na-ká<sup>↓</sup>áŋga, i.e. apparent *domain overlap* — the domain structure here seems to be (a-na-[ká<sup>↓</sup>])<sup>↓</sup>áŋga. As other verb tenses will show, this overlap normally occurs only in the present tense. For now, however, it is impossible to decide between the alternatives.

### 2.6.1 On domains

Domains (Kisseberth 1994; Cassimjee and Kisseberth 1998) are a very useful tool for the description of Bantu tone, providing a unified treatment of varied phenomena such as tone spread, tone shift and tone doubling. A domain is a range of consecutive elements (TBUs in our case) related to a specific feature (High tone). Each domain corresponds to an element in the underlying representation, or a “sponsor”. The feature may surface on every element in the domain or just on the “head” — one of the edges of the domain. In Giriyama, as we see, the head of a High domain is the rightmost mora, and the feature (a High tone) is heard only on the head.

## 2.7 What the present tense has taught us

Before we move on to other verb tenses, let us recap the key points of Giriyama seen so far:

- Verb stems can either be Low or High; High stems have an underlying initial High tone. The third person subject prefixes also provide a High.
- A High tone moves forward up to the next underlying High or the end of the word (actually, intonational phrase). Non-finality causes this movement to stop on the penult.
- A High tone may not surface on (the first mora of) a depressor-initial syllable. As a result, on depressor-initial High stems the third person High will not reach its stem-initial “target”.
- TBUs following a surface High will be higher in pitch than the basic pitch of the speaker. This pitch extends up to the first depressor-initial TBU.
- So far there has been no need to assume the existence of an underlying Low tone.

# Chapter 3

## Verbs: Other tenses

The present tense, while definitely revealing, still does not exhibit the whole gamut of tonal processes in Giriyama. In this chapter I will present a selection of other verb tenses which make other points.

### 3.1 Subjunctive

The subjunctive is simple in itself, but it provides a nice example of two key points of Giriyama.

#### 3.1.1 Formation of the subjunctive

Table 3.1 shows some verbs in the subjunctive, compared with their infinitive forms<sup>1</sup>.

Stem	Infinitive	1sg.	3sg.	
Low	ku-ri:ra	ni-ri:re	a-ri:re	‘to weep’
High	ku-ǐ:ga	ni-ǐ:ge	a-ǐ:ge	‘to mimic’
High	ku-pĩngilĩ:ka	ni-pĩngilĩ:ke	a-pĩngilĩ:ke	‘to roll tr.’
Low	ku-gi:t <sup>h</sup> a	ni-gĩ:t <sup>h</sup> e	a-gĩ:t <sup>h</sup> e	‘to cook’
Low	ku-vugu:la	ni-vugũ:le	a-vugũ:le	‘to unfasten’
High	ku-gala-gǎ:la	ni-gale-gǎ:le	a-gale-gǎ:le	‘to roll on the ground’

Table 3.1: Subjunctive

Apart from the structure of the subjunctive (SP-VS-e) we see that neither subject prefix nor verb stem affects the word: the subjunctive always has one High tone, heard as a rising penult. So as we see, the subjunctive overrides the stem’s lexical tone with its own grammatical tone. The

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<sup>1</sup>Note: I will not discuss OPs in the subjunctive, since the recorded data is scarce and somewhat erratic.



question remains where this High originates — it could be overwritten on the stem or associated with all subject prefixes alike — but the data offers no way to decide between the two.

### 3.1.2 An unexpected bonus

But the really interesting evidence in the subjunctive recordings lies elsewhere. To get the subjunctive meaning, all verbs are cited after the verb *a-na-malá*... “(s)he wants...”. Now, *ku-mala* ‘to want’ is a Low stem, and in isolation the 3sg. present tense form is of course *a-na-mála*. But when followed by the subjunctive we get *a-na-malá ni-ṛ̌:re*, *a-na-malá a-piŋgĩḷ:ke* etc. In other words: the 3sg. High surfaces *word-finally!* (There is no mistaking the whole phrase for a phonological word as the words are pronounced with very clear separation).

First of all, this proves that all of the rising penults we have seen were in fact not the result of attraction to stress (or length) but of simple rightward movement combined with non-finality. And more interestingly, this means that non-finality does not operate at the level of the phonological word but on a larger domain. Sadly, it is well beyond the scope of the present work (and the data covered in it) to explore how exactly this “tonal phrase” is defined. It is, however, a very striking feature of Giriyama tonology, as tones can often cross the word boundary when the need arises. Examples of this will show up later in this work, when we get to nouns.

## 3.2 Imperative

The imperative offers another crucial piece of the puzzle. Its form is VS-(OP)-a (singular) and VS-(OP)-a-ni (plural). Representative words can be seen in table 3.2.

Stem	Infinitive	Imperative (sg.)	Imperative (pl.)	
Low	ku-taru:ra	taru:ra	tarurǎ:ni	‘to tear’
High	ku-ṛ̌:ma	ṛ̌:ma	ṛ̌omǎ:ni	‘to read’
Low	ku-gi:t <sup>h</sup> a	gi:t <sup>h</sup> a	gi:t <sup>h</sup> ǎ:ni	‘to cook’
High	ku-gambahĩ:za	gambahĩ:za	gambahizǎ:ni	‘to squeeze’

Table 3.2: Imperative

First of all, lexical tone is ignored, just like in the subjunctive. What’s more interesting is the difference between the singular and plural: singular forms have no audible (surface) High, while plural forms — which merely have an additional suffix — seem to have one High. Since the only difference is the *-ni*, we might expect that to be the source of the High, but then it would have to move *backwards* from the *-ni*, something which would be highly unusual.

The key to this mystery is non-finality. Suppose the imperative suffix *-a* carries a High tone, which cannot surface due to non-finality, and has nowhere to go since tones only move to the right. In final position, this High is deleted; when we add *-ni*, the tone is no longer in final position and is free to move itself one TBU forward to create a rising tone.

So my transcription of the imperative is e.g. *gambahiz-a* (no surface High) and *gambahiz-ǎ:-ni*.

### 3.3 Perfect

The perfect tense (SP-dza-(OP)-VS-a) is a harder nut to crack. The facts are shown in table 3.3 (for the sake of variety, the table shows the 1st. person plural, tonally identical to the singular).

I have indicated all sponsors (underlying tones) in this table; discussion of why this is so follows.

<b>Infinitive</b>	<b>Perfect 1pl.</b>	<b>Perfect 3sg.</b>	
<i>Low stems:</i>			
ku-lo:la	hu-dzǎ-lǒ:la	ǎ-dzǎ-lǒ:la	‘to look’
ku-ga:za	hu-dzǎ-gǎ:za	ǎ-dzǎ-gǎ:za	‘to divide’
ku-rihi:za	hu-dzǎ-rihi:za	ǎ-dzǎ-rihi:za	‘to avenge oneself’
ku-daga:da	hu-dzǎ-dagǎ:da	ǎ-dzǎ-dagǎ:da	‘to get slack’
ku-ereme:za	hu-dzǎ-eremé:za	ǎ-dzǎ-eremé:za	‘to prop up’
ku-zazigiri:ka	hu-dzǎ-zazigiri:ka	ǎ-dzǎ-zazigiri:ka	‘to be capable of playing’
<i>D[epressor]-initial High stems:</i>			
ku-ǎ:ndza	hu-dzǎ-ǎ:ndza	ǎ-dzǎ-ǎ:ndza	‘to hawk about’
ku-bǎ:nda	hu-dzǎ-bǎ:nda	ǎ-dzǎ-bǎ:nda	‘to break’
ku-bǎ:la	hu-dzǎ-bǎ:la	ǎ-dzǎ-bǎ:la	‘to spring out afresh’
ku-dǎngǎ:la	hu-dzǎ-dǎngǎ:la	ǎ-dzǎ-dǎngǎ:la	‘to persevere’
ku-dǎngerǎ:ka	hu-dzǎ-dǎngerǎ:ka	ǎ-dzǎ-dǎngerǎ:ka	‘to turn round’
<i>N[on]-D-initial High stems (bisyllabic):</i>			
ku-ǎra	hu-dzǎ-ǎra	ǎ-dzǎ-ǎra	‘to be clean’
ku-ǎma	hu-dzǎ-ǎma	ǎ-dzǎ-ǎma	‘to stand’
ku-kǎra	hu-dzǎ-kǎra	ǎ-dzǎ-kǎra	‘to climb’
ku-lǎha	hu-dzǎ-sǎha	ǎ-dzǎ-sǎha	‘to dream’
ku-fǎma	hu-dzǎ-fǎma	ǎ-dzǎ-fǎma	‘to read’
<i>ND-initial High stems (polysyllabic):</i>			
ku-hǎkǎna	hu-dzǎ-hǎkǎna	ǎ-dzǎ-hǎkǎna	‘to abuse’
ku-kǎbǎla	hu-dzǎ-kǎbǎla	ǎ-dzǎ-kǎbǎla	‘to throw a morcel into the mouth’
ku-tǎlǎka	hu-dzǎ-tǎlǎka	ǎ-dzǎ-tǎlǎka	‘to leap over’
ku-rǎrikǎna	hu-dzǎ-rǎrikǎna	ǎ-dzǎ-rǎrikǎna	‘to consider’
ku-ǎrekezeǎna	hu-dzǎ-ǎrekezeǎna	ǎ-dzǎ-ǎrekezeǎna	‘to explain to each other’

Table 3.3: Perfect

As clearly evident from the table, the perfect tense has no grammatical tone, preserving the difference between Low and High stems. I shall now discuss the data as grouped in the table.

### 3.3.1 Low stems

The situation here is simple enough: we see a High tone surface on the penult and another one on the 3rd. person subject marker; the obvious explanation is an underlying High on the tense marker and another on the 3rd. person marker, like so: *hu-dzà-zazigirĩ:ka* and *á-dzà-zazigirĩ:ka*. While this explanation is straightforward, it helps decide on an issue raised above in §2.3.1: a High tone seems to move up to the underlying location of the next tone; otherwise (if we take the “morphological” approach) we would expect two High tones on a word to surface stem-initial and on the penult, e.g. *á-dzà-rihĩza* would have been *\*á-dzà-ríhĩza*. Instead, is it the tense marker High tone which stops the advance of the subject marker High, even though it itself moves as well. This is easiest to see in domain notation (recall §2.6) where we get  $(\acute{a})-(dz\grave{a}-rih\grave{i})za$ . But there is more to come.

### 3.3.2 Depressor-initial High stems

The second set of data in table 3.3 shows the interaction of a stem tone with the perfect tones. The facts here are clear but somewhat unexpected. In all of these forms, the stem tone is free to surface as a rising penult. And, as before, the 3rd. person High tone cannot advance. However, the tense marker High surfaces *in situ*, giving us something we haven’t seen before — a surface High tone on a depressor-initial syllable (*hu-dz\grave{a}-d\grave{a}ng\grave{u}la*). This High tone cannot surface stem-initially since that would create a domain overlap, and only result in another “depressed High” problem (*\*hu-dz\grave{a}-d\grave{a}ng\grave{u}la*). Moving even further to the right might resolve the depressor issue (e.g. we might have *\*hu-dz\grave{a}-d\grave{e}ng\grave{e}ka*), but then the overlap would be even worse. What is interesting to note here is that, unlike non-finality which can eliminate a High tone, a depressor-initial TBU can live with a surface High if it has nowhere better to go. But is the force that’s preventing the High from moving onto the stem really domain overlap, or is it the depressor on the stem? Let us now examine non-depressor-initial stems.

### 3.3.3 Non-depressor-initial bisyllabic High stems

The third group in table 3.3 shows non-depressor-initial bisyllabic High stems in the perfect, and the striking thing about these is that they are identical to the depressor-initial High stems: although the stem does not start with a depressor consonant, the tense marker High is barred from advancing. The only thing that can block the advance here is domain overlap, i.e. structure like *hu-(dz\grave{a})-(f\grave{u})ma*. Note that the constraint against domain overlap is even stronger than the

one against a depressor-initial surface High, since we are left with *dzá*; we might have expected \**hu-dzà-ǰôma* to be a better alternative, but it isn't. It seems that domain boundaries are a strong force in Giriyama. However, when we look at the final group of verbs in the perfect, we encounter another surprise.

### 3.3.4 Non-depressor-initial polysyllabic High stems

Looking at the fourth group of verbs in table 3.3, we encounter an unexpected difference between the 1st. and 3rd. person forms. The 1st. person forms behave like we would expect: the tense marker High seems to be blocked by the underlying stem High tone, and we get forms with a depressed High like *hu-(dzǎ)-(tɯl<sup>↓</sup>ú)ka*. But for some reason, in the 3rd. person we see the tense marker High advance, resulting in an apparent domain overlap, e.g. *(ǎ)-(dzǎ-[tú<sup>↓</sup>]<sup>↓</sup>ú)ka*. What has happened here? Clearly, the only difference in these forms is the High subject prefix *ǎ-*, but how can that morpheme affect the movement of another tone (note also that in all of the cases, the subject marker is barred from moving)? In other words, what would have been wrong with the expected form \**(ǎ)-(dz<sup>↓</sup>ǎ)-(tɯl<sup>↓</sup>ú)ka*?

Compared with the 1st. person form, the only “problem” with such a form is the existence of two consecutive surface High tones. In fact, tone languages are well known to avoid such a situation and preserve the Obligatory Contour Principle (OCP). My suggestion is that what we see here is the OCP in action, preferring a stem-initial High (which is disfavoured otherwise in this tense) over two consecutive High tones. Languages use different strategies to maintain the OCP, and it seems that in Giriyama this force allows the High subject marker to “push” the tense marker High tone forward.

#### Problems with the OCP explanation

While the OCP offers a nice solution, and is certainly motivated cross-linguistically, the astute reader will soon recall that we have already seen numerous cases where Giriyama is quite happy to violate the OCP. Let us recall those cases and assess the implications.

First of all, there is the case of depressor-initial High stems in the perfect (the second group in table 3.3): in these 3rd. person forms the OCP is systematically violated. Why can Giriyama tolerate forms like *ǎ-dz<sup>↓</sup>ǎ-dǎŋgǔla* but rules out \**ǎ-dz<sup>↓</sup>ǎ-tɯl<sup>↓</sup>úka* to yield *ǎ-dzǎ-tú<sup>↓</sup>úka*? Obviously this has to do with the stem depressor: it seems that the OCP in Giriyama is not strong enough to push a High tone onto a depressed mora.

But depressors won't save us in all cases, for example in the third group in table 3.3, namely bisyllabic High stems. In these cases there is no depressor to prevent the tense marker High from moving, and yet Giryama favors an OCP violation like  $\underline{á}\text{-dz}^{\downarrow}\underline{á}\text{-s}^{\downarrow}\underline{ó}\text{ha}$  over something like  $*\underline{á}\text{-dzà}\text{-s}\underline{ó}\text{ha}$ . Why is this? Well, here too the answer is evident from the rejected form: the only thing “worse” about  $*\underline{á}\text{-dzà}\text{-s}\underline{ó}\text{ha}$  as compared to, say,  $\underline{á}\text{-dzà}\text{-r}^{\downarrow}\text{írik}^{\downarrow}\underline{ána}$  is the (falling) contour tone. It seems, then, that the OCP is not strong enough to push a High tone forward if that would result in two High tones surfacing on one syllable. Again, this is a quite well-motivated constraint, as many languages disfavor contour tones — see for example (Hyman 2004; Yip 2007).

To conclude, from the perfect tense data it seems that the OCP can push a High tone forward, causing a domain overlap, but only in very restricted situations, namely when such an overlap would not result in a contour tone or in a High tone on a depressed syllable. From a different angle, it seems that domain overlap can only result under very specific conditions. And that brings us back to the present tense.

### Present tense revisited

The force of domain boundaries, in the sense that a High tone stops before the underlying location of the next High, is quite evident in the perfect tense. However, recall that in the present tense, domain overlap is the norm: for non-depressor-initial High stems, the 3rd. person High tone always reaches the stem, for example  $\underline{a}\text{-na}\text{-t}^{\downarrow}\underline{ú}\text{ka}$  (cf.  $\text{hu}\text{-dz}\underline{á}\text{-t}^{\downarrow}\underline{ú}\text{ka}$ ), or even more strikingly  $\underline{a}\text{-na}\text{-f}\underline{ó}\text{ma}$  where the subject marker High tone surfaces on the same syllable as the stem High (cf.  $\underline{á}\text{-dz}^{\downarrow}\underline{á}\text{-f}^{\downarrow}\underline{ó}\text{ma}$ ).

Clearly, the difference here is related to the tense marker and not the stem. We cannot maintain a claim, for example, that the underlying location of the stem High is somehow different for the different tenses, especially in bisyllabic stems like  $\text{ku}\text{-f}\underline{ó}\text{ma}$  where there is only one possibility for the underlying location. Simply put, the difference here is that the present tense allows domain overlap whereas the perfect tense doesn't (except in very specific cases as above). At this stage, I will not go into the details of how this difference works, but one main question presents itself: which of the two strategies is the norm in Giryama? As we look at the data, I will show that the situation in the perfect tense is in fact the default behavior, and that the domain overlap seen in the present tense (and some other constructions) is the exception.

### 3.3.5 Object prefixes in the perfect

Another interesting piece of evidence comes from object prefixes in the perfect tense. Unfortunately, the recorded data at my disposal does not exhibit a wide range of verb stems in these paradigms, so it is hard to prove my claims. Nevertheless, consider the data in table 3.4.

<b>Infinitive</b>	<b>ND-initial OP</b>	<b>D-initial OP</b>	
<i>Low stems:</i>			
ku-loga	ni-dz̄a-kí-lǒga	ni-dz̄a-vì-lǒga	‘to bewitch’
ku-tsukula	ni-dz̄a-kí-tsukǔla	ni-dz̄a-vì-tsukǔla	‘to carry’
ku-marigiza	ni-dz̄a-kí-marigǐza	ni-dz̄a-vì-marigǐza	‘to finish’
<i>High stems:</i>			
ku-tǎla	ni-dz̄a-kí-t <sup>↓</sup> ǎla	ni-dz̄á-vì-tǎla	‘to count’
ku-lǎza	ni-dz̄a-kí-l <sup>↓</sup> ǎza	ni-dz̄á-vì-lǎza	‘to put forth’
ku-kalǎnga	ni-dz̄a-kí-kal <sup>↓</sup> ǎnga	ni-dz̄á-vì-kalǎnga	‘to fry’
ku-songǐza	ni-dz̄a-kí-song <sup>↓</sup> ǐza	ni-dz̄á-vì-songǐza	‘to bring near’
ku-tsukǔla	ni-dz̄a-kí-tsuk <sup>↓</sup> ǔla	ni-dz̄á-vì-tsukǔla	‘to carry’

Table 3.4: Perfect: Object prefixes

The behavior of Low verb stems is not surprising and is as we would expect (after all, there is only one High tone in these forms). However, the High stems differ in a subtle yet interesting way from the cases where there is no object prefix: the tense marker High can advance to the object prefix when that has no depressor. The consequences of this are more far-reaching than it seems: it implies that (at least tonally) object prefixes are not analyzed as part of the verb stem, contrary to the view mentioned in §2.6. For if they were, we would expect the same behavior as in the cases above with no object prefix: if for instance ku-kí-lǎza were to be treated as a single stem (ku-kílǎza) we would expect to find in the first person perfect \*ni-dz̄á-kíl<sup>↓</sup>ǎza (cf. ni-dz̄á-tul<sup>↓</sup>úka). The fact that the High tone is free to advance from the tense marker dz̄a to the object prefix indicates that the underlying location of the stem High is still on the stem — as I have indicated in table 3.4. Again, we see that it is only the domain barrier which stops the movement of the High, e.g. ni-(dz̄a-kí)-(l<sup>↓</sup>ǎ)za, ni-(dz̄a-kí)-(tsuk<sup>↓</sup>ǔ)la and so forth.

#### Back to the present

What does this imply for the present tense? Recall that in the present tense, object prefixes seem to be part of the stem in that the subject prefix High will surface on an object prefix if present; for example for ku-tsukǔla compare a-na-tsuk<sup>↓</sup>ǔla and a-na-kí-tsuk<sup>↓</sup>ǔla. However, the facts from the perfect tense shed new light on this behavior: it seems that when there is an object prefix,

the High surfaces there not because it is considered the new stem-initial position, but because it is barred from advancing further and overlapping the stem High domain. In other words, the correct representation is (a-na-kí)-(tsuk↓ú)la. When there is no object prefix, a-na-tsúk↓úla, the High tone from the subject prefix actually overlaps the stem High domain, due to the peculiarity of the present tense. This further tells us that in the present tense tones don't "just" advance to overlap the stem High domain. Rather, they advance beyond the tense marker (na). If that has to result in domain overlap, so be it; if not, the High tone still stops before the next domain.

### 3.4 Past

We now examine briefly the past tense (SP-a-(OP)-VS-a), which is very simple but offers more evidence of High Shift stopping before the underlying location of another High tone.

<b>Infinitive</b>	<b>Past 1sg.</b>	<b>Past 2sg.</b>	
<i>No depressors:</i>			
ku-era	ná-↓éra	wá-↓éra	'to try tr.'
ku-ěra	ná-↓éra	wá-↓éra	'to be clean'
ku-rihiza	ná-rih↓íza	wá-rih↓íza	'to take revenge'
ku-fononeka	ná-fonon↓éka	wá-fonon↓éka	'to be grieved'
<i>Depressors:</i>			
ku-degeza	ná-dègěza	wá-dègěza	'to slacken (tr.)'
ku-dàngǔla	ná-dàngǔla	wá-dàngǔla	'to persevere'
ku-dèŋgerěka	ná-dèŋgerěka	wá-dèŋgerěka	'to turn around (intr.)'
ku-zazigirika	ná-zàzigirika	wá-zàzigirika	'to be capable of playing'

Table 3.5: Past

First of all, we see that lexical tone is ignored: whatever type the stem, the past tense will have two surface High tones, one on the fused subject prefix/tense marker and another on the penult. As a matter of fact, even depressors make no difference in this tense (they only serve to show that there is indeed another High on the penult). So clearly there are two High tones here. It is impossible to tell from the data at my disposal where the underlying location of these tones should be: for example, one might be on tense marker and another on the stem (e.g. ná-fonon↓éka), or they may be both on the fused subject prefix and tense marker (n(i)-a-fonon↓éka).

Whichever may be the case, it is important to note here that the first High tone never surfaces on the stem; even if we take the view that the grammatical tone here is on the stem, this supports the claim that the normal state of affairs in Giriyama to avoid domain overlap (as in the perfect tense), and that the present tense is the exception.

### 3.5 Negative past

In all of the examples so far, broadly put, we have only seen tones advance to the vicinity of the stem-initial mora. Let us now look at a tense in which the situation is different, namely the negative past tense. In this tense (NSP-(OP)-VS-ere/ire, where NSP stands for Negative Subject Prefix), shown in 3.6, stems are divided into two groups on different grounds than before.

Infinitive	1sg.	3sg.	
<i>Group A:</i>			
ku-to:l-a	si-tol-ê:re	k <sup>h</sup> a-tol-ê:re	‘to pick out’
ku-suku:m-a	si-sukum-î:re	k <sup>h</sup> a-sukum-î:re	‘to push’
ku-voj:j-a	si-voj-ê:re	k <sup>h</sup> a-voj-ê:re	‘to beg (tr.)’
ku-ʃǝ:r-a	si-fer-ê:re	k <sup>h</sup> a-fer-ê:re	‘to sweep’
ku-ʃonǝ:n-a	si-ʃonon-ê:re	k <sup>h</sup> a-ʃonon-ê:re	‘to crackle over the fire’
ku-bimbind-a	si-bimbind-î:re	k <sup>h</sup> a-bimbind-î:re	‘to knock down and beat’
<i>Group B:</i>			
ku:-dz-a	sí-dz-ì:re	k <sup>h</sup> á-dz-ì:re	‘to come’
ku-hǝ:g-a	si-hég-è:re	k <sup>h</sup> a-hég-è:re	‘to entrap’
ku-ʒo:d-a	si-ʒód-è:re	k <sup>h</sup> a-ʒód-è:re	‘to pound corn in mortar’
ku-fumǎ:g-a	si-fumág-ì:re	k <sup>h</sup> a-fumág-ì:re	‘to shoot with an arrow’
ku-galu:z-a	si-galúz-ì:re	k <sup>h</sup> a-galúz-ì:re	‘to cause to turn’
ku-gomě:z-a	si-goméz-è:re	k <sup>h</sup> a-goméz-è:re	‘to encircle’
ku-ʒaga:ʒ-a	si-ʒagáʒ-ì:re	k <sup>h</sup> a-ʒagáʒ-ì:re	‘to cause to sit’
ku-marigi:z-a	si-marigíz-ì:re	k <sup>h</sup> a-marigíz-ì:re	‘to bring to an end’

Table 3.6: Negative past

#### 3.5.1 The grouping

Let’s start with the obvious: lexical tone and the choice of subject prefix make no difference, as we’ve seen with other cases of grammatical tone. Verbs in group A have a *falling* penult and those in group B have a high antepenult, something we haven’t seen before. Now, we have seen falling penults before, but that was only when two tones needed to surface on a bisyllabic stems, which is definitely not the case for words like si-ʃononê:re.

We get a clue to the solution when we identify the feature which defines group B: obviously it can’t be lexical tone (which is overwritten) and it can’t be the initial consonant either: both groups contain depressor-initial as well non-depressor-initial stems. The relevant feature is this: the stems in group B are exactly those with a stem that *ends* with a depressor.

How should this affect the form? Let us assume that group A is the default form of this tense. Combined with the past suffix -ire (-ere after a mid vowel), the verbs in group B get a depressor-



initial penult. Applying the Group A generalization, we would expect \*si-fumagî:re, \*k<sup>h</sup>a-ʒodê:re etc. And here we see the problem: these forms have a High on the first mora of a depressor-initial syllable (more succinctly, a depressor-initial TBU), which we know is bad (although we've only seen its effect on short vowels up to now). Because of this, the High is pushed back one TBU in group B, giving us a High antepenult.

### 3.5.2 Why a falling tone?

Now that we've reconciled the differences between the two groups, we are still left with a riddle: why should the default pattern for this tense be a falling penult? As I mentioned above, the only case where we expect this to happen is when two Highs surface on a single vowel, and the negative perfect looks nothing like the cases of two Highs we've seen so far. So the question is: why does the High tone surface as it does?

The answer is that there is a hidden High tone on the final vowel of the suffix; in other words, I claim that these verbs have the forms  $\text{si-tolê:re}$ ,  $\text{k}^{\text{h}}\text{a-fononê:re}$ ,  $\text{si-goméʒè:re}$  and so on. The existence of this hidden tone will further be revealed when we look at tonal phrases; basically, when there is another word after the verb, that hidden tone can surface. For now, all we have is the falling penult to guide us.

### 3.5.3 Falling vs. rising tone

If we look more closely at the suggested interpretation of these forms, another problem arises: why should a hidden High tone on the final mora affect the shape of the penult surface tone? If we write out the domains in a form like those seen above, we get  $(\text{si-fononé})\text{e}(\text{re})$ ; why can't we get  $(\text{si-fonone})\text{é}(\text{re})$ , i.e. a rising penult?

I have to admit I do not have a convincing phonological argument for why this should be so. It does, of course, serve to maintain a phonological distinction between a word with a hidden final High and one that doesn't have one. However, this can hardly be considered a good enough reason, since Giryama has plenty of hidden tones with no audible effect (on a word in isolation). Since this phenomenon only occurs on the lengthened vowel, I think it would be sufficient at this stage to simply conclude that that is how a High tone surfaces before an adjacent High domain: on the first mora of the vowel.

In other words, we can say that in Giryama a High tone surfaces on the final mora of the syllable if there is no High domain following it, and on the initial mora if there is a domain. This difference is only manifested on the penult, and as the negative past tense shows as it has interesting implications: a High penult with no following domain (rising) is not affected by depressors, whereas a falling one is.

### 3.5.4 Depressing behavior

There is a subtle point in table 3.6 which I should mention at this stage. Consider the forms *si-ʒóðèrè*, *si-ʒagáʒìrè* and especially *si-marigízìrè*. In all of these forms, the High tone surfaces on a depressed syllable, even though it has “better places to go”. This is most evident in *si-marigízìrè* where there are two stem syllables (and one prefix syllable) which would have been a better landing site for the High (*\*si-marigízìrè*). I have to admit that I have not encountered sufficient data to explain this phenomenon. The data I do have seems to indicate that depressors can in fact restrict High Shift by at most one mora, but I only have systematic evidence in the negative past tense.

## 3.6 Negative perfect

The negative perfect tense will introduce us to another tonological phenomenon in Giryama. This tense (NSP-dza-(OP)-VS-a) displays what seems to be free variation between two patterns, shown in table 3.7. There seems to be no phonological factor deciding between the two groups, and in fact one verb appears in both.

Infinitive	Neg. Perfect 1sg.	Neg. Perfect 1pl.	
<i>Group A</i>			
ku-tosa	sí-dzà-tosa	k <sup>h</sup> ahú-dzà-tosa	‘to cut off’
ku-vǔna	sí-dzà-vuna	k <sup>h</sup> ahú-dzà-vuna	‘to reap’
ku-pìngilíka	sí-dzà-pìngilika	k <sup>h</sup> ahú-dzà-pìngilika	‘to roll along (tr.)’
ku-zazigirwa	sí-dzà-zazigirwa	k <sup>h</sup> ahú-dzà-zazigirwa	‘to be played with’
<i>Group B (24 of 91)</i>			
ku-lola	si-dza-lôla	k <sup>h</sup> ahu-dza-lôla	‘to look’
ku-sijna	si-dza-sîjna	k <sup>h</sup> ahu-dza-sîjna	‘to be too much for’
ku-tetema	si-dza-tétema	k <sup>h</sup> ahu-dza-tétema	‘to tremble’
ku-rírikanirwa	si-dza-rírikanirwa	k <sup>h</sup> ahu-dza-rírikanirwa	‘to be considered’
<i>Groups A &amp; B</i>			
ku-fonóna	si-dza-fónona	k <sup>h</sup> ahú-dzà-fonona	‘to crackle over the fire’

Table 3.7: Negative perfect

Now, the first thing to note here is that lexical tone is ignored, which is not a new thing by now. What is new is the patterns themselves. In group A we see a High tone on the last mora of the negative prefix, and that is the only audible High tone — since the depressor-initial tense marker drops the pitch we can be sure that no other High is audible. Group B is basically the same, except that the single surface High is on the stem-initial mora. But before we can address the difference, we need to figure out what is going on here.

What is stopping the advance of the negative prefix High tone? It can't simply be the depressor, since we have seen again and again that depressors do not just block the advance of a High tone, only prohibit it from surfacing in certain situations. The only thing we've seen so far that actually stops a High tone's movement inside a word is another underlying High. But if there is another underlying High tone, especially in the longer stems like *ku-piŋgĩlĩka*, why doesn't it surface? In other words, why do we get *sí-dzà-pìŋgìlìkà* instead of *\*sí-dzà-piŋgĩlĩka*?

As a matter of fact, we can find proof that there is indeed a High tone there: it is heard on a following word if one exists. Since I have not discussed nouns yet, I cannot elaborate on the examples, and will simply present the relevant phrases as they are:

- *kʰá-dzà-ŋǵbe ku-hambǎla* '(s)he has not yet started to crawl' (cf. *ku-hambala* 'to crawl'): here we see a High tone on the next word which has no tone of its own.
- *sí-dzà-ŋǵbe kú-ǫna...* 'I have never seen... ' (cf. *ku-ǫna* 'to see'): here we see a High tone stopping before the High domain in the next word.

So we know that the negative perfect tense has an additional High. On the one hand, this High tone blocks the advance of the negative prefix High, implying that it should be on the stem-initial mora. On the other hand, it is not heard in isolation, implying that it should be on the final mora. How can we reconcile the two?

My suggestion, given the usefulness of the domain notation, is that the grammatical tone in this tense (and some others) domain boundaries are specified, rather than underlying locations of tones. Generally speaking, in *Giryama* every High tone is connected with two morae: the one where preceding tones stop (the left edge of the domain) and the mora from which the High tone itself starts to move (the right edge of the domain). In all the cases we've seen so far, the two morae were the same; but in the negative perfect tense we need them to be separate.

What this tells us, then, is that a form like *kahú-dzà-piŋgĩlĩka* is actually (*kahú*)-*dzà*-(*piŋgĩlĩka*); since in *Giryama* a High tone is only heard on the rightmost mora in its domain, this tone should

be heard on the final mora, but tones are never heard on the final mora and so this tone cannot surface. As a notational device, I will transcribe the underlying representation of such forms as kahu-dza-pigilika.

### The variation

Now we can turn to group B in table 3.7, where the prefix High tone surfaces stem-initially. At first we might be tempted to say that in these forms the grammatical tone starts on the second mora of the stem, as in si-dza-tétema. Such a proposal (while possible) becomes much less desirable when we consider the bisyllabic stems like si-dza-lôla; we wouldn't want the underlying domain to start on the second mora of the long verb, since length does not exist in the underlying representation.

It seems much better to treat this group as another case of domain overlap, like in the present tense (and polysyllabic High stems in the affirmative perfect). My suggestion is that, perhaps out of analogy with the cases mentioned above, in group B the tense marker (dza-) is treated in the same way as the present tense marker, and is able to “push” a High tone to overlap a domain, provided that domain is not depressor-initial. Note also that none of the stems in group B have any depressors in them. In fact, depressor-initial stems could be in group B for all we know — there is no way of telling. If we only count the non-depressor-initial stems in group A we get only 21 cases. Compare this with the 24 cases in group B and we actually get an almost equal division.

I conclude that the nature of the variation between groups A and B is the treatment of the tense marker: in group B it is treated like the present tense marker, and in group A like the (affirmative) perfect tense marker. And the variation seems to be basically free, with a roughly equal number of stems in either group.

## 3.7 Reduplicated verb stems

An often discussed issue in Bantu languages is that of reduplication. The basic question is to what extent the reduplicated stem is still analyzable as two copies of the original stem. For example, in Giryama verbal reduplication, the final vowel -a is still separate from the stem, and so for example the negative subjunctive form of ku-sina-sina ‘to begin to cry’ is u-si-sine-sine, and the negative past form of ku-gala-gála ‘to roll on the ground’ is k<sup>h</sup>a-galire-galîre. The question at hand is, of course, what happens to the reduplicated stem tone? In verb stems the situation is simple: a verb stem can have at most one High tone, reduplicated or not. This is well-known stress-like characteristic

of some tone systems (Kisseberth and Odden 2003; Downing 2003) known as *culminativity*. So reduplicated verb stems are tonally equivalent to simple stems (in other words, the second copy of the stem loses its High). Examples of reduplicated High verb stems include ku-g<sub>á</sub>la-g<sub>ǎ</sub>la ‘to roll on the ground’, ku-t<sub>ǎ</sub>ŋga-t<sub>ǎ</sub>ŋga ‘to wander about’ and ku-t<sub>f</sub>era-t<sub>f</sub>ěra ‘to tickle the throat’.

### 3.8 What the tenses have taught us

To close the discussion of the different tenses, here are the key points which they add to those exemplified by the present tense:

- High tones are not attracted to the stressed syllable; instead, they move to the right up to the next underlying High (or the end of the phrase).
- Certain morphemes are associated with a High tone stopping not before the underlying location of another High, but on it. The OCP can also lead to this, but it can only operate under very restricted conditions.
- A High tone can never surface on the last mora of a phrase: if a High tone starts out on the last mora of a word, it can only be heard if there is another word after it.
- Several verb tenses can have grammatical tone, overriding any lexical tone a stem may have.
- As the negative perfect tense shows, the underlying representation can specify an entire domain, as opposed to a simple High tone “sponsor”. The simple case can be viewed as a special case of the general claim.

# Chapter 4

## Nouns

### 4.1 Introduction

Armed with the knowledge gleaned from verbs, it is now time to tackle Giryama nominal tonology. As I will show, the same principles are at work here, albeit in a freer way. I shall reserve an in-depth discussion of exactly why and how nouns can differ from verbs for a later stage.

The key diagnostic tool for identifying the tonal pattern of nouns is the copula *ni*. As my notation indicates, the copula bears a High tone, and since it is always in a tonal phrase with the nouns it refers to, this High tone can affect the noun. Consider the nouns in table 4.1 (I will present an analysis of these data only at a later stage).

<b>Noun</b>	<b>With coupla</b>	<b>Gloss</b>
mu-tsango	ni mu-tsǎŋgo	‘contribution’
mu-tsǎŋgo	ni mú-ts <sup>↓</sup> ǎŋgo	‘abdominal disturbance’
u-dzoga	ni u-dzǒga	‘mushroom’
u-dzoga	ni ú-dzòga	‘fine fur’
gonggo	ni gǒŋgo	‘thick forest’
gonggo	ní gòŋgo	‘stick’

Table 4.1: The effect of the copula

As this sample clearly shows, not only does the copula affect a noun in a familiar way (namely, adding a High tone), but it can expose differences which are indiscernible in isolation. As (Tucker 1964) writes, “the tone of a given word cannot be determined simply by the pitch pattern heard in the isolated form” (p. 607). In light of this, my discussion of nominal tonology relies heavily on the copula (as do the recordings).

## 4.2 A bird’s-eye view of noun types

Generally speaking, nouns in Giryama can be divided into six groups based on their behavior in isolation and after the copula. Of these six, three (which I have labeled L1-3) are low in isolation and three (H1-3) have a surface High tone in isolation. Some representative lexical items are shown in table 4.2 below. Discussion of the facts follows.

Noun	With coupla	Gloss
<i>L1: Low in isolation, rising after High</i>		
ki-gulu	ni ki-gǔlu	‘leg’
mu-lomo	ni mu-lǒmo	‘lip’
ɲombe	ni ɲǒmbe	‘cow’
<i>L2: Low in isolation, falling after High</i>		
mu-fuŋga	ni mu-fǔŋga	‘pledge’
ki-tambi	ni ki-tǎmbi	‘colored cloth’
u-pande	ni u-pǎnde	‘side, part’
<i>L3: Low in isolation, High antepenult after High</i>		
ma-fuha	ni má-fuha	‘oil’
lu-rimi	ni lú-rimi	‘tongue’
mi-latso	ni mí-latso	‘blood’
<i>H1: Rising penult in isolation</i>		
ki-nǔndu	ni kí-n <sup>↓</sup> úndu	‘small hump’
mu-sǎɲa	ni mú-s <sup>↓</sup> áɲa	‘blacksmith’
u-pǎti	ni ú-p <sup>↓</sup> áti	‘riches’
mu-lomberéri	ni mú-lomber <sup>↓</sup> éri	‘mourner’
<i>H2: Falling penult in isolation</i>		
ki-kpâta	ni kí-kp <sup>↓</sup> áta	‘thorny shrub’
mu-pîra	ni mú-p <sup>↓</sup> íra	‘ball’
ki-lôlo	ni kí-l <sup>↓</sup> ólo	‘glass’
mu-tsuŋgurízi	ni mú-tsuŋgur <sup>↓</sup> ízi	‘water spout’
<i>H3: High antepenult in isolation</i>		
ri-pálata	ni rí-p <sup>↓</sup> álata	‘large stain’
mu-ténde	ni mú-t <sup>↓</sup> énde	‘children’s game’
ki-réreŋg̃ba	ni kí-r <sup>↓</sup> éreŋg̃ba	‘type of tree’
ma-dendéŋgule	ni má-dèndéŋgule	‘flattery’

Table 4.2: The six noun types

**Morphology** As can be seen from table 4.2, Giryama nouns have the familiar Bantu morphology, i.e. a noun class and a stem. Most “genuine” Bantu noun stems (i.e. not deverbal, compound or borrowed) are bisyllabic.

## Basic analyses

Given all we have seen in verb tonology, these forms should look familiar enough. In fact, we have all we need to offer the basic analysis for all six noun types (some of these will be revised when we go over the data in detail):

L1 These nouns are low in isolation and have a rising penult after the copula. There is no reason to assume any underlying tone on these.

⇒ L1 nouns are toneless.

Examples: ki-gulu, ŋombe.

L2 These nouns have a falling penult after the copula. As we have seen in the negative past tense (§3.5) this implies an underlying High on the final mora, which is not heard due to non-finality.

⇒ L2 nouns have an underlying final High tone.

Examples: mu-fuŋg̃a, ki-tambị.

L3 In these nouns, the copula High stops on the noun class prefix, yet there is no audible High in isolation. This is reminiscent of tenses like the negative perfect (§3.6), where the underlying representation contains a domain specification spanning the entire stem: the High tone cannot surface in isolation due to non-finality.

⇒ L3 nouns have an underlying domain on the stem.

Examples: ma-fuha, lu-rimi.

H1 These nouns have a rising penult in isolation, the mark of a single High. Furthermore, a preceding High stops before the stem.

⇒ H1 have an underlying stem-initial High.

Examples: ki-nũndu, mu-lõmberëri.

H2 These are the natural counterpart to L2 nouns, having a falling penult in isolation. This is the first case we've seen of a stem with two High tones.

⇒ H2 nouns have underlying Highs on the first and last morae.

Examples: ki-lôlo, mu-tsuŋgurizi.



H3 I will go into detail on these further on; since they have a visible High that stops on the antepenult, there is only one way to derive them.

⇒ H3 nouns have an underlying initial High and a final binary domain.

Examples: ri-pálata, ma-dendéngule.

Let us now start to examine the data in more detail.

### 4.3 Properties of the copula

There is one crucial property of the Giryama copula, which is easiest to see when we examine nouns of type H1. Recall that these nouns have a rising penult in isolation, and the High tone from the copula surfaces on the first mora of the noun. Table 4.3 below shows the behavior of different length nouns of this type after the copula.

Noun	With coupla	Gloss
<i>With noun class prefix:</i>		
ka-tʃíri	ni ká-tʃ <sup>+</sup> íri	‘store-bought perfume’
ki-tűro	ni k <sup>+</sup> í-t <sup>+</sup> úro	‘shoulder’
mu-ŋǒli	ni mú-ŋ <sup>+</sup> ǒli	‘barber’
lu-βára	ni lú-β <sup>+</sup> ára	‘natural baldness’
u-kuluhírwi	ni ú-kuluh <sup>+</sup> írwi	‘faithfulness’
ma-sumuríro	ni má-sumur <sup>+</sup> íro	‘conversation’
mu-lomberěri	ni mú-lomber <sup>+</sup> éri	‘mourner’
<i>Without noun class prefix:</i>		
áda	ni áda	‘custom’
ts <sup>h</sup> áwe	ni ts <sup>h</sup> áwe	‘grandfather’
k <sup>h</sup> űro	ni k <sup>h</sup> űro	‘dog’
ŋěre	ni ŋěre	‘hair’
sukăni	ni súk <sup>+</sup> áni	‘rudder’
fajiri	ni fáj <sup>+</sup> íri	‘barley’
k <sup>h</sup> et <sup>h</sup> ět <sup>h</sup> e	ni k <sup>h</sup> et <sup>h</sup> ět <sup>h</sup> é <sup>+</sup> t <sup>h</sup> e	‘locust’
p <sup>h</sup> olokăna	ni p <sup>h</sup> ólok <sup>+</sup> ána	‘forced path’

Table 4.3: Type H1 nouns after the copula

As we can see, in all of these words the High from the copula reaches the noun. The important thing to note is the behavior of prefix-less nouns. For prefixed nouns like **mu-lomberěri** we assume the lexical High starts on the stem, and we get (ni mú)-(lomber<sup>+</sup>é)ri — the copula High advances up to the domain boundary. But when there is no prefix we get domain overlap: the copula High surfaces on the underlying location of the stem High (ni súk<sup>+</sup>áni).

Perhaps in the longer stems like p<sup>h</sup>olokǎŋa we might say that the High actually starts out on the second stem mora (not unheard of in Bantu languages) but we certainly cannot say this for bisyllabic nouns like k<sup>h</sup>ǔro or ɲěre: there is simply no other place for the High to come from. We must conclude that there is overlap in forms like ɲi k<sup>h</sup>ǔro and ɲi ɲěre — Just like in the present tense of bisyllabic High stems. And so we learn that the copula ɲi has the same property as the present tense marker: it has to ability to cause a domain overlap, even at the expense of causing two tones to surface on the same vowel (in bisyllabic nouns like ɲi ɲěre).

## 4.4 Depressors

The next subject to consider is the effect of depressors. Again, these are easiest to see in overt High nouns, since in all of them the copula High normally surfaces on the first mora of the nouns. If a nouns starts with a depressor, the High will be pushed back to the copula. The nice thing about this is that for many nouns, the singular differs in this respect from the plural, most notably class 7/8 nouns, where the prefixes are ki-/vi- (tʃ-/ʒ- before a vowel). Table 4.4 below shows this in action.

Type	Singular		Plural		
H1	zěze	ní zěze	ma-zěze	ni má-zěze	‘musical instrument’
	bambǎŋo	ní bàmǎǎŋo	ma-bambǎŋo	ni má-bàmǎǎŋo	‘forlorn hope’
H2	ǰbǎŋǰbǎŋa	ní ǰbǎŋǰbǎŋa	ma-ǰbǎŋǰbǎŋa	ni má-ǰbǎŋǰbǎŋa	‘broken crock’
	dʒǎŋgâa	ní dʒǎŋgâa	ma-dʒǎŋgâa	ni má-dʒǎŋgâa	‘native vegetable’
H3	bájoja	ní b <sup>+</sup> ájoja	ma-bájoja	ni má-b <sup>+</sup> ájoja	‘apology’
	hám̩bini	ní h <sup>+</sup> ám̩bini	ma-hám̩bini	ni má-h <sup>+</sup> ám̩bini	‘scorpion’
ki-/vi-	ki-ɲǎgo	ni k <sup>+</sup> í-ɲ <sup>+</sup> ǎgo	vi-ɲǎgo	ní v <sup>+</sup> ì-ɲǎgo	‘scarecrow’
	ki-ǰûma	ni k <sup>+</sup> í-ǰ <sup>+</sup> ûma	vi-ǰûma	ní v <sup>+</sup> ì-ǰûma	‘sleeping mat’
	ki-tindízo	ni k <sup>+</sup> í-tind <sup>+</sup> ízo	vi-tindízo	ní v <sup>+</sup> ì-tindízo	‘resting place for flock’
	ki-kokôra	ni k <sup>+</sup> í-kok <sup>+</sup> ôra	vi-kokôra	ní v <sup>+</sup> ì-kokôra	‘elbow’
	ki-gúgùt <sup>h</sup> a	ni k <sup>+</sup> í-g <sup>+</sup> úgùt <sup>h</sup> a	vi-gúgùt <sup>h</sup> a	ní v <sup>+</sup> ì-gúgùt <sup>h</sup> a	‘part of corn cob’

Table 4.4: Initial depressors in over High nouns

As we can see, the situation here is the same as in the verbs, and indeed anywhere in the Giryama tone system: a depressor can always prevent a High tone from shifting onto it.

## 4.5 Sources of ambiguity

The data presented above may make it seem like it is always possible to tell the type of a noun from its form in isolation and after the copula. In reality, however, this is not the case. Especially for the types L2 (low in isolation, falling after High) and L3 (low in isolation, High antepenult after High), several factors can blur the distinction.

### 4.5.1 Depressors

The first possible cause for confusion turns out to be depressors. Recall from the negative past tense (§3.5) that a depressor-initial penult can prevent the formation of a falling tone, pushing a High tone back to the antepenult. Consider now the nouns in table 4.5 below.

In isolation	After <i>ní</i>	
lu-bondo	ní lú-bòndo	‘grass seed’
ki-bandzu	ní kǐ-bàndzu	‘chip’
ka-berwa	ní ká-bèrwa	‘type of jackal’
mu-dzũngu	ní mú-dzũngu	‘creeping gourd plant’
ri-dzihi	ní rǐ-dzihi	‘a large tree’
u-dzèri	ní ú-dzèri	‘truth’

Table 4.5: L2/L3 nouns with a depressed penult

All of these nouns are low in isolation, and the copula High surfaces on the antepenult — exactly our definition of type L3 nouns. However, we could equally describe them as type L2 nouns where the depressed penult prevents a falling tone. Which is the answer?

Well, the answer is that in Giryama there may be no way to tell (unless we can show that depressors restrict High Shift by at most one mora, as suggested in §3.5). As far as a Giryama speaker is concerned, these nouns can all be exactly what their behavior makes them out to be: type L3. Only comparative and historical evidence can show us that some of these nouns should have been of type L2. There are, however, hundreds of these ambiguous nouns in the Giryama lexicon, and I feel that to simply label them all L3 would lose the insight. I shall therefore label these nouns as type L3d: type L3 with a depressed penult.

### Overt High nouns

As we might expect, the same sort of ambiguity can arise in over High nouns, confusing type H2 with H3. The nouns in table 4.6 all exhibit this behavior (the copula is irrelevant here).

dzalágùmbe	‘thumb’
p <sup>h</sup> ombóvíro	‘tadpole’
mu-sígànde	‘type of plant’
ki-gúgùt <sup>h</sup> a	‘part of corn cob’

Table 4.6: H2/H3 nouns with a depressed penult

The discussion above holds here as well: there seems to be no way in Giriyama to tell whether the second underlying High in these nouns covers the final two syllables or just one.

### 4.5.2 Short nouns

But depressors are not the only source of ambiguity. Recall from §4.3 that the High tone from the copula can overlap another High domain. Of course, this is only relevant in prefixless nouns, since all Giriyama noun class prefixes are toneless. Let us examine the data in table 4.7 below.

In isolation	After <i>n</i> <sub>i</sub>	
ndangu	ni ndângu	‘aching of feet’
βanga	ni βânga	‘bad luck’
p <sup>h</sup> embe	ni p <sup>h</sup> êmbé	‘horn, ivory’
lele	ni lêlé	‘type of bird’
sugu	ni sûgu	‘animal itch’

Table 4.7: Bisyllabic nouns with a falling penult after *n*<sub>i</sub>

These nouns all have a falling penult after the copula, which would normally make them type L2 (final underlying High). However, they may also be of type L3, with an underlying High domain covering the entire stem — the copula High would be able to overlap the stem domain, yielding same result. Fortunately for us, there are several ways to tell the true nature of these nouns.

First of all, we have already seen some nouns that have a class prefix only in the plural (or singular). When there is such a prefix, it can expose the true nature of the stem, as in table 4.8.

	Singular	Plural		
	<i>Prefix proves type L2</i>			
hundu	ni hûndu	ma-hundu	ni ma-hûndu	‘small thicket’
kumba	ni kûmba	ma-kumba	ni ma-kûmba	‘fish’
tsoka	ni tsôka	ma-tsoka	ni ma-tsôka	‘axe’
	<i>Prefix proves type L3</i>			
fugu	ni fûgu	ma-fugu	ni má-fugu	‘type of animal’
ts <sup>h</sup> eru	ni ts <sup>h</sup> êru	u-tseru	ni ú-tseru	‘field ready for planting’
w-ira	ni w-îra	ma-ira	ni má-ira	‘song’
lu-tsaga	ni lú-tsaga	ts <sup>h</sup> aga	ni ts <sup>h</sup> âga	‘store, garner’

Table 4.8: Nouns where a singular/plural prefix reveals the type

As we can see, some nouns may be ambiguous in the singular (or the plural) where there is no class prefix, or where the historical class prefix has disappeared — for example, the “N class” nouns like *ts<sup>h</sup>eru*, *k<sup>h</sup>uta* etc. where the only trace of an original nasal prefix is aspiration — but they do have a prefix in one of the forms that reveals their identity.

While the above method is accurate, it is basically a matter of chance: some nouns don’t have a plural form, and for many other the singular and plural forms are identical. In these cases, the copula cannot help us. Are these nouns truly ambiguous? In other words, how do the speakers know? Well, it’s actually quite easy to tell. Consider that under normal circumstance a High tone will stop before the underlying location of the next High, and only specific morphemes like the copula can create an overlap which leads to this ambiguity. All we have to do, then, is to observe the behavior of High tones other than the copula High; for example, a High tone from a preceding verb. In such a setting, the preceding High would not be able to penetrate the stem domain and we would get a difference in behavior. I will not go into any detail, but as an example consider the following sentence from the recordings, which shows the type of *ɲmaka* ‘east’ (low in isolation):

- *βul<sub>a</sub> í-dzà-funga k<sup>h</sup>pá ɲmaka*  
 rain SP-TM-threaten PREP east  
 ‘the rain threatened from the east.’

Here we see the High tone from the perfect tense marker stop on the preposition *k<sup>h</sup>pá*; this shows us that *ɲmaka* is in fact of type L3 (*ɲmaka*) and not of type L2 (*\*ɲmaka*), otherwise we would have had *\*βul<sub>a</sub> í-dzà-fungga k<sup>h</sup>pá ɲmák<sub>a</sub>*.

And so we see that the Giryama speaker has no difficulty telling type L2 from type L3 nouns. In analyzing the data at my disposal, however, I have not been as lucky. Since most of the nouns have only been recorded after the copula, many of these ambiguities could not be resolved. For nouns of this type (bisyllabic nouns with a falling penult after the copula) I have no choice but to leave the question open, marking them L2/L3.

## 4.6 Where do domains start?

### 4.6.1 Hidden domains in type L3

Consider again the nouns of type L3, which are low in isolation and after the copula have forms like *ni má-fuha*, *ni lú-rimi* etc. I have analyzed these nouns as having an underlying domain, i.e. *ma-fuha*, *lu-rimi* and so forth. Compare these with nouns of type H3, which have an underlying domain on the last two syllables, e.g. *ma-dendéngule*. The question is, what is the correct generalization for type L3 nouns? Does the underlying domain cover the entire stem (like the grammatical tone in some negative tenses) or does it cover the last two syllables? For the canonical, bisyllabic stems, this difference is meaningless. It only becomes consequential for longer stems, and table 4.9 shows the data.

In isolation	After <i>ni</i>	
<i>Entire stem</i>		
<i>ki-foloŋgo</i>	<i>ni kí-foloŋgo</i>	‘a type of insect’
<i>lu-k<sup>h</sup>ululu</i>	<i>ni lú-k<sup>h</sup>ululu</i>	‘noise’
<i>mu-tuwiwa</i>	<i>ni mú-tuwiwa</i>	‘person followed’
<i>vi-tsukizi</i>	<i>ní v<sup>̀</sup>i-tsukizi</i>	‘crossness’
<i>Last two syllables</i>		
<i>mu-pumbavu</i>	<i>ni mu-púmbavu</i>	‘person of substance’
<i>ri-kumbuu</i>	<i>ni ri-kúmbuu</i>	‘large belt’
<i>mu-maiḏa</i>	<i>ni mu-máiḏa</i>	‘enemy’

Table 4.9: Polysyllabic type L3 nouns

As the table shows us, both options occur in the language and there are in fact two types of L3. Unfortunately, I haven’t found any longer stems (more than three syllables) of these types, and even the trisyllabic stems are rather scarce. It is therefore hard to say which of the two types is the default behavior. However, since we have type H3 (High on the antepenult) and no nouns seem to be of the hypothetical type H3’ (High on the initial mora in a quadrisyllabic or longer stem), I will consider the type where the domain is on the final two syllables to be the more natural one, and will refer to that as L3. The other type, where it occurs, will be labelled L3’.

### 4.6.2 Overt domains in the High types

The same question raised above applies also for the overt High noun types. In types H1 (rising) and H2 (falling), the High domain can start on the penult (where it is heard) or on any mora to the left, if the stem is long enough. Similarly for type H3, the High may start out on the antepenult, or

(in very long stems) earlier. As usual, the diagnostic test is where do preceding High tones stop. Consider table 4.10.

	<b>In isolation</b>	<b>After ni</b>	
	<i>Surface location</i>		
H1	mu-kurŭrjo	ni mu-kúr <sup>↓</sup> úrjo	‘track made by dragging’
	ma-furǎndze	ni ma-fúr <sup>↓</sup> ándze	‘sores caused by the yaws disease (pl.)’
H2	ma-fijîŋgi	ni ma-fíj <sup>↓</sup> íŋgi	‘gizzard (pl.)’
	ki-lugu-lûgu	ni ki-lúgù <sup>↓</sup> -lûgu	‘slackness’
H3	ma-kolókofwe	ni ma-kól <sup>↓</sup> ókofwe	‘land crab (pl.)’
	<i>Larger domain</i>		
H1	mu-kuluhŭrwi	ni mú-kuluh <sup>↓</sup> írwi	‘trustworthy person’
	ma-furǎndze	ni má-fur <sup>↓</sup> ándze	‘the yaws disease’
H2	ki-kokôra	ni kí-kok <sup>↓</sup> óra	‘elbow’
	mu-tungûru	ni mú-tung <sup>↓</sup> úru	‘type of plant’
H3	<i>(No examples found)</i>		

Table 4.10: Polysyllabic overt High nouns

Once again, we see both types of behavior. Note especially the difference between ma-furǎndze ‘the yaws disease’ and ma-furǎndze ‘sores caused by the yaws disease’ — a true minimal pair. However, unlike the situation in type L3 above, there are plenty of long H1-type nouns, especially deverbal nouns: a noun formed from a High verb stem usually maintains the initial High tone, and since verbs stems can get relatively long, so can the noun stems. As a result, the vast majority of overt High nouns have an initial underlying High. I will consider this to be the normal case, and denote nouns that behave otherwise (like ma-furǎndze above) as type H3’.

## 4.7 Between the rock and the hard place

In this section I discuss a rather rare phenomenon that occurs in very specific conditions.

### 4.7.1 A closer look at the sixth type

Type H3 (High antepenult) is special in that it can only exist in trisyllabic or longer stems (recall the analysis: a hidden domain covering the last two syllables and another underlying High before that). For trisyllabic stems with a prefix, the copula High will surface on the prefix. What happens with trisyllabic stems with no prefix? Consider a word like mísomo ‘father’s younger brother’s wife’. The domain structure of that must be (mí)(somo). The question is, where will the High from the copula go? Remember, it can overlap a domain, but if the copula High surfaces on

the initial *ni*, where will that tone go? Table 4.11 shows the data.

In isolation	After <i>ni</i>	
mísomo	ni mís <sup>↓</sup> ómo	‘father’s younger brother’s wife’
k <sup>h</sup> ólowa	ni k <sup>h</sup> ól <sup>↓</sup> ówa	‘lunar eclipse’
ɲgúmbao	ni ɲgúmb <sup>↓</sup> áo	‘hero’
p <sup>h</sup> ázà	ni p <sup>h</sup> ázà	‘curtain’
ndódòre	ni ndódòre	‘parched corn’
mízàla	ni mízàla	‘woman’s mother-in-law’

Table 4.11: Trisyllabic prefixless H3 nouns

In the first set of nouns in the table, we see the hidden domain being overlapped due to the “pressure”. But the second group is more surprising: we expect to hear two High tones and there is only one (the depressor leaves no room for mistake). Which one is it and what happened to the other one? Either the surface tone we hear belongs to the stem, in which case the copula High is not heard, or it is the copula High that surfaces and the stem tone is deleted. I will only be able to argue later on which is the correct solution.

#### 4.7.2 ... and a closer look at the fifth type

Since the above phenomenon can only happen when an underlying High is situated between an “overlapping” High and another domain, it is natural to look for other cases where this might happen. And indeed one exists: in bisyllabic stemless nouns of type H2. Recall that type H2 nouns are said to have initial and final underlying High tones, for example *ki-kpâta* ‘thorny shrub’. What happens when there is no prefix for the copula High to stop on? Table 4.12 shows us.

In isolation	After <i>ni</i>	
ɲgbîdi	ni ɲgbîdi	‘stump of fowl’s tail’
ts <sup>h</sup> âlu	ni ts <sup>h</sup> âlu	‘small monkey’

Table 4.12: Bisyllabic prefixless H2 nouns (both of them)

Alas, these are the only two such nouns in Giryama, but both behave like the H3 nouns above.

## 4.8 Some misbehaving nouns

Although the tonology of Giryama, like that of many Bantu languages, is extremely regular, there are some nouns that don’t correspond neatly to my categorization. I will not discuss here those



isolated cases where a depressor fails to “work”<sup>1</sup>, but there are several cases where the singular seems to behave differently from the plural. The data can be seen in table 4.13.

	Singular		Plural		
ki-ǝeǝa	ni kí-ǝèǝa	vi-ǝeǝa	ni vi-ǝèǝa		‘evil happenings’
ki-luma	ni kí-lùma	vi-luma	ni vi-lùma		‘brine’
ki-ŋandu	ni ki-ŋându	vi-ŋandu	ní vì-ŋandu		‘type of beetle’
ki-lagane	ni ki-lágàne	vi-lagane	ní vì-lagane		‘agreement’
mu-kíggiri	ni mú-kíggiri	mi-kíggiri	ni mi-kíggiri		‘a type of shrub’
mu-hiríwe	ni mú-hiríwe	a-hiríwe	ni a-hiríwe		‘the second day’
mu-kperéro	ni mú-kperéro	mi-kperéro	ni mi-kperéro		‘ladder’

Table 4.13: Singular vs. plural

As we can see after a moment’s reflection, all of these can be explained as a difference in the underlying location of a High: for example, *ki-luma* behaves like type L3 (*ki-luma*) but *vi-luma* behaves like type L2 (*vi-luma*). Similarly, *mu-kíggiri* behaves like *mu-kiggiri* and its plural looks like *mi-kiggiri*. Finally *m-hiríwe* looks like *mu-hiríwe* and its plural seems to be *a-hiríwe*.

One can, of course, find alternative explanations for this differences (for example, stems with a *ǝ*, *h* or *f* could be analyzed as depressors in one case and non depressors in the other); but whatever the explanation(s) may be, these exceptions are too scarce to undermine the system. In my opinion, it is nice to see that an explanation can be found which obeys all the tone rules, requiring nothing more than a change in an “invisible” feature — how far to the left of its surface location a High tone originates.

## 4.9 Reduplicated nouns

Recall from §3.7 that reduplicated verb stems are subject to culminativity, i.e. a verb stem can have at most one High tone. Since noun stems don’t have this restriction, it is interesting to see how they behave. Needless to say, reduplicated toneless nouns (type L1) remain toneless. The question is, what happens to reduplicated stems with a High tone, overt or otherwise. Table 4.14 on page 50 shows us the state of affairs (unfortunately, most of the stems have not been recorded in their non-reduplicated form).

The vast majority of reduplicated High nouns pattern like type H3, with an overt High antepenult; we might be tempted to deduce that this is somehow the default pattern for reduplicated High nouns, whatever their original type. The final two nouns in table 4.14 reveal the truth: a

<sup>1</sup>There are two: *negêre* ‘badger’ and *ma-gbâŋi* ‘chaff’.

In isolation	After <b>ni</b>	
<i>Majority: like H3 (high antepenult in isolation)</i>		
k <sup>h</sup> ulú-k <sup>h</sup> ulu	ni k <sup>h</sup> úlu-k <sup>h</sup> ulu	‘sort of beetle’
ma-kombé-kombe	ni má-kombe-kombe	‘large spots’
ki-lumé-lume	ni k <sup>í</sup> -lume-lume	‘violence’
bomú-bòmu	n <sup>í</sup> bòmú-bòmu	‘an illness’
uvuru-úvùru	ni úvùru-úvùru	‘dimness of sight’
<i>But also: like H2 (falling penult in isolation)</i>		
mu-ɲandze-ɲândze	ni mu-ɲándze-ɲ <sup>↓</sup> ándze	‘type of bird’
ki-lugu-lûgu	ni ki-lúgù-lûgu	‘idleness’

Table 4.14: Reduplicated High nouns

form like *ni ki-lúgù-lûgu* can only have the structure  $(\underline{\text{ni}} \text{ ki-lú})(\underline{\text{gù-lû}})\underline{\text{gù}}$ , i.e. two copies of type L2; the hidden High of the first copy is now free to surface. I conclude that reduplicated noun stems in Giryama preserve their original Highs. The majority looks like H3 stems because the same would be true of reduplicated L3, of reduplicated depressor-initial L2 and of any reduplicated overt High.

## 4.10 Back to verbs: reflexives

Now we can finally shed light on some phenomena I have not touched upon in verbs. First, I am now able to explain the single exception to tone rules in verb stems, which is *ku-kelési* ‘to sit’. Given the fact that the final vowel is part of this stem, the answer is now obvious: *ku-kelési* has an underlying High on its final vowel, i.e. it is of type H2.

But a consistent issue with verb stems is that of the reflexive. The reflexive in Giryama is formed by prefixing *dzi-* to the verb stem, as table 4.15 shows.

Original stem <i>(not attested)</i>	Reflexive
ku-neněra ‘to speak for/against’	ku-dzi-ûɲa ‘to control oneself’
ku-ramaza ‘to bestow gifts upon’	ku-dzi-nén <sup>↓</sup> éra ‘to speak at random’
ku-singizira ‘to blame’	ku-dzi-rám <sup>↓</sup> áza ‘to deck oneself out’
ku-vůna ‘to harvest’	ku-dzi-síngizíra ‘to blame oneself’
ku-vuɲa ‘to emphasize’	ku-dzí-vůna ‘to be conceited’
	ku-dzí-vůɲa ‘to be conceited’

Table 4.15: Reflexive verbs

First, we see that original tone is ignored. What does happen is that both the stem and the reflexive morpheme get a High tone. This is easily seen from depressor-initial verbs like *ku-dzí-vůna* show. Non-depressor-initial verbs like *ku-dzi-rám<sup>↓</sup>áza* and especially *ku-dzi-ûɲa* reveal is that the reflexive morpheme is another one of those (like the present tense marker and the copula) that

can cause a domain overlap.

An interesting fact about the reflexive is that reflexive verbs seem to refuse grammatical tone imposed by the verb tenses. For example, recall from §3.2 that the imperative deletes lexical tone and has a High tone on its suffix *-a*. Given that, we would expect the imperative of *ku-dzi-héh<sup>↓</sup>éra* ‘to defend oneself’ to be *\*dzi-hehera* (singular) and *\*dzi-heheráni* (plural), but instead we find *dzi-héh<sup>↓</sup>éra* and *dzi-héher<sup>↓</sup>éni*. Similarly from *ku-dzi-ôña* we get *dzi-ôñe* ‘beware!’<sup>2</sup>.

Another noteworthy fact is that nouns derived from reflexive verbs maintain this underlying tonal structure. As an example consider *u-dzi-hêndji* ‘hypocrisy’ from *ku-dzi-hêndja* ‘to pretend’, in turn from *ku-hendja* ‘to cause to be done’ (the causative of *ku-henda* ‘to make, to do’).

## 4.11 A taste of phrases

Before I conclude my discussion of nouns in *Giryama*, I would like to present some data showing the movement of tone in a phonological phrase. This subject is a very broad one, and would on its own require more space than the present work, so I shall restrict myself to a single set of examples. These examples use personal names, which behave like normal nouns and exhibit the same tonal types, in conjunction with the consecutive tense (SP-ka-(OP)-VS-a): the key features of this tense are that lexical tone remains intact and the affixes are toneless. This allows us to have a completely toneless verb interact with different configurations of noun types. Table 4.16 shows the patterns encountered for type L1/2/3 subjects. All underlying tones are shown.

Subject	Object	Phrase	
L1	L1	<i>gona a-ka-m-piga kahaso</i>	‘and Gona hit Kahaso’
L1	L3	<i>gona a-ka-m-piga kazungu</i>	‘and G. hit Kazungu’
L3	L1	<i>kazungu a-ka-m-songgerera tǽro</i>	‘and Kazungu drew near to Charo’
L3	L2	<i>kazungu a-ka-m-songgerera kâdzô</i>	‘and K. drew near to Kadzo’
L3	H1	<i>kazungu a-ka-m-songgerera kásitf<sup>↓</sup>ána</i>	‘and K. drew near to Kasichana’
L3	H2	<i>kazungu a-ka-m-songgererá ñm<sup>↓</sup>ár<sup>↓</sup>ó</i>	‘and K. drew near to Mwaro’

Table 4.16: Phrases: Subject low in isolation

It is easy to see from these phrases two expected facts: that type L1 nouns are indeed toneless (the L1 subject *gona* had no affect on the other words); and that nouns with a hidden High tone indeed have a High tone (the L3 subject *kazungu* adds a High to the equation). In addition, we see here the most striking feature of *Giryama* tonology: observe how the hidden tone from the subject is free to travel across an entire word to surface on the object. This shows just how mobile

<sup>2</sup>Unfortunately, there are only three reflexives recorded in tenses other than the present, so it is hard to make a generalization.

Giryama tones are. But something slightly unexpected occurs when we look at subjects with an overt High: consider table 4.17.

Subject	Object	Phrase	
H1	L1	ŋmálimu a-ka-m-songerera t̄jaro	‘and Mwalimu drew near to Charo’
H1	L1	karísá a-ka-m-tsungurira t̄jaro	‘and Karisa drew near to Charo’
H1	L2	karísá a-ka-m-tsungurira kâdze	‘and Karisa peered at Kadze’
H1	L3	karísa a-ka-m-pigà kazungu	‘and Karisa peered at Kazungu’
H1	H1	karísa a-ka-m-pigà ðahăbu	‘and Karisa hit Dahabu’

Table 4.17: Phrases: Overt High subject

The striking thing about these examples is that the subject High surfaces on the subject. In some cases it surfaces where it would in isolation (on the penult), in others it advances (*karísa/karísá*)<sup>3</sup>, but it never leaves the noun. This generalization seems to hold throughout the phrases I have seen: a type H1 High tone will not advance beyond the noun.

One can think of different explanations for this behavior, for example the need to preserve lexical distinction. We should bare in mind, however, that this is another difference between nouns and verbs, since the tones of High verb stems move freely outside the verb. This raises an interesting question, wether the High tone on deverbal H1 nouns can move beyond the noun; preliminary results show that this may be the case (at least with arguments to the deverbal noun) but I do not have sufficient data to address the question.

## 4.12 Summary

This concludes my overview of tone in the Giryama noun. At this point, let us review how the study of nouns has contributed to our understanding of Giryama tonology. On the theoretical front, nouns did not have much to add. We have seen some rare cases where a High tone can actually be deleted (§4.7), and also that an overt High will not usually move beyond the noun (§4.6.2), but the basic principles have not changed. What nouns did have to offer is a rich set of tonal types. Verb stems can have at most one High tone on their initial mora. Nouns can also have such a High tone, but they can also have a hidden domain covering the last syllable, two syllables or the entire stem. This basically simple set of building blocks creates an extremely complex system on the surface.

<sup>3</sup>This seems to be a matter of free variation; I do not have sufficient data to elaborate.

Here is a final review of the principles of Giryama tonology:

- A High tone will shift forward from its underlying location (“sponsor”) to the TBU before the next sponsor. The last High in an intonational phrase will surface on the penult.
- An underlying High on (or extending to) the final TBU will not be heard; it will, however, stop the movement of a preceding High.
- A High shifting “through” certain morphemes (e.g. the copula and the present tense marker) will surface *on* the next sponsor.
- High Shift cannot result in a depressor-initial High TBU, and will stop one mora to the left in such a case.
- An overt High on a noun will not shift beyond the word.

## Chapter 5

# Generating Giryama

In this chapter I will show how the behavior of Giryama tones can be derived within the framework of Optimality Theory (OT) and what theoretical implications this system seems to have. Since, as I have shown, the domain abstraction seems to be extremely well suited for the Giryama facts, I will mostly follow the details of Optimal Domains Theory (ODT). However, I will introduce some modifications to the theory, primarily as a response to an alternative proposal recently published by John McCarthy. I will also sketch out what I believe to be an inherent problem in the model of Optimality Theory, on which I expand in appendix (?).

### 5.1 Theoretical background

#### 5.1.1 Optimality, domains and spans

The present discussion assumes a general acquaintance with Optimality Theory (Prince and Smolensky 2004). My starting point will be Optimal Domains Theory (ODT), as presented in (Cassimjee and Kisseberth 1998). In the first part of this work, I have already discussed the notion of domains and its usefulness in describing Giryama tonology; ODT is a combination of domains as a representation of phonological features (in this case, tone) with OT. It sets up the constraints and framework for working with domains. As I explained, the biggest strength of the domain abstraction in describing a language like Giryama is the ability of a feature not to be expressed on all elements in the domain (in our case, a tone does not have to surface on all TBUs in its domain). In effect, this doubles the expressive power of each feature: it can surface in one location, yet still affect other tones in another location, just like Giryama tones.

However, one main issue in the description of phenomena like tone spreading and tone shift in OT is how to explain the actual change: in domain terms, the question is what are the constraints that drive domain extension? Since these processes produce an output different from the input, what is it that makes output forms with a large domain “better”? Or as (McCarthy 2004) puts it, “what is this pro-spreading markedness constraint?” Several approaches have been suggested in the literature. Some analyses (Baković 2000; Eisner 2000; Pulleyblank 2007) suggest that it is basically local assimilation; such an approach might be suitable for tone spreading, as well as many harmony systems, but it is certainly not applicable to a tone shifting language like Giryama.

An approach which does work is that in (Cassimjee and Kisseberth 1998), which utilizes the familiar set of OT alignment constraints. In ODT, there are two competing families of alignment constraints: a set of faithfulness constraints termed “Basic Alignment”, which require that a feature domain contain only and exactly its sponsor (underlying location of the tone, in our case), and a set of markedness constraints that require that the edges of a domain be aligned with the edges of the appropriate prosodic category — in Giryama, this would be the intonational phrase. There are also minimality constraints to account for languages in which domains expand by exactly one element, but those are irrelevant here.

### **McCarthy’s alternative**

Now, while the approach of “spreading as alignment” certainly works, (McCarthy 2004) presents some convincing arguments against it. I will not repeat the full argumentation here, but the paper points out that such an approach would predict the existence of unattested system types, ones in which harmony or tonal processes drive the addition or deletion of segmental material. Feature Spans, which are McCarthy’s suggested alternative, are largely reminiscent of domains with two crucial differences.

First of all, spans are related to a binary feature such as  $[\pm\text{nasal}]$ : a span of  $[\text{+nasal}]$  segments and a span of  $[\text{-nasal}]$  segments are the same type of object (unlike domains which are taken to represent privative features, as is High tone in Giryama and many other Bantu languages). This, in turn, enables McCarthy to require that every prosodic constituent (e.g. the word) be exhaustively parsed into spans: while this would be almost meaningless for a privative feature domain, it basically divides a word into “runs” of segments which share a feature value, e.g.  $[\text{+nasal}]$  spans alternating with  $[\text{-nasal}]$  spans.

But the crucial difference in McCarthy’s approach is the force that drives spreading or span expansion: in Span Theory (henceforth ST), it is not alignment with the edges but *the need to minimize the number of spans*. Since the word is exhaustively parsed into spans, less spans equals less feature value alternations, which means longer spans. In essence, instead of requiring that spans reach a certain “target”, Span Theory requires them to be as few, and therefore as wide as possible. This, in my view, is the crux and biggest “selling point” of Span Theory.

### **The problem with spans**

While McCarthy’s approach has its advantages, it is not applicable to a language like *Giryama* in its original form, simply because it requires that the feature be expressed on all elements in a domain. (Key 2006) recognizes this and tries to remedy the situation. However, his solution seems to work only for one-place High Shift (in ODT, binary domains), which is still not enough. But even within that typology, the insistence on exhaustively parsing a prosodic constituent into spans requires that High Spans be complemented by something like Low (or [-High]) Spans: not only is this cumbersome, since we would have to explain where all the supposed Low tones have gone (consider *Giryama* intermediate pitch), but I find it less than elegant, to say the least. It is perfectly acceptable to say that every oral segment can be in a [-nasal] span; but not so much that every mora not specified for a High tone is in a [Low] span. As far as I know, there has always been good reason to assume the existence of underlying toneless TBUs.

### **My suggestion**

As we can see, domains are still the most versatile tool for describing the types of behavior we encounter in Bantu tonology. But spreading as alignment does has its flaws. I suggest a hybrid explanation, which I believe reflects the spirit of McCarthy’s proposal, and is in fact cited by McCarthy as a non-violable principle: that the constraint driving unbounded domain expansion is one requiring all TBUs to be in a domain. In our case, this amounts to a constraint requiring that every TBU in the intonational phrase be part of a High domain. This constraint, like all constraints, is violable, and will indeed usually be violated in *Giryama* by the final TBU, depressor-initial TBUs and any toneless morphemes in the beginning of a phrase; but it will drive domain expansion when possible. This is, in a sense, an extension of both ODT and Span Theory. I will call this constraint EXH(austive)DOM(ains).



- EXHDOM (X, F)

Assign a violation mark for every element (TBU) in X (Intonational Phrase) which is not in an F-domain (High).

As we can immediately see, all we need to get Span Theory in its original form is to rank EXHDOM above all other constraints. If it is ranked low enough to be violated, we can maintain the view that at least some features are privative. In my view, this also mirrors the fact that tonal processes show types of behavior which are not found in harmony systems.

### 5.1.2 Getting directionality

Another basic question is how to derive directionality. In other words, we have a constraint requiring that domains grow, now how do we get them to grow only to one side? This was a non-issue for the alignment approach of ODT, since there are different constraints for aligning the left and right edges with the sponsor, so that when for example “Basic Alignment Right” is ranked low enough, domains could spread to the right. For Span Theory there is no such solution, and McCarthy proposes a family of constraints requiring that the element which determines the feature of the span (“head” in Span Theory, “sponsor” in ODT) be the leftmost (rightmost) element of the span: if a span extends in the “wrong” direction, that would incur a violation. Such an approach would work for the usual patterns of Bantu tone, but not for Giryama, where it would prevent the systematic domain overlap in certain environments.

The ODT approach would work, but it does use alignment, which has been recently criticized as an admissible constraint (in general) in (McCarthy 2003), that makes the strong claim that no constraint should be allowed to count the distance an element (here, the domain edges) has moved, but at most to count elements violating it. Luckily for us, the facts of Giryama can be derived without this property, and so I shall modify ODT’s “Basic Alignment” slightly (although I cannot prove that the counting versions might not still be required in the general case). Another issue of minor importance is that my underlying representations have domains (unlike ODT and ST, which only have “sponsors”); “Basic Alignment”, then, can do with nothing more than simple and direct I-O faithfulness.

- EF-L/R (EDGEFAITHFULNESS-L/R)

Assign a violation mark for every left (right) edge of a domain that does not remain in place.

### 5.1.3 Getting surface Highs

In addition to the constraints explained above, several other constraints are defined in (Cassimjee and Kisseberth 1998) in order to get (and suppress) the realization of surface High tones. These are the following two constraints:

- EXPRESS (F)

Every TBU in an F Domain must have the feature F (High).

- \*(H, NONHEAD)

Every TBU in a High Domain other than the head must *not* be pronounced High.

These two constraints give us the two basic tonal processes: if EXPRESS is ranked above \*(H, NONHEAD) we will get Tone Spread, and in the other case we will get Tone Shift (as in Giriyama). However, the switch I have made from alignment to “exhaustive coverage” as the force driving domain expansion requires me to add a third constraint which may seem redundant at first (the technical details of why this is so follow):

- (H, HEAD)

The head TBU in a High domain must be pronounced High.

#### Why the extra constraint

##### Notes:

- In all of the following tableaux,  $\Rightarrow$  identifies the actual output (surface form). Where used, the symbol  $\otimes$  indicates an incorrectly predicted output. All other candidates are numbered.
- This discussion is sketchy and somewhat technical; for obvious reasons, I cannot go into full detail as I have not yet discussed the data.

The constraint (H, HEAD) seems to be nothing more than \*(H, NONHEAD)  $\gg$  EXPRESS, but it isn't, and Giriyama provides a proof. In a tone shifting language like Giriyama, my new pro-expansion markedness constraint EXHDOM has to outrank EXPRESS in order for High Shift to ever occur. The reason for this is that, the wider a domain is, the more violations of EXPRESS it contains (every non-head TBU). Tableau 5.1 demonstrates the importance of this ranking.

/a-na-sumurir-a/	EXHDOM	EXPRESS	EF-R
☞ (a-na-sumur <sup>ǎ</sup> )ra	*	****	*
a. (a-na-sumú)rira	**!	***	*
b. (a-na-sú)murira	**!*	**	*
c. (a-ná)-sumurira	**!**	*	*
d. (á)-na-sumurira	**!***		

Tableau 5.1: Why EXHDOM  $\gg$  EXPRESS

If we were to rank EXPRESS above EXHDOM, candidate *d* (\*á-na-sumurira) would have won. So a shifting language must rank EXHDOM  $\gg$  EXPRESS, EF-R. But Giryama also has another feature, and that is depressor behavior. Now, I won't go into exactly how depressors “work” just yet, but there must be some markedness constraint, call it DEPRESS for now, that can restrict a High Shift. This obviously means that DEPRESS  $\gg$  EXHDOM. So we get DEPRESS  $\gg$  EXHDOM  $\gg$  EXPRESS, and this is the “catch”: consider what would happen to a word like *si-fumágìrè* ‘I did not shoot with an arrow’, shown in tableau 5.2. As we can see, we need another constraint to force the High to surface or a better solution would be to delete the High and get \*(si-fumagi)(re). The natural constraint for the job is (H,HEAD), which is in itself rather well-motivated; after all, that is the entire reason of the head<sup>1</sup>.

/si-fumagire/	???	DEPRESS	EXHDOM	EXPRESS
☞ (si-fumá)gì(re)			*	***
(si-fumagî)(re)		*!		****
☠ (si-fumagi)(re)	?			*****

Tableau 5.2: Why we need (H,HEAD)

In a shifting language like Giryama, (H,HEAD) and \*(H,NONHEAD) are ranked very high and EXPRESS is ranked very low.

#### 5.1.4 More faithfulness

Additional faithfulness constraints are defined in (Cassimjee and Kisseberth 1998) and repeated below. I have slightly adapted them from the original which does not have underlying domains. Their rationale is that a derivation should not exclude, join, add or delete domains, and many of them have effects in Giryama, as we shall see.

<sup>1</sup>There could, of course, be other viable constraints, e.g. “every domain must have a surface High”.

- INCORPORATE

Assign a violation mark for every TBU in an underlying domain which is not in a surface domain.

- DOM(AIN)COR(REPONDENCE)

There must be a one-to-one correspondence between input and output domains.

- UNIQUENESS

A surface domain can have a non-empty intersection with at most one underlying domain.

There is also another faithfulness constraint, quite low-ranked in Giryama, which can be claimed to have an effect in some languages:

- MAXHIGH

Assign a violation mark for any TBU in an underlying High domain (“sponsor”) that is not High in the surface form.

## 5.2 Derivations and rankings

Having set the ground, let us now turn to the actual points of Giryama tonology. In the following derivations, I will not deal with showing how penult lengthening works (being the simplest and most common stress system); rather I will simply transcribe it when relevant. More importantly, I will not discuss the reason that a High penult surfaces as falling before a hidden tone.

### 5.2.1 The starting point: High Shift

The most basic fact we need to account for is the movement of a single High tone from its underlying location to the penult, for example in the 3rd. person present tense of Low verbs, or the 1st. person present tense of High verbs. As I mentioned, the constraint driving the movement is EXHDOM “cover all TBUs”. We also need a constraint to prevent the final mora from surfacing as High, or what I have referred to as non-finality. As discussed in (Cassimjee and Kisseberth 1998), non-finality has different effects in Bantu languages, requiring different constraints. Here are (some of) the basic constraints:

- \*(H,FIN) (NOHIGHONFINAL)

The final TBU (of an intonational phrase) must not be pronounced High.

- NOGROWFIN

A domain must not expand to include the final TBU.

- EXCFIN (EXCLUDEFINAL)

The final TBU must not be in a High domain.

\* $(H,FIN)$  is the most direct generalization of the facts of *Giryama*. EXCLUDEFINAL is a stronger requirement, which, when ranked high enough, could eliminate underlying final sponsors, which is not what happens. What we need is NOGROWFIN, which bars domains from getting to the final TBU, but doesn't affect domains that start out there<sup>2</sup>. Both \* $(H,FIN)$  and NOGROWFIN are undominated in *Giryama*. Tableau 5.3 shows how High Shift works, and tableau 5.4 shows why a hidden High tone remains hidden. Another point demonstrated in these tableaux is the power of EF-L to stop leftward spreading.

/ni-na-f̥inikira/	NOGRWF <sub>FIN</sub>	EF-L	* $(H,NOHD)$	EXHDOM	$(H,HD)$	EXPRESS	EF-R
☞ ni-na-(f̥inik̥)ra				***		**	*
a. ni-na-(f̥inikirá)	*!			**		***	*
b. ni-na-(f̥inikira)	*!			**	*	****	*
c. ni-na-(f̥iníkí)ra			*!*	***			*
d. ni-na-(f̥í)nikira				****!*			
e. ni-(na-f̥inik̥)ra		*!		**		***	*
f. (ni-na-f̥inik̥)ra		*!		*		****	*

Tableau 5.3: ni-na-f̥inik̥ira ‘I am covering’

/vi-tsukizi/	INCORP	EF-L	* $(H,FIN)$	* $(H,NONHD)$	EXHDOM	$(H,HD)$	MAXHIGH
☞ vi-(tsukizi)					*	*	*
a. vi-(tsukizí)			*!		*		*
b. vi-(tsuk̥izi)				*!	*	*	*
c. vi-(tsúkízi)			*!*		*	*	
d. vi-(tsuk̥)zi	*!				**		*
e. (vi-tsukizi)		*!				*	*

Tableau 5.4: vi-tsukizi ‘crossness’

<sup>2</sup>On a theoretical note, NOGROWFIN can be directly defined withing the “comparative markedness” framework of (McCarthy 2002) as EXCFIN<sub>N</sub>, a “new violation” of EXCLUDEFINAL.

So far we have demonstrated the following rankings:

- INCORPORATE, NOGROWFIN, EF-L, \*(H, NONHEAD) and \*(H, FIN) are undominated.
- \*(H, FIN)  $\gg$  (H, HEAD) (for hidden tones)
- EXPRESS, EF-R and MAXHIGH are ranked lower.

### 5.2.2 Domain boundaries

Having derived the most basic fact of Giryama tonology (single High Shift), let us consider now the force that stops this movement. We have already seen the reason High domains in Giryama expand, and that is EXHDOM, or more precisely the fact that it outranks EF-R and EXPRESS. That does not suffice to make expansion stop where it does, as tableau 5.5 shows. What we need is EF-L which prevents the left edge of the right domain from moving in either direction.

**Note:** I am assuming throughout this work that domain boundaries may never overlap. In other words, a surface representation like (cvcv[cv]cv)cv is never a valid candidate output from GEN. I will discuss cases of apparent overlap in the next section.

/ǰ-na-tsuha ma-neǰno/	EF-L	EXHDOM	EXPRESS	EF-R	MAXHIGH
ǰ (a-na-tsuha má)(neǰé)no		*	*****	**	**
a. (a-na-tsuhá) ma(neǰé)no		**!	****	**	**
b. (a-na-tsú)ha ma(neǰé)no		***!	***	**	**
c. (a-na-tsuhá) (maneǰé)no	*!	*	*****	**	**
d. (á)-(na-tsuha maneǰé)no	*!	*	*****	*	*
e. (a-na-tsuha mané)(ǰé)no	*!	*	*****	*	*

Tableau 5.5: ǰ-na-tsuha má-nǰé:ǰno ‘(s)he is shouting from a distance’

### 5.2.3 Sponsor overlap

Let us now turn to the cases in which a systematic violation of “no domain overlap” seems to occur. Recall that these are associated with certain morphemes, namely the present tense marker na-, the copula nǰ- and the reflexive morpheme dzi- — I shall call them “pusher morphemes”, for lack of a better term. The constraints we have seen thus far are not enough to drive this.

Before I discuss the constraints behind “pushing”, I would like to show why certain constraints cannot be the cause in Giryama. One such constraint might be \*MONOHD: the underlying High

tone on the copula or the reflexive morpheme might be constrained to require a bimoraic domain; this might force the High tone from the copula  $n\grave{i}$  to shift. But this explanation soon disintegrates when we consider the present tense marker  $na-$  which has no underlying High; in verb forms like  $\underline{a}\text{-}na\text{-}k\grave{a}na^{\acute{i}}za$  ‘(s)he is denying’ the first High domain covers three morae, or in other words not expanding ( $*\underline{a}\text{-}n\acute{a}\text{-}k\grave{a}na^{\acute{i}}za$ ) would still satisfy  $*MONOHD$ .

A constraint which seems to be the perfect candidate is  $MAXHIGH$  (a sponsor must be High), since all cases of overlap result in a sponsor getting a surface High; in a language where  $MAXHIGH$  is ranked high enough we would predict a consistent one-mora overlap or “attraction to stem”<sup>3</sup>, but that is not the case in Giryama. Even if we were to rank  $MAXHIGH \gg EF-L$  locally (near the “pusher”), that would mean  $MAXHIGH$  has the power to “pull” a domain into overlapping; and that would not be an appropriate description of the perfect tense overlap (§3.3). I will not present at this point a complete discussion of the flaw in OT which requires this apparatus; the interested reader is referred to appendix B.

The constraint allowing domain overlap when it occurs must work in the other direction, by assigning violation marks to a domain that hasn’t gone past the “pusher morpheme”. I suggest the following constraint, which is reminiscent of depressors, and which explains the effect of “pushers” as a rejection of a High tone:

- $*(H,PUSH)$

A “pusher morpheme” must not be the head of High domain.

$*(H,PUSH)$  will be ranked below  $EXHDOM$ , so as not to “push” domains to the left. It will be ranked *locally* above  $EF-L$  (and  $UNIQUENESS$ ). Exactly what this means can be defined in several ways, and Giryama cannot help us decide which is best. For the present discussion, I shall leave the details somewhat vague and assume that a candidate with a violation of  $EF-L$  is considered more harmonious than one with a  $*(H,PUSH)$  on the previous mora. See appendix §B for a more detailed discussion of the reasons and alternatives.

To reduce ambiguity in the tableaux, I will refer to the locally violable  $EF-L$  as  $EF-L_L$  and to other violations as  $EF-L_G$ . Tableaux 5.6 and 5.7 illustrate how the interaction of these constrains describes “pusher” behavior. (Note: if I were to adhere strictly to one of the alternatives suggested for locality in OT, simply re-ranking  $EF-L$  might be too weak for the facts; this is meant to be a sketch of the solution rather than a full-fledged one).

<sup>3</sup>Which does seem to happen in some languages (C. Kisseberth, personal communication).

/a-na-kánaiza/	EF-L <sub>G</sub>	(H,HEAD)	EXHDOM	*(H,PUSH)	EF-L <sub>L</sub>
☞ (a-na-ká)(na <sup>í</sup> )za			*		*
a. (a-ná)-(kana <sup>í</sup> )za			*	*!	
b. (á)-na-(kana <sup>í</sup> )za			**!		
c. (á)-(na-kana <sup>í</sup> )za	*!		*		
d. (a-na-kaná)( <sup>í</sup> )za	*!		*		
e. (a-na-ká)na( <sup>í</sup> )za			**!		*
f. (a-na-ká)(n <sup>á</sup> )iza			**!		*
g. (a-na)-(kana <sup>í</sup> )za		*!	*		

Tableau 5.6: a-na-kána<sup>í</sup>za ‘(s)he is denying’

/ni-na-kánaiza/	EF-L <sub>G</sub>	EXHDOM	*(H,PUSH)	EF-L <sub>L</sub>
☞ ni-na-(kana <sup>í</sup> )za		***		
a. (ni-na-kana <sup>í</sup> )za	*!	*		
b. ni-(na-kana <sup>í</sup> )za	*!	****		
c. ni-(na-ká)naiza	*!	****		
d. ni-na-(ká)naiza		****!*		

Tableau 5.7: ni-na-kána<sup>í</sup>za ‘I am denying’

Having dealt with the effects of “pusher morphemes” in Giryama, we can look at depressors.

### 5.2.4 Depressors

The most obvious generalization for the interaction of tones and depressor consonants in Giryama is \*DH listed below. (Note the symmetry with the “pusher” constraint discussed above).

- \*DH (or \*D<sup>V</sup>; might also be D<sup>V</sup>)

The TBU immediately following a depressor consonant must not be High.

I believe that \*DH is a particularly well motivated constraint, since it is a direct generalization of a cross-linguistic phonetic relation between voicing and low pitch, apparent even in languages like English (House and Fairbanks 1953), although the range of depressor effects in Bantu languages might in fact require additional constraints.

If a constraint such as \*DH is ranked high enough, it may prevent High tones from ever surfacing on a depressor, which is clearly not the case in Giryama; \*DH must be ranked high in Giryama, but not too high. It should be ranked above EXHDOM, the constraint driving High Shift,



for the simple reason that it overrides it whenever possible. However, this brings us once again to the issue of repairs and their representation in OT (§5.2.3, §B). The simple generalization is that a violation of \*DH can only be remedied by restricting High Shift (which normally amounts to a violation of EXHDOM). I will not repeat the discussion here, but in classic OT, simply ranking \*DH high would falsely predict ruling out the correct form  $(\acute{a})-(dz\acute{a})-vi-(ka\check{a})\eta ga$  in favor of the incorrect  $*(\acute{a})-(dz\grave{a}-vi-k\acute{a})(l\acute{a})\eta ga$ . (Note that the “locality” approach I have chosen for the effect of “pushers” will not salvage this incorrect prediction).

In light of this, and in the lack of an established theory for the representation of repairs in OT, we need a constraint that would be violated only when a High tone advances to surface on a depressor, and not when the depressor is the sponsor. This is actually easy to define using \*DH; either in Comparative Markedness theory (McCarthy 2002) as a “new” violation of \*DH, or using the oft-cited mechanism of Local Constraint Conjunction (Smolensky 1995):

- NOGROWDEP := \*DH&EF-R

Assign a violation mark to every TBU violating \*DH as well as EF-R (no movement of the right edge).

### Restricting High Shift

The basic thing that depressors “do”, of course, is to restrict High Shift from reaching a depressed TBU. Tableau 5.8 shows this in action. Note how the high-ranking EF-L prevents a depressor from “attracting” a following domain to satisfy EXHDOM or causing overlap.

/ <u>a</u> -na-piga tʃere/	EF-L	NOGROWDEP	EXHDOM	*(H,PUSH)
☞ (a-na-pí)gà (tʃě)re			**	
a. (a-na-pigá) (tʃ <sup>l</sup> é)re		*!	*	
b. (a-na-piga tʃé)( <sup>l</sup> é)re	*!		*	
c. (a-na-pí)(gà tʃ <sup>l</sup> é)re	*!		*	
d. a-na-(pí)gà (tʃě)re	*!		****	
e. (a-ná)-pigà (tʃě)re			***!	*

Tableau 5.8: a-na-píga tʃěre ‘(s)he is cutting a slice’

### Preventing overlap

To further learn where NOGROWDEP is ranked in the hierarchy, we need to look at a case where a depressor not only restricts High Shift, but at the same time directly counteracts a “pusher morpheme”. Tableau 5.9 shows this at work, and tableau tableau 5.10 shows why the copula may not “push” a High beyond a depressor-initial noun class prefix (candidate *c*).

/ǎ-na-bǎmbahula/	EF-L <sub>G</sub>	NOGROWDEP	EXHDOM	*(H,PUSH)	EF-L <sub>L</sub>
☞ (a-ná)-(bǎmbahǔ)la			*	*	
a. (a-na-bá)(mbah <sup>↑</sup> ú)la		*!	*		*
b. (á)-na-(bǎmbahǔ)la			**!		
c. (á)-(na-bǎmbahǔ)la	*!		*		
d. (a-na-bambá)(h <sup>↑</sup> ú)la	*!		*		

Tableau 5.9: ǎ-ná-bǎmbahǔla ‘(s)he is wrenching apart’

/nǐ vi-fǐnikiro/	EF-L <sub>G</sub>	NOGROWDEP	EXHDOM	*(H,PUSH)
☞ (ní) vǐ(finikǐ)ro			**	*
a. (ni ví)(finik <sup>↑</sup> í)ro		*!	*	
b. (ní) (vǐfinikǐ)ro	*!		*	*
c. (ni vífí)(nik <sup>↑</sup> í)ro	*!		*	
d. (ni vífiní)(k <sup>↑</sup> í)ro	*!		*	

Tableau 5.10: nǐ vǐ-fǐnikiro ‘those are lids’

As we might have expected, ranking NOGROWDEP  $\gg$  EXHDOM  $\gg$  \*(H,PUSH) allows depressors, whether on the stem or not, to prevent the “pusher” effect. In the next section, we will examine the more delicate situation of the perfect tense.

### 5.2.5 The perfect tense

The perfect tense (§3.3) offers a somewhat more complex interaction of constraints, including violations of \*DH, as well is overlap that is not caused by a “pusher morpheme”. In this section I will see how the proposed system of constraints does in explaining the facts.

#### The normal pattern

Let us first recall the “normal” facts of this tense: the tense marker dza- has an underlying High which surfaces on the penult of low stems, and in High stems it normally cannot overlap the stem

boundary. Tableau 5.11 demonstrates that the perfect tense marker is not a “pusher” morpheme (as well is the importance of NOGROWDEP), and tableau 5.12 proves that it is indeed the stem High that keeps the perfect tense marker from moving.

/hu-dz̄a-r̄irikana/	EF-L <sub>G</sub>	(H,HEAD)	NOGROWDEP	EXHDOM	*DH
☞ hu-(dzá)-(ririk <sup>↓</sup> á)na				**	*
a. hu-(dza-rí)(rik <sup>↓</sup> á)na	*!			**	
b. hu-(dza-rirí)(k <sup>↓</sup> á)na	*!*			**	
c. hu-(dza)-(ririk <sup>↓</sup> á)na		*!		**	

Tableau 5.11: hu-dz̄a-r̄irik<sup>↓</sup>ána ‘we have considered’

/ni-dz̄a-ki-tsukula/	EF-L <sub>G</sub>	EXHDOM	*DH
☞ ni-(dza-kí)-(tsuk <sup>↓</sup> ú)la		**	
a. ni-(dzá)-ki-(tsuk <sup>↓</sup> ú)la		***!	*
b. ni-(dza-ki-tsú)(k <sup>↓</sup> ú)la	*!	**	
c. ni-(dza-kí)-(ts <sup>↓</sup> ú)kula		***!	
d. (ni-dza-kí)-(tsuk <sup>↓</sup> ú)la	*!	*	

Tableau 5.12: ni-dz̄a-ki-tsuk<sup>↓</sup>úla ‘I have carried [cl. 7]’

### The odd pattern

As the two tableaux show us, the ranking we already have in place predicts the normal state of affairs in the perfect tense. But this tense has a complication: sometimes domain overlap does occur. For this we will need to introduce an additional constraint. Here are some OCP-related constraints (not all of which are visible in Giryama), in order of strength:

- \*(\*) (Assign a violation mark to every pair of adjacent High domains.
- \*HH Assign a violation mark to every pair of High tones on two consecutive TBUs.
- \*(HH,V) Assign a violation mark to every (long) vowel with two High tones.

The constraint that drives overlap in the perfect tense is \*HH; however, \*HH is routinely violated in Giryama in other contexts without resulting in overlap, and so must by itself be low ranked (though admittedly such cases are hard to come by, and my data may not provide the full picture). What seems to set the perfect tense violation apart is the depressor, and so I shall use another local conjunction to express the special circumstances formed in these verbs:

- \*HH&\*DH

Assign a violation mark to any TBU violating \*HH and \*DH (a  $\acute{V}D^{\acute{V}}$  sequence)<sup>4</sup>.

The crucial point here is that, just like the “pusher” constraint \*(H,PUSH) above, \*HH&\*DH needs to be locally ranked above EF-L. Consider the data in tableau 5.13.

/ǎ-dzǎ-tsubkula/	EF-L <sub>G</sub>	(H,HEAD)	*HH&*DH	EF-L <sub>L</sub>
☞ (ǎ)-(dzǎ-tsub)(kubú)la				*
a. (ǎ)-(dz <sup>1</sup> ǎ)-(tsukubú)la			*	
b. (ǎ)-(dzǎ-tsubú)( <sup>1</sup> ú)la	*!			
c. (ǎ-dzǎ)-(ts <sup>1</sup> ú)(kubú)la	*!*			
d. (ǎ)-(dzǎ)-(tsukubú)la		*!		

Tableau 5.13: ǎ-dzǎ-tsub<sup>1</sup>ú:la ‘(s)he has carried’

As this tableau demonstrates, \*HH&\*DH is ranked just high enough to cause overlap. It is still not ranked high enough to create an overlap on a depressor — see tableaux 5.14 and 5.15.

/ǎ-dzǎ-dengereka/	EF-L <sub>G</sub>	NOGROWDEP	*HH&*DH	EF-L <sub>L</sub>	*DH
☞ (ǎ)-(dz <sup>1</sup> ǎ)-(dengerě)ka			*		*
a. (ǎ)-(dzǎ-dé)(nger <sup>1</sup> é)ka		*		*	*
b. (ǎ)-(dzǎ-dengeré)(r <sup>1</sup> é)ka	*!				

Tableau 5.14: ǎ-dz<sup>1</sup>ǎ-dengerěka ‘(s)he has turned round’

/ǎ-dzǎ-vi-kalǎnga/	EF-L <sub>G</sub>	NOGROWDEP	EXHDOM	*HH&*DH
☞ (ǎ)-(dz <sup>1</sup> ǎ)-vi-(kalǎ)nga			**	*
a. (ǎ)-(dzǎ-ví)-(kal <sup>1</sup> ǎ)nga		*!	*	
b. (ǎ)-(dzǎ-vi-ká)( <sup>1</sup> ǎ)nga	*!		*	

Tableau 5.15: ǎ-dz<sup>1</sup>ǎ-vi-kalǎnga ‘(s)he has fried [cl. 8]’

### The odder pattern

Now that we’ve allowed a High SP in the perfect to cause overlap, we need to explain the last feature of the perfect tense saga: this overlap is not possible on bisyllabic stems. Since the only thing that would make overlap in that case “worse” is the fact that both Highs would surface on

<sup>4</sup>Perhaps a better name for this constraint might be “no downstep on a depressor”, which hints at its basic phonetic and perceptual motivation.

one vowel, we can provide a ranking for another OCP-type constraint mentioned above,  $*(HH, V)$ . Tableau 5.16 shows this. Remember, though, that  $*(HH, V)$  is routinely violated after “pusher morphemes”, for example in the 3sg. present tense of bisyllabic stems. Tableau 5.17 demonstrates this can be explained by ranking the “pusher” constraints above  $*(HH, V)$ .

/ǎ-dzǎ-fǒma/	NOGROWFIN	EXHDOM	*(HH, V)	*HH&*DH	EF-L <sub>L</sub>	*DH
☞ (ǎ)-(dz <sup>+</sup> ǎ)-(fǒ <sup>+</sup> ó)ma		*		*		*
a. (ǎ)-(dzǎ-fǒ)( <sup>+</sup> ó)ma		*	*!		*	
b. (ǎ)-(dzǎ-fǒó)(ma)	*!					

Tableau 5.16: ǎ-dz<sup>+</sup>ǎ-f<sup>+</sup>ǒ:ma ‘(s)he has dreamed’

/ǎ-na-fǒma/	EF-L <sub>G</sub>	EXHDOM	*(H, PUSH)	*(HH, V)	EF-L <sub>L</sub>
☞ (ǎ-na-fǒ)( <sup>+</sup> ó)ma		*		*	*
a. (ǎ-nǎ)-(fǒ <sup>+</sup> ó)ma		*	*!		
b. (ǎ)-na-(fǒ <sup>+</sup> ó)ma		**!			
c. (ǎ-na-fǒó)(ma)	*!	*			
d. (ǎ)-(na-fǒ <sup>+</sup> ó)ma	*!	*			

Tableau 5.17: ǎ-na-fǒ:ma ‘(s)he is dreaming’

### 5.2.6 Additional cases

The above discussion covers the basic facts of Giryama tonology, which have led to some nontrivial theoretical implications. In this section I will outline briefly how one would treat some points which I do not have sufficient data to consider proven generalizations.

#### Negative past

Recall that in the negative past tense (§3.5), the normal pattern is a falling penult, e.g. *sǐ-fonon-êrē*, which I have taken as the sign of an underlying final High. When the penult has a depressor, this High will be pushed back as in *sǐ-fumág-ìrē*. The surprising fact is that this can happen only once; a depressor on the antepenult never pushes the depressor back: *sǐ-marígíz-ìrē*.

One possible generalization for these facts, which I haven’t been able to disprove, is that depressors can in general push back by only one TBU. How do we derive this in OT? Well, recall the “push back” constraint I have been using, NOGROWDEP. We could refine this constraint even

further and make it  $\text{NOGROWDEP}' := \text{NOGROWDEP} \& *$ ). Such a constraint would only penalize  $\text{NOGROWDEP}$  at a domain boundary. The following tableau shows how this would work:

/sᵢ-marigizire/	NOGROWDEP'	EXHDOM	NOGROWDEP
☞ (si-marigí)zì(re)		*	*
a. (si-marigizî)(re)	*!		*
b. (si-mari)gìzi(re)		**!	

Tableau 5.18: sᵢ-marigí`zìre ‘I did not bring to an end’

### The movement of overt noun High

As I have mentioned, a High tone that appears on a noun in isolation does not seem to be able to advance beyond the prosodic word (although it is not static — it can surface on an adjective, for example). Such a phenomenon can have different functional and historical explanations, but any theory would need some way of representing that fact in synchronic grammar. Since these tones are moveable, one would want them to behave in the same way as all tones, with an additional constraint restricting their advance, something we might call  $\text{KEEPNOUNHIGH}$ . However, the data I have analyzed so far still leaves it unclear whether the movement of such tones is optional, binary or unrestricted within the prosodic word.

## 5.3 Summary

As I have shown in this chapter, Optimal Domains Theory can be successfully modified to accommodate for the critique raised in Span Theory. I also believe that a language like *Giryama* makes a very strong case for domains as a representational tool. However, it has proved impossible to get the full range of *Giryama* tonal phenomena within classic OT (a detailed demonstration of this appears in appendix B). While OT is a step forward in attempting to integrate *motivation* into phonological theory, I believe languages like *Giryama* show that it is undesirable to completely forego *derivation*.

A full list of the constraints and relative rankings appears in appendix A.

## Chapter 6

# Conclusions

The overview of Giriyama tonology presented in this paper should be viewed as just that: an overview. Often in linguistics, the deeper one digs, the more intriguing the facts become; my personal experience with Giriyama can definitely be described in this way. Without doubt, there is still a substantial amount of work to be done.

The first type of work is crucial, and consists of filling the descriptive gaps in my work. The most obvious example is that of phrasing: I have completely avoided the question of how phonological phrases are defined in Giriyama. Trivial syntactic generalizations like maximal projections don't seem to hold, but phrases are almost doubtlessly connected to syntactic structure. Identifying those links would be very interesting, typologically and theoretically. On the phonological/phonetic side of the picture, I have also not gone in any detail into the questions of the realization of High tones on long vowels (rising vs. falling tones) and on the issue of what I called "intermediate pitch". In my opinion, both of these subjects should not be trivially dismissed (by the phonologist) as "phonetic", but should be studied.

On the theoretical side, I believe there is no doubt that Giriyama provides definite proof for the problems of classic OT. This is especially intriguing since Giriyama doesn't seem to exhibit the types of behavior usually given as a problem for OT (opacity), and is in fact easier to understand as the interaction of competing motivations than in a derivational model. Another major issue is how tones should be represented in phonological theory. The combination of High Shift, depressors and variation between overlap and the lack thereof make Giriyama an excellent "benchmark" for any theory of tone. Needless to say, my own proposal for the modification of Optimal Domain Theory needs to be considered in the light of cross-linguistic data.

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# Appendix A

## Constraints

### A.1 Constraint catalog

Following is a list of all OT constraints used in chapter 5. For each constraint, I provide a short definition, the page on which it is originally defined, and a few notes when relevant.

- *\**( [p. 67]

Assign a violation mark to every pair of adjacent High domains.

*A strong OCP constraint; not active in Giryama.*

- *\*DH* [p. 64]

The TBU immediately following a depressor consonant must not be High.

*The “naïve” depressor constraint.*

- *DOMCOR* (*DOMAINCORRESPONDENCE*) [p. 60]

There must be a one-to-one correspondence between input and output domains.

*An ODT constraint.*

- *EF-L/R* (*EDGEFAITHFULNESS-L/R*) [p. 57]

Assign a violation mark for every left (right) edge of a domain that does not remain in place (i.e. is not “faithful” to the input).

*This constraint gives us directionality.*

- EXCFIN (EXCLUDEFINAL) [p. 61]

The final TBU must not be in a High domain.

*One of the basic non-finality constraints*

- EXHDOM (EXHAUSTIVEDOMAINS) [p. 56]

Assign a violation mark for every element (TBU) in X (Intonational Phrase) which is not in an F-domain (High).

*This is my generalization of the key point of Span Theory.*

- EXPRESS [p. 58]

Every element (TBU) in an F (High) Domain must have the feature F (High).

*An ODT constraint.*

- \*(H,FIN) [p. 60]

The final TBU (of an intonational phrase) must not be pronounced High.

*One of the basic non-finality constraints*

- \*HH [p. 67]

Assign a violation mark to every pair of High tones on two consecutive TBUs.

*An OCP constraint; not active in Giryama.*

- \*(HH,V) [p. 67]

Assign a violation mark to every (long) vowel with two High tones.

*An OCP constraint.*

- (H,HEAD) [p.58]

The head TBU in a High domain must be pronounced High.

*Required addition to ODT due to change in spreading motivation.*

- \*(H,NONHEAD) [p. 58]

Every TBU in a High Domain other than the head must *not* be pronounced High.

*An ODT constraint.*

- \*(H,PUSH) [p. 63]

A “pusher morpheme” must not be the head of High domain.

*Drives overlap in the present tense and the copula.*

- INCORPORATE [p. 60]

Assign a violation mark for every TBU in an underlying (“sponsor”) domain which is not in a surface domain.

*An ODT constraint.*

- MAXHIGH [p. 60]

Assign a violation mark for any TBU in an underlying High domain (“sponsor”) that is not High in the surface form.

*Inactive in Giryama.*

- \*MONOHD [p. 62]

Domains must not include exactly one element (TBU).

*Motivation for binary domains; inactive in Giryama.*

- NOGROWDEP [p. 65]

Do not extend a High domain if that would result in a depressed High.

*A depressor constraint; defined using other constraints.*

- NOGROWFIN [p. 61]

A domain must not expand to include the final TBU.

*A non-finality constraint; can be defined using others.*

- UNIQUENESS [p. 60]

A surface domain can have a non-empty intersection with at most one underlying domain.

*An ODT constraint.*



## Appendix B

# Why (classic) OT is not enough

As I will show in this appendix, Optimality Theory as described in (Prince and Smolensky 2004) is not enough to derive the tonology of Giryama. Although the facts of the system seem perfectly natural to phrase as the interaction of constraints (see especially §4.12), the combination of depressor consonants with *optional* domain overlap is impossible (or at least, highly unnatural) to describe in OT without introducing some notion of repair or locality.

In working out my argument below, I will intentionally not make reference to any specific theory of how tones are represented and why they move (or fail to move); this is not an argument for or against Span Theory, Optimal Domains Theory, my own proposal, or any other view of tone, but rather against the weakness (or excessive strength) of classic OT architecture.

As I have mentioned, the fact that Giryama has depressor consonants and *optional* domain overlap is the crucial element; a language in which domain overlap is the standard, or one which lacks depressor consonants, can probably be represented in classic OT, but not so Giryama. My argument is most easily exemplified with the cases of overlap in the perfect tense (§3.3) but it can also be shown with the copula or the present tense.

Since all tones in Giryama move, I will not discuss the constraints driving this movement; assume there is some family of constraints that does this, and call the highest-ranking one SHIFT. In ODT, this would be an alignment constraint; in ST, the need to minimize the number of spans; in my own proposal, the desire to include all TBUs in a domain.

Let us first examine the word *hu-dzǎ-r̥rik<sup>↓</sup>ána* ‘we have considered’; notice the fact that the High tone from the tense marker doesn’t advance (just like most cases of domain contact in Giryama; the depressor on *dza-* is not the point). In OT, we would then have one or more constraints

that prevent this overlap from occurring: in ODT, these would be BASICALIGNMENT-L and/or UNIQUENESS. Whatever these constraints may be, let us refer to them (or the most highly ranked one) as NOOVERLAP. This is not to say that there aren't constraints that can promote overlap; they are just ranked below NOOVERLAP.

Now consider a word like  $\underline{\acute{a}}\text{-dz}\grave{\text{à}}\text{-r}\grave{\text{í}}\text{rik}^{\uparrow}\acute{\text{á}}\text{na}$  '(s)he has considered' where overlap does occur — the High tone from  $\text{dz}\grave{\text{a}}$ - surfaces on the stem. Again, phrasing this as generally as possible, some combination of constraints needs to rule out the alternative  $*\underline{\acute{a}}\text{-dz}^{\uparrow}\underline{\acute{a}}\text{-r}\grave{\text{í}}\text{rik}^{\uparrow}\acute{\text{á}}\text{na}$  and/or to promote this form; presumably this would include an OCP-type violation, but it might conceivably be specific to the perfect tense. Call the highest constraint of this type NOHPH (High-Perfect-High). What  $\underline{\acute{a}}\text{-dz}\grave{\text{à}}\text{-r}\grave{\text{í}}\text{rik}^{\uparrow}\acute{\text{á}}\text{na}$  shows us is that NOHPH  $\gg$  NOOVERLAP. (Again, the hypothetical DOOVERLAP might take a part here too). This is sketched in the following tableau<sup>1</sup>.

$/\underline{\acute{a}}\text{-dz}\grave{\text{a}}\text{-r}\grave{\text{í}}\text{rikana}/$	NOHPH	NOOVERLAP
$\Rightarrow$ $(\acute{\text{a}})\text{-}(\text{dz}\grave{\text{à}}\text{-r}\acute{\text{í}})(\text{rik}^{\uparrow}\acute{\text{á}})\text{na}$		*
<i>a.</i> $(\acute{\text{a}})\text{-}(\text{dz}^{\uparrow}\acute{\text{á}})\text{-}(\text{rik}^{\uparrow}\acute{\text{á}})\text{na}$	*!	

Tableau B.1:  $\text{hu-dz}\grave{\text{a}}\text{-r}\grave{\text{í}}\text{rik}^{\uparrow}\acute{\text{á}}\text{na}$  'we have considered'

But recall that this overlap is prevented when there is a depressor present, as in  $\underline{\acute{a}}\text{-dz}^{\uparrow}\underline{\acute{a}}\text{-d}\grave{\text{à}}\text{ng}\grave{\text{u}}\text{la}$  '(s)he has persevered'. There must be some other constrain — call it NOREACHDEP — which is preventing the High tone from shifting to a depressor. In other words, we must have the relative rankings NOREACHDEP  $\gg$  NOHPH  $\gg$  NOOVERLAP.

$/\underline{\acute{a}}\text{-dz}\grave{\text{a}}\text{-d}\grave{\text{à}}\text{ng}\grave{\text{u}}\text{la}/$	NOREACHDEP	NOHPH	NOOVERLAP
$\Rightarrow$ $(\acute{\text{a}})\text{-}(\text{dz}^{\uparrow}\acute{\text{á}})\text{-}(\text{d}\grave{\text{à}}\text{ng}\grave{\text{u}})\text{la}$		*	
<i>a.</i> $(\acute{\text{a}})\text{-}(\text{dz}\grave{\text{à}}\text{-d}\acute{\text{á}})(\text{ng}^{\uparrow}\acute{\text{ú}})\text{la}$	*!		*

Tableau B.2:  $\underline{\acute{a}}\text{-dz}^{\uparrow}\underline{\acute{a}}\text{-d}\grave{\text{à}}\text{ng}\grave{\text{u}}\text{la}$  '(s)he has persevered'

So far there we have not encountered a contradiction, and this ranking even predicts the correct facts if we add the class 7 object prefix  $\text{ki-}$ .

<sup>1</sup>The name NOHPH does not mean that this constraint has to be specific for the perfect tense; it can either be so or not in different theories, but this argument covers all options. The same goes for NOREACHDEP.



/ǎ-dzǎ-ki-kǎlǎŋga/	NOREACHDEP	NOHPH	NOOVERLAP
↪ ǎ-dzǎ-kí-kǎl <sup>+</sup> ǎŋga			
a. ǎ-dz <sup>+</sup> ǎ-ki-kǎl <sup>+</sup> ǎŋga		*!	
b. ǎ-dzǎ-ki-kǎl <sup>+</sup> ǎŋga			*!

Tableau B.3: ǎ-dzǎ-kí-kǎl<sup>+</sup>ǎŋga ‘(s)he has fried [cl. 7]’

/ǎ-dzǎ-ki-dǎŋgǔla/	NOREACHDEP	NOHPH	NOOVERLAP
↪ ǎ-dzǎ-kí-dǎŋgǔla			
a. ǎ-dz <sup>+</sup> ǎ-ki-dǎŋgǔla		*!	
b. ǎ-dzǎ-ki-dǎŋg <sup>+</sup> ǔla	*!		*

Tableau B.4: ǎ-dzǎ-kí-dǎŋgǔla ‘(s)he has persevered’

But notice what we get when we try to derive the same verb with the depressor-initial object prefix *vi-* (class 8). Figuratively speaking, NOHPH  $\gg$  NOOVERLAP means that we can “fix” a NOHPH violation by introducing a NOOVERLAP violation, so long as no higher-ranked constraint like NOREACHDEP is not affected to the worse.

/ǎ-dzǎ-vi-kǎlǎŋga/	NOREACHDEP	NOHPH	NOOVERLAP
↪ ǎ-dz <sup>+</sup> ǎ-vì-kǎlǎŋga		*	
a. ǎ-dzǎ-ví-kǎlǎŋga	*!		
☠ ǎ-dzǎ-vi-kǎl <sup>+</sup> ǎŋga			*

Tableau B.5: ǎ-dz<sup>+</sup>ǎ-vì-kǎlǎŋga predicted to be \*ǎ-dzǎ-vi-kǎl<sup>+</sup>ǎŋga

The ranking incorrectly predicts \*ǎ-dzǎ-vi-kǎlǎŋga to be the correct output; in other words, since the correct output has a violation of NOHPH, it is predicted to be resolvable by violating NOOVERLAP somewhere else (by allowing the High tone to advance even more). Where could we have gone wrong? In order to salvage the derivation, some constraint ranked above NOHPH should have been violated. Let us see what this constraint might be — it should be something that’s “wrong” with \*ǎ-dzǎ-vi-kǎl<sup>+</sup>ǎŋga, in which the High from *dzǎ-* advances onto the stem to avoid landing on the depressed *vi-*.

- There might be a constraint against shifting a High tone across two depressors.
  - ⇒ If such a constraint were ranked high in Giriyama, all depressor pairs would stop High Shift, which is clearly not the case, e.g.  $\underline{a}$ -na-zazigirika ‘(s)he is willing to play’.
- There must be constraints to stop the dz̥a- (or any) High from shifting.
  - ⇒ An example would be ODT’s BASICALIGNMENT-R; but no such constraint could be ranked very high in Giriyama, some tones shift quite freely, e.g. hu-dz̥a-zazigirika ‘we have been willing to play’.
- Maybe a constraint that’s “guarding” the left edge of the stem High.
  - ⇒ This can be ODT’s BASICALIGNMENT-L, UNIQUENESS or a number of other constraints. But whichever constraint one takes, it must be included in what I called NOOVERLAP, and so must be ranked lower than NOHPH.
- Perhaps NOHPH (which we have not defined) is still violated by \* $\underline{a}$ -dz̥a-vi-kál<sup>+</sup>án̄ga?
  - ⇒ Any reasonable definition of NOHPH that is violated by \* $\underline{a}$ -dz̥a-vi-kál<sup>+</sup>án̄ga should also be violated by the correct output  $\underline{a}$ -dz̥a-kí-kál<sup>+</sup>án̄ga.

Regarding this last statement, it is of course possible to imagine some way of penalizing both \* $\underline{a}$ -dz̥<sup>+</sup> $\underline{a}$ -kál<sup>+</sup>án̄ga and \* $\underline{a}$ -dz̥a-vi-kál<sup>+</sup>án̄ga but not  $\underline{a}$ -dz̥a-kál<sup>+</sup>án̄ga or  $\underline{a}$ -dz̥a-kí-kál<sup>+</sup>án̄ga. For example, we might start out with something like “adjacent sponsors must have exactly binary domains”, requiring that the High from dz̥a- shift by no more than one mora. If such a constraint were to exist, it would rule out the case of low stems like  $\underline{a}$ -dz̥a-zazigirika. Or we might consider a constraint against overlap after a depressor which does not have an underlying High; but such a constraint would be very hard to defend. It is technically possible to define constraints that work this way, but they are inevitably very contrived and offer no insight to the system. The reader is invited to try and come up with a convincing formulation.

I therefore conclude that it is impossible to use classic OT to describe Giriyama tonology. I believe that a theory would have to include derivations, or at the very least some notion of repairs, to be successful in the derivation of such a system. Several such modifications to OT have been suggested in the literature, including Targeted Constraints (Baković and Wilson 2000; Wilson 2006) and Candidate Chains (McCarthy 2006). The scope of this paper prevents me from discussing whether or how well these theories would fare for the Giriyama data.