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**The Phonology and Morphology of Zacatepec Eastern
Chatino**

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**The Phonology and Morphology of Zacatepec Eastern
Chatino**

by

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DISSERTATION

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The Phonology and Morphology of Zacatepec Eastern Chatino

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Supervisor: Anthony C. Woodbury

This dissertation presents an analysis of the phonology and some aspects of the morphology of Zacatepec Eastern Chatino (ISO 639-3: ctz), an Otomanguean language of the Zapotecan branch spoken near the Pacific coast of the State of Oaxaca, Mexico.

It is based on primary data obtained from fieldwork conducted by the author (from 2006 to 2013) in the community of San Marcos Zacatepec, district of Juquila, Oaxaca, Mexico. Zacatepec Chatino is only spoken in that small community of about one thousand inhabitants. There are only about 300 speakers left, all above 50 years old. This variety of Chatino finds itself in an advanced language shift to Spanish, and as a result its vitality status is considered severely endangered.

The description of Zacatepec Chatino is important within the study of Chatino languages in general, as contrary to most other Chatino varieties, it conserves all non-final syllables of its roots. This fact makes it a centerpiece for the Chatino language puzzle as its transparent morphology tells the story of the evolution of more innovative Chatino varieties. Indeed, beyond simply revealing lost segments/morphemes, it provides polymoraic structures that host clear sequences of tones that are not discernable in the monosyllabic/monomoraic varieties.

The phonological analysis begins with a presentation of the segmental sound system, including two of the three contrastive supra-segmental features: nasalization and vowel length. Nasal vowels and long vowels are described together with oral vowels whereas tone, is dealt with in detail in a separate chapter. Directly following the segmental analysis, a chapter is devoted to the phonotactics of the language.

Tone, being the hallmark of Otomanguean languages, is an area of the phonology that is described in great detail. The tonal system is intricate as it involves four levels of pitch represented in five mora-linked tones and three unlinked (floating) tones arranged in many tonal sequences which become the signatures for lexical classes. Furthermore, polysyllabicity allows for many moraic shapes resulting in a variety of possible phonetic realizations of the tonal sequences which mark the tonal Classes.

The other highlight of this dissertation is a chapter dedicated to the description of the inflectional system, an area revealed to be quite com-

plex at the morphological and the morphophonological level. Nevertheless, despite its *prima facie* maze of irregularities, this intricate inflectional system actually presents a high rate of predictability in its segmental (aspect prefixes) and tonal conjugation Classes. This chapter describes the different patterns of inflection (segmental and tonal) for three different parts of speech: the verb, the inalienable noun, and the predicative adjective.

The last chapter is devoted to the description of the numerical system which is interesting because the numerical phrases do not always follow the tonal sandhi rules of the language, and often result in idiosyncratic tonal patterns. It is important to document and describe this ancient numerical system as the language is in advanced language shift to Spanish. Its usage is loosing ground very rapidly and usually, when speakers need to count or utter a number (especially one above 15), they code-switch to Spanish.

This work is a first step towards a comprehensive documentation of Zacatepec Chatino, which as of today, includes a large corpus of natural discourse recorded within the community by native speakers (about 170 hours), a collection of transcribed and translated texts, and a lexicon and verb database with full paradigms for more than 300 verb roots. The corpus is archived with *open access* at the *Archive of Indigenous Languages of Latin America*, University of Texas at Austin, and at the *Endangered Languages Archive*, School of Oriental and African Studies, London.

Table of Contents

Acknowledgments	iv
Abstract	ix
List of Tables	xviii
List of Figures	xx
Chapter 1. Introduction	1
1.1 Zacatepec Chatino and its speakers	3
1.1.1 Ethnographic information	3
1.1.2 Sociolinguistic situation	12
1.1.2.1 Vitality and endangerment status	12
1.1.3 Genetic affiliation	16
1.1.3.1 External and internal classification	16
1.2 Typological profile	20
1.3 Previous work on Zacatepec Chatino	23
1.4 Fieldwork narrative	25
1.4.1 Zacatepec Chatino Documentation Project	25
1.5 Corpus and data collection	32
1.6 Theoretical framework	37
Chapter 2. Segmental phonology	43
2.1 Practical orthography	44
2.2 Vocalic system	49
2.2.1 Oral vowels	52
2.2.1.1 /a/	52
2.2.1.2 /e/	54

2.2.1.3	/i/	56
2.2.1.4	/u/	58
2.2.1.5	/o/	60
2.2.2	Nasal vowels	62
2.2.2.1	/ã/	62
2.2.2.2	/ẽ/	64
2.2.2.3	/ĩ/	66
2.2.2.4	/ũ/	67
2.2.3	Vowel length	69
2.2.4	Vowel harmony	72
2.2.4.1	Translaryngeal Vowel Harmony	72
2.2.4.2	Nasal spreading	76
2.3	Consonantal system	78
2.3.1	Bilabial consonants	81
2.3.1.1	/p/	82
2.3.1.2	/b/	82
2.3.1.3	/m/	83
2.3.2	Apico-dental consonants	84
2.3.2.1	/t/	85
2.3.2.2	/d/	87
2.3.2.3	/ts/	88
2.3.2.4	/s/	89
2.3.2.5	/n/	90
2.3.2.6	/l/	93
2.3.2.7	/r/	95
2.3.2.8	/r̥/	96
2.3.3	Lamino-alveolar consonants	96
2.3.3.1	/t̪/	98
2.3.3.2	/t̪ʃ/	99
2.3.3.3	/ʃ/	100
2.3.3.4	/n̪/	101
2.3.3.5	/l̪/	102

2.3.4	Palatal consonants	104
2.3.4.1	/j/	104
2.3.5	Velar consonants	106
2.3.5.1	/k/	107
2.3.5.2	/k ^w /	108
2.3.5.3	/w/	110
2.3.6	Glottal consonants	113
2.3.6.1	/ʔ/	113
2.3.6.2	/h/	115
2.3.7	The phonological status of laryngeals	117
Chapter 3.	Phonotactics	122
3.1	Syllable structure	125
3.1.1	Syllable onsets	125
3.1.1.1	Simple onsets	125
3.1.1.2	Complex onsets	126
3.1.2	Syllable nuclei	134
3.2	Phoneme distribution within the word	138
Chapter 4.	Tone in simplex words	142
4.1	Introduction	142
4.2	The tonal inventory	148
4.3	The mora as the Tone Bearing Unit	149
4.4	Prosodic shapes of words	153
4.5	Tone realization at the sentence level	153
4.5.1	Moras unspecified for tone and spreading	154
4.5.2	Linking and realization of floating tones in subsequent tonally unspecified moras	163
4.5.3	Phonetic data illustrating the Spreading and Floating Tone Linking rules	172
4.6	The Lexical Tone Classes	177
4.6.1	Tone Classes in dimoraic disyllables	179
4.6.1.1	Tone Classes in isolation	179

4.6.1.2	Tone Classes preceded by a word ending in /LS/	181
4.6.1.3	Tone Classes followed by /X-X/	186
4.6.2	Tone Classes in dimoraic monosyllables	190
4.6.3	Tone Classes in monomoraic monosyllables	193
4.6.4	Tone Classes in trimoraic trisyllables	199
4.6.5	Tone Classes in trimoraic disyllables	203
4.7	Formal representation of linking rule for mora-linked tones .	204
4.8	Distribution of Tone Classes according to word shape	207
4.9	Distribution of tone within the word	210
4.10	Tonal Sequences as Lexical Tone Classes	211
4.11	Tone realization at the sentence level revisited	216
4.11.1	Description of Spreading revisited	216
4.11.2	Description of floating tone realization revisited	222
4.11.2.1	Floating /LS/ followed by all Tone Classes	222
4.11.2.2	Floating /H/ followed by all Tone Classes	232
4.11.2.3	Floating /L/ followed by all Tone Classes	245
4.11.2.4	Formal representation of Linking Rules for floating tones	257
4.11.3	Phonetic pitch lowering	263
4.12	Conclusion	270
Chapter 5.	Inflectional morphology	275
5.1	Introduction	275
5.2	Generalities about verbal inflection	276
5.3	Aspectual verbal inflection	282
5.3.1	Segmental aspectual conjugation Classes	282
5.3.1.1	Aspect markers	283
5.3.1.2	The vowel hierarchy	285
5.3.1.3	The aspect prefix Classes	286
5.3.1.3.1	Class A	288
5.3.1.3.1.1	Subclass A _u	289
5.3.1.3.1.2	Subclass A _c	291
5.3.1.3.1.3	Subclass A ₂	293

5.3.1.3.2	Class B	298
5.3.1.3.2.1	Subclass B _c	298
5.3.1.3.2.2	Subclass B _k	302
5.3.1.3.2.3	Subclass B _{post}	304
5.3.1.3.2.4	Subclass B _y	306
5.3.1.3.3	Class C	310
5.3.1.3.3.1	Subclass C _a	310
5.3.1.3.3.2	Subclass C ₂	313
5.3.1.4	Conclusion	315
5.3.2	Tonal aspectual conjugation Classes	317
5.3.2.1	Composed TS's in progressive verb forms	318
5.3.2.2	Tone Class 1 aspectual conjugation	322
5.3.2.3	Tone Class 3 aspectual conjugation	325
5.3.2.4	Tone Class 13 aspectual conjugation	327
5.3.2.5	Tone Class 4 aspectual conjugation	329
5.3.2.6	Tone Class 8 aspectual conjugation	331
5.3.2.7	Tone Class 9 aspectual conjugation	335
5.3.2.8	Tone Class 10 aspectual conjugation	337
5.3.2.9	Tone Class 11 aspectual conjugation	342
5.3.2.10	Tone Class 12 aspectual conjugation	349
5.3.2.11	Conclusion	351
5.4	Subject person marking	354
5.4.1	Person marking on inalienable nouns	354
5.4.2	Subject person marking on predicative adjectives	359
5.4.3	Subject person marking on verbs	365
5.4.3.1	2s subject person marking on verbs	365
5.4.3.1.1	Tone Class 1 person conjugation	365
5.4.3.1.2	Tone Class 3 person conjugation	369
5.4.3.1.3	Tone Class 13 person conjugation	374
5.4.3.1.4	Tone Class 4 person conjugation	376
5.4.3.1.5	Tone Class 8 person conjugation	379
5.4.3.1.6	Tone Class 9 person conjugation	383

5.4.3.1.7	Tone Class 10 person conjugation . . .	387
5.4.3.1.8	Tone Class 11 person conjugation . . .	390
5.4.3.1.9	Tone Class 12 person conjugation . . .	398
5.4.3.1.10	Conclusion	402
5.4.3.2	1s subject person marking on verbs	402
5.4.3.3	Plural subject marking on verbs	416
5.5	Conclusion	420
Chapter 6. The numerical system: an extended demonstration of tone in phrasal lexemes		424
6.1	Numbers 1 to 10	425
6.2	Numbers 11-30	426
6.3	Numbers 31-40	430
6.4	Numbers from 41-60	431
6.5	Numbers from 61-80	434
6.6	Numbers from 81-100	437
6.7	Conclusion	440
Appendix		442
Appendix 1. Abbreviations		443
References		444

List of Tables

2.1	Practical orthography: consonants	46
2.2	Phonemic inventory: consonants	46
2.3	Phonemic inventory: consonants	78
2.4	Practical orthography: consonants	79
2.5	The distribution of laryngeals	120
2.6	The characteristics of laryngeals	120
3.1	Two-consonant clusters	133
3.2	Phoneme distribution within the word	140
4.1	Tonal representation	145
4.2	The ZAC Tone Classes	147
4.3	The ZAC Tone Classes	178
4.4	Distribution of Tone Classes according to word shape	207
4.5	Distribution of tones in simplex words	210
4.6	Prevalence of tonal sequences in the lexicon	213
5.1	Example of a complete verbal paradigm for a Tone Class 8 verb	278
5.2	Independent and dependent subject pronouns	279
5.3	Aspect allomorphs	284
5.4	Vowel hiatus resolution	286
5.5	Aspect prefix Classes	287
5.6	Characteristics of the prefix Classes	288
5.7	Prefix Classes statistics	315
5.8	Example of a complete verbal paradigm for a Tone Class 8 verb	318
5.9	Tone conjugation Classes statistics	353
5.10	Tonal ablaut patterns for person marking on inalienable nouns	358
5.11	Example of a paradigm for the predicative adjective <i>tsaʔwě</i> 'be good, generous'	359

5.12 Tonal ablaut patterns for person marking on predicative adjectives	363
5.13 Tonal ablaut patterns for person marking on inalienable nouns and predicative adjectives	364
5.14 Tonal ablaut patterns for subject marking on verbs	403
5.15 3s and 1s tonal ablaut patterns across aspects	408
5.16 Independent and dependent plural subject pronouns	416
5.17 Example of a complete verbal paradigm for <i>u-lukwǎ</i> 'sweep it'	418
5.18 Subject plural marking on verbs	419
5.19 Verbal, nominal and adjectival tonal ablaut patterns for person marking	423

List of Figures

1.1 Map of the Chatino languages. (Villard and Sullivant (under review))	5
1.2 Map of the village of San Marcos Zacatepec by Javier Ayuso	6
1.3 A palm house in San Marcos Zacatepec (photo by Tony Woodbury)	11
1.4 Scenery of San Marcos Zacatepec showing palm houses (photo by Stéphanie Villard)	12
1.5 Chatino vitality in San Marcos Zacatepec (modified from Villard and Sullivant (under review))	15
1.6 The Chatino varieties: External and internal relationships (E. Cruz & Woodbury, 2014)	18
1.7 Internal structure of Chatino including the now extinct Teojomulco (Sullivant, under review)	19
1.8 Autosegmental representation of prosodic features: <i>nkasín?</i> 'he/she squeezed it'	38
2.1 Practical orthography: vowels	45
2.2 Phonemic inventory: vowels	45
2.3 Autosegmental representation of prosodic features: <i>nkasín?</i> 'he/she squeezed it'	51
2.4 Phonemic vowel inventory	51
2.5 Regressive Translaryngeal Vowel Harmony rule	73
2.6 Progressive Translaryngeal Vowel Harmony rule	73
2.7 Autosegmental representation of Progressive Translaryngeal Vowel Harmony rule: <i>joʔō'</i> [hʔʔʔ]	75
2.8 Autosegmental representation of Nasal Spreading rule: <i>nkūwēn</i> [ngūwē̃]	77
2.9 Voicing assimilation rule	80
2.10 Place assimilation rule	81

3.1	Autosegmental representation of prosodic features: <i>nkasíín?</i> 'he/she squeezed it'	124
4.1	Monomoraic words with level outcomes	148
4.2	The ZAC rising tones on monomoraic words	149
4.3	Autosegmental representation of prosodic features: <i>nkasíín?</i> 'he/she squeezed it'	150
4.4	Linking of tone in a disyllabic dimoraic word: <i>kwíná</i> 'snake'	153
4.5	Prosodic shapes of simplex words (Modified from (Villard & Woodbury, 2012))	154
4.6	Sentence where all words are unspecified for tone	155
4.7	Persistence of high pitch [H] (from /M-H/) into subsequent tonally unspecified moras	156
4.8	Persistence of the final high pitch [H] (from /LH/) into subsequent unspecified moras	157
4.9	Persistence of super high pitch [S] (from /L-LS/) into subsequent tonally unspecified moras	158
4.10	[M] pitch (from /M/) does not persist in subsequent tonally unspecified moras	159
4.11	[L] pitch (from /M-L/) has no effect on subsequent tonally unspecified moras	160
4.12	Persistence of [H] pitch (from /M-H/) in subsequent unspecified moras until it reaches the TS /M-M/ in <i>lyūwā</i> , which is realized on each mora with [M] pitch.	162
4.13	Spreading rule	163
4.14	Autosegmental representation of the word <i>xunī?</i> 'dog'	164
4.15	Floating /LS/ in subsequent tonally unspecified moras	166
4.16	Floating /H/ in subsequent tonally unspecified moras	168
4.17	Floating /L/ in subsequent tonally unspecified moras	170
4.18	Preliminary Floating Tone Linking rule 1	171
4.19	Averaged pitch for <i>kula</i> (/X-X/) AFTER each tone	174
4.20	Averaged pitch for <i>kula</i> (/X-X/) AFTER each floating tone	175
4.21	Monomoraic words pronounced in sequence and overlaid	197
4.22	<i>ne?</i> (/X/) after /X/ and after /LS/ VERSUS <i>nkùn?</i> (/L (LS)/) after /X/ and after /LS/	198
4.23	Linking rule for lexically linked tones	199

4.24	Linking rule for each Tone Class according to word shape . . .	206
4.25	Averaged pitch tracks for falling melodies in long stems . . .	209
4.26	Persistence of [H] pitch (from /LH/) in subsequent unspecified moras until /M/ (from /M-M/)	217
4.27	Persistence of [S] pitch (from /L-LS/) in subsequent unspecified moras until /M/ (from /M-M/)	218
4.28	Persistence of [H] pitch (from /M-H/) in subsequent tonally unspecified moras until /L/ (from /X-L (LS)/)	219
4.29	Persistence of [H] pitch (from /X-LH/) in subsequent tonally unspecified moras until /L/ (from /X-L (LS)/)	220
4.30	Persistence of [S] pitch (from /L-LS/) in subsequent tonally unspecified moras until /L/ (from /X-L (LS)/)	221
4.31	Preliminary Floating Tone rule 2	232
4.32	Final Floating Tone Linking rule for /H/ and /LS/	256
4.33	Final Floating Tone Linking rules for /L/	256
4.34	Floating /LS/ linking mode	258
4.35	Floating /H/ linking mode	260
4.36	Floating /L/ linking mode	262
4.37	Summary of tonal typological features (Modified from Villard and Woodbury (2012))	272
5.1	Simplex Verb template	276
5.2	The vowel hierachy	286
5.3	Tone deletion rule in progressive forms	320

Chapter 1

Introduction

This dissertation presents an analysis of the phonology and some aspects of the morphology of Zacatepec Eastern Chatino (ISO 639-3: ctz), a severely endangered indigenous language spoken near the Pacific coast of the State of Oaxaca, Mexico. This work is a first step towards a comprehensive documentation of Zacatepec Chatino, and these chapters represent the first parts of a descriptive grammar which will eventually cover all main areas of the language.

One focus of this work is to describe the complexities of the language's tonal system. The approach taken here, takes the reader through the methodology and the discovery path, and by doing so, unveils the fine mechanics and the dynamic characteristics of the system.

This work also aims to shed light on the inflectional system of ZAC, an area revealed to be quite complex at the morphological and the morphophonological level, by demonstrating that despite its *prima facie* maze of irregularities, the system presents some order, and even an important degree of predictability.

This dissertation is organized as follows: the remainder of this chap-

ter gives general information about Zacatepec Chatino and its speakers, offering ethnographic information as well as sociolinguistics insights looking at its vitality and endangerment status. It also lays out the language's genetic affiliation and more precisely the external and internal classification. A highlight of this chapter is a narrative about the Zacatepec Documentation Project including speakers' etiquettes describing their respective role in the project. This chapter ends with a presentation of the theoretical framework upon which the phonological representations are based through out this work.

Chapter 2 describes in detail ZAC's segmental sound system. It discusses the distribution of each phoneme and its allophonic variations to show their contrastiveness, and also discusses their respective distributional constraints.

Chapter 3 deals with the non-tonal phonemic inventory showing that the segmental contrastive system consists of vowels and consonants, and that the autosegmental inventory includes vowel nasality and vowel length. This chapter describes the distributions of those contrastive elements within the syllable first and then within the word.

Chapter 4 describes the phonology of the ZAC tonal system, discussing the distribution of tone as well as describing in detail all the phonetic realizations for each Tone Class for simplex words only. Furthermore, it documents and illustrates all of the sandhi processes occurring in connected speech in the language.

Chapter 5 describes the inflectional system of ZAC, and presents the different patterns of inflection (segmental and tonal) for three different parts of speech: the inalienable noun, the predicative adjective, and the verb. The data and the analysis presented in that chapter reinforce the claim already made in chapter 4 that the TS's are morphological entities that pertain to simplex words, whereas the tonal elements are phonological entities that pertain to moras.

Finally, chapter 6 presents ZAC's numerical system which has nearly fallen out of use. The data presented in that chapter is an extended demonstration of the tonal system in phrasal lexemes. The number system demonstrates compounding and the formation of phrasal lexemes, as well as the sandhi system, but it also shows unexpected changes in tonal patterns and tone sandhi.

1.1 Zacatepec Chatino and its speakers

1.1.1 Ethnographic information

The Chatino speaking area occupies the coastal ranges of Oaxaca's Southern Sierra Madre in Mexico. It is contained within a quadrant from 15°39' to 16° 35' N latitude and from 97° 04' to 97°40' W longitude, from relatively low lands and river valleys to high mountaintop communities. As shown in map 1.1, to the west and southwest the Chatino languages border Coastal Mixtec-speaking towns and to the east lie Southern Zapotec-speaking communities. Not included in the map but still worth mentioning,

to the north are Papabuco Zapotec and West Zapotec languages. West appears to have older contact with Chatino, and Papabuco less older contact (Mark Sicoli, p. c., April 2015).

Zacatepec Chatino (henceforth ZAC) is only spoken in the town of San Marcos Zacatepec (*kichen tsii'* 'pueblo del zacate' 'the village of grassy weeds') located in the lowlands of the Chatinophone area, at about 820 meters above sea level, about thirty minutes from the commercial town of Rio Grande on the Pacific coast. It has a population of approximately one thousand people (according to the 2013 local clinic data). The population's ethnicity is almost exclusively Chatino, as few (non-Chatino) outsiders have settled in the community. It is a highly endangered Chatino variety as it is only spoken by about 300 people all above 50 years of age.

Figure 1.2 presents a map of the community drawn by a community member, Javier Ayuso. It shows all the important sites within the village, the demarcations for the different neighborhoods as well as all the names of the surrounding rivers and mountains. This map has a corresponding soundfile where one of the village's elder named Silviano Cortés discusses (in Spanish) all the various points on the map telling the history of the community. It is archived at the *Archive of the indigenous languages of Latin America*¹ (AILLA), and at the *Endangered languages Archive* (ELAR).

¹AILLA Resource: CTZ0005R136: Village map

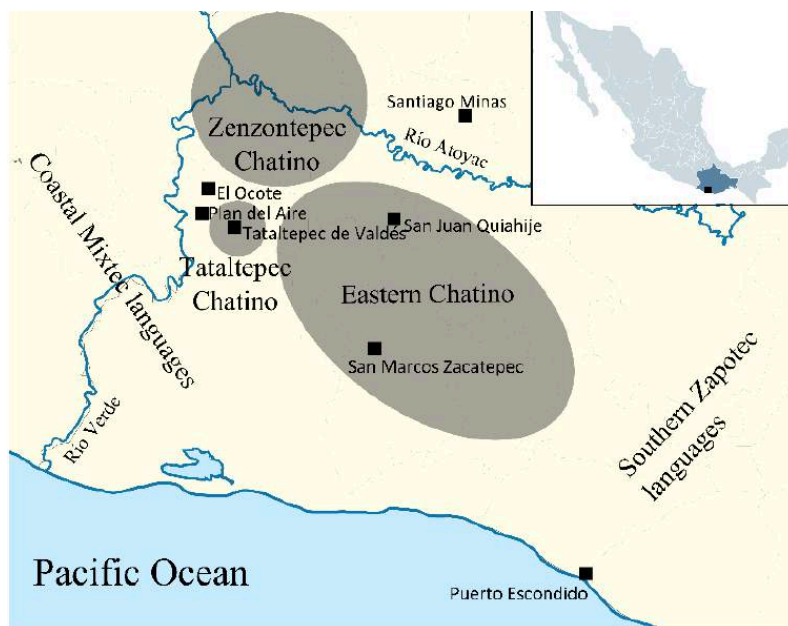


Figure 1.1: Map of the Chatino languages. (Villard and Sullivant (under review))



Figure 1.2: Map of the village of San Marcos Zacatepec by Javier Ayuso

Even if the village's ethnicity is almost exclusively Chatino, women do not wear the typically Chatino modern clothing which consists of a colorful synthetic skirt with layers of underskirts topped with a cotton apron and an embroidered cotton shirt. This type of clothing is found in neighboring Chatino communities such as Santiago Yaitepec, San Juan Quiahije or Cieneguilla. In Zacatepec, a few elders still wear the older traditional outfit which consists of white cotton pants and shirt for men, and white skirts with colorful or white underskirts and a white cotton embroidered shirt for women.

The tropical climate and low altitude of Zacatepec is ideal for growing all sorts of fruits and vegetables. Economic activities in San Marcos Zacatepec include growing corn and beans, but also sweet potatoes and squash at a subsistence farming scale. Some people also raise chickens for eggs and meat, also principally for their own consumption. A few raise a hand full of turkeys with the intent of selling them, which can be quite lucrative as they can be sold for about MX\$500 each. People buy turkeys over Christmas time or for large parties such as weddings, *quinceñeras*, *cabo de año* (death anniversary celebration) etc.

Many village men and women work in near-by commercial towns like Rio Grande, Puerto Escondido, and Santa Catarina Juquila. Since the 1980's the village has been experiencing mass migration by the younger generation of men, and recently even by young women, to Mexican cities and the US (Villard & Sullivant, under review).

Coffee cultivation is also an important aspect of the community's economy. As recounted in *El café amargo* (Hernández Díaz Jorge, 1987), the region was transformed in the 1950s by large scale coffee production. Zacatepec has known a coffee growing boom during that period, but today most coffee production comes from small parcels of land. At that time, Zacatepec experienced waves of temporary migration from other surrounding communities at the time of harvest in December and January, but nowadays all the harvesting is done by community members.

Another cultivation in decline compared to past production, is the cohune nut, a small type of nut which grows on the cohune palm tree. The production and processing of cohune nuts was a major source of revenue for San Marcos Zacatepec 30-50 years ago. It is still harvested today, but it is so labor intensive and gets sold so cheaply that it is no longer economically viable for most people. The processing of the cohune nut is physically very demanding. It is done manually with a couple of stones: one flat and the other round in order to break the shell. People who worked processing cohune nuts have their left thumb and first finger damaged from being smashed by the round stone over and over. Their back is also generally damaged from sitting on the ground for long hours smashing nuts. The processed nuts get sold for the production of lubricant, cooking oil and soap. People still enjoy consuming cohune nuts in many type of sweets such as *tortilla de corrozo* 'cohune tortillas', as well as a type of drink made with cohune nuts and bananas.

Cacao is also grown in the area. It is a very small scale production. I only know a few people who have cacao trees and harvest the nuts for their own consumption, or to sell to other community members. Cacao is an important ingredient in many regional dishes and the most popular one is probably the traditional drink called *champurrado* whose main ingredients are corn and cacao. It is particularly consumed over *Todos Santos* and the Christmas holidays.

Oranges, bananas, nances, pineapple and mangos are plentiful in Zacatepec. Nances (from the *Byrsonima Crassifolia* tree) and oranges are particularly appreciated by Chatino people in general. As those fruits, do not grow at high altitude (Zacatepec is only at about 800m above sea level), many Chatino people from other close by communities such as Juquila, Yaitepec or San Juan Quihije often come to Zacatepec to buy some and sell them in their own community. Banana plants and mango trees can be found everywhere in the community, along the main road, and in the surrounding forests, in fact, there are so many of them, that the fruits often end up rotting on the trees or cover the ground. There is a very small pineapple production farm near by the village whose harvest is mainly sold to local or regional grocers.

Most women do not work outside of home for a salary. Nevertheless, they have a very important role as they take care of all things related to the household. They are generally in charge of the household's finances. They get up at around 4 am to go to the mill and make the tortilla dough for their

family's lunch. They are a few privately owned mills dispersed in the village so most people have a mill they can go to near by. Traditionally women are the ones who go and collect wood for cooking purposes, but I have often seen couples go together in order to collect as much as possible and go less often. Women also forage for edible plants such as chepil (*Crotalaria Longirostrata*), pie de gallo (a mustardy tasting type of green which is steamed, ground and served with tortillas), purslane (*Verdolaga Portulaca Oleracea*), and wild mushrooms. They also complement the family's income by selling prepared food within the village. In Zacatepec, there is a constant flow of food items being sold all through the day, tamales, warm sweet potatoes, steamed hearts of palm, enchiladas during lunch time, and freshly baked sweet breads in the late afternoon. Besides, this array of local delicacies, street vendors from the coast also often come up to Zacatepec to sell freshly caught fish and seafood.

Men often go hunting or fishing to complement their family's meals: squirrels, deer, iguanas, doves, and crawfish from near by forests and rivers are consumed regularly. Men may work as village taxi drivers, masons, day laborers, cantina owners or handy men. As some neighboring communities such as San Juan Quiahije have known a construction boom in the last 10 years from the remittances sent from people who have migrated to the US, many men from Zacatepec have found construction work there. They usually stay there for the entire week and come back home for the weekend.

The community of San Marcos Zacatepec is among the very last com-

munities in the region to still build houses made of palms. Most houses are made out of concrete blocks or adobe but people still appreciate the esthetics and insolation qualities of palm houses. They can be built in a couple of days, and it is always a community enterprise. The owner of the house calls a few villagers for help and the women prepare meals for everybody involved in the process. At the end, the owner always organizes a party for the blessing of the house. A short video showing a house being built as well as a text transcription describing the entire building process are archived at AILLA², and ELAR.



Figure 1.3: A palm house in San Marcos Zacatepec (photo by Tony Woodbury)

San Marcos Zacatepec is governed locally in part by a civil-religious hierarchy also referred as *usos y costumbres* or *cargo system*. The yearly

²AILLA Resources: CTZ0005R135 and CTZ0003R023



Figure 1.4: Scenery of San Marcos Zacatepec showing palm houses (photo by Stéphanie Villard)

ceremony ratifying the installation of new appointees is one of the only instances of official use of Chatino. Most of the ceremony is conducted in Spanish except when one of the village's elders gives a ritual speech to bless all new entering *cargo*-holders. A recording of the annual ceremony including the speech of one of the community's elder during the ceremony can be found archived at AILLA³, and ELAR.

1.1.2 Sociolinguistic situation

1.1.2.1 Vitality and endangerment status

In the last forty years, the community of San Marcos Zacatepec has developed important commercial ties with near-by non-Chatino communi-

³AILLA Resource: CTZ0005R061

ties thanks to improved access to the coast through a direct paved road system. It is a very open and welcoming community to visiting foreigners (although there aren't many of them) and outsiders in general. People easily welcomed me into their home (even at first), and were very curious about me and my life. I noticed the same attitude with visiting outsiders (generally Mexican nationals who passed by on their way to visit the Catholic religious site in Santa Catarina Juquila).

First visitors to San Marcos Zacatepec quickly realize that Spanish is the dominant language. It is spoken in all households and all public domains. The town's loudspeakers (both those used by the municipal authorities as well as those used by private announcement services) make their announcements in Spanish only. However, a stroll along the village's main street during the quiet time of the afternoon's *comida* gives an impression that ZAC is still very much present as one can hear the animated conversations in ZAC through every wide open door. Furthermore, a peak within the municipality's building during the busy late afternoon time when many of the village's elders gather to discuss political matters, offers an image of a thriving body of ZAC speakers.

Spanish is the language of governance, but government officials often chat with one another in Chatino in municipal buildings. As already mentioned, the yearly ceremony ratifying the installation of new appointees is one of the only instances of official use of Chatino.

During conversations about the state of the language, non-fluent speak-

ers often deplore the loss of ZAC, and often express regret or blame their parents for not teaching them. One can sense a budding feeling of nostalgia. For example, a local credit union *Caja Solidaria Ki'che-Tzi* uses the Chatino name of the community, and has it painted in large print on its facade. However, despite the laments, many in the community still feel that ZAC is very much part of their daily life.

In the community, the younger generation is monolingual in Spanish, the language of education, media and modern life. Some members of the older generation between 30 to 40 years of age are passive ZAC speakers. Only the elder group, over 40, still consists of bilingual Chatino-Spanish speakers. Unfortunately, there are no ZAC monolinguals left.

The Ethnologue (Lewis, Gary F. Simons, & Charles D. Fennig, 2015) gives the vitality of ZAC as 7 in the EGIDS scale (Shifting: the child-bearing generation can use the language among themselves, but it is not being transmitted to children). My own assessment of ZAC's vitality according to the EGIDS scale is 8a (Moribund: the only remaining active users of the language are members of the grandparent generation and older).

Figure 1.5 shows the distribution of the population according to age and ZAC fluency in the community. The number of individuals is listed on the x axis and age cohort in years on the y axis. Blue indicates Chatinophone persons and orange indicates Spanish monolinguals.

ZAC fluency is related to age, but naturally individual linguistic skills

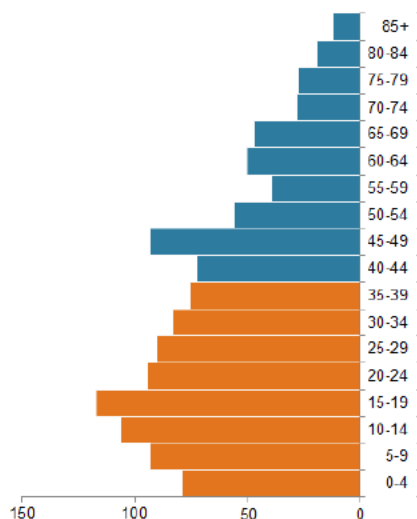


Figure 1.5: Chatino vitality in San Marcos Zacatepec (modified from Villard and Sullivant (under review))

vary according to the internal composition of a household. Figure 1.5 gives a general picture of the linguistic landscape of the community: the vast majority of the population up to 39 years of age refers to itself as Spanish monolinguals, and the population above that age cohort refers to itself as either semi-speakers (40-50 years old) or full (native) speakers (50 and up) of ZAC.

However, my long term presence in the community allowed me to understand and assess the various linguistic layers with more accuracy than shown in the simple graph in figure 1.5. As far as ZAC monolinguals are concerned, as of 2014, I am fairly sure that there are none left. This was not true when I first visited the community in 2006, but they have all passed away since. The middle aged population characterizes itself as Spanish speakers

only, but the vast majority of them are actually at least passive speakers of ZAC as they often take care of their aging parents within their home. In this case, conversations between the aging parent and the son or daughter take place in Spanish, but the level of exposure to spoken ZAC is very important through the parent's social network consisting of native ZAC speakers. The community still has a socially integrated body of ZAC speakers consisting of oldsters only. Conversations among themselves always occur in ZAC whether at home or outside, and even within governmental buildings in the community.

The younger generation between 25 and 35 represents the age cohort with the most variety as far as ZAC skills are concerned. They all refer to themselves as Spanish speakers only, but the reality is more complex. Again, based on the characteristics of their respective household, many of them are actually *ghost speakers* (Grinevald & Bert, 2011) as they deny their ZAC linguistics skills whereas facts prove the contrary. Furthermore, one important fact about *ghost speakers* is that their non-performance profoundly affects their children, who will not learn the language even covertly.

1.1.3 Genetic affiliation

1.1.3.1 External and internal classification

Chatino refers to three closely related languages (Eastern Chatino, Tataltepec Chatino and Zenzontepec Chatino) of the Zapotecan branch within the Otomanguan language family (Boas, 1913; Campbell, 2013; Wood-

bury, 2009). All the Chatino languages are spoken in the Southern Sierra Madre in the State of Oaxaca by about 28,000 people of chatino ethnicity (E. Cruz & Woodbury, 2014).

Eastern Chatino⁴, which includes ZAC, is internally diverse, with about fifteen distinct topolects, many of which are mutually unintelligible, and are substantially different from each other. Campbell (2013) agrees with the claim of a tripartite division made early by Boas (also sustained by Woodbury (2009)), and furthermore demonstrates, via phonological, morphological, lexical isoglosses and shared innovations, that all the Eastern Chatino varieties form a distinct genetic unit. Furthermore, he shows that Eastern Chatino and Tataltepec Chatino form a proper subgroup, Coastal Chatino, that is coordinate with Zenzontepec Chatino, the family's most divergent variety. Figure 1.6 shows the external and internal relationships of the Chatino varieties.

Eastern Chatino groups together about fifteen different topolects (including ZAC) which vary considerably from each other with regard to phonological structure including tone and non-final syllable loss (E. Cruz, 2011; McIntosh, 2009; Pride & Pride, 2004; Rasch, 2002; Villard & Woodbury, 2012) preventing mutual intelligibility. However, no divisions or

⁴The Ethnologue (Lewis et al., 2015) splits Eastern Chatino in four: Western Highland Chatino (ctp), Eastern Highland Chatino (cly), Nopala Chatino (cya) and Zacatepec Chatino (ctz), and presents no subgrouping among the six Chatino languages it identifies. These divisions were based on researcher intuitions and input from a 1983 mutual intelligibility survey (Egland & Ramos, 1983), but have not been proven by application of the comparative method.

subgrouping within Eastern Chatino have been demonstrated at this point⁵.

- Otomanguean (Many subfamilies)
 - Zapotecan
 - Zapotec (Many varieties)
 - Chatino
 - Zenzontepec Chatino [ISO 639-3 czn] (ZEN)
 - Coastal Chatino
 - Tataltepec Chatino [cta] (TAT)
 - Eastern Chatino
 - San Juan Quiahije Eastern Chatino [ctp] (SJQ)
 - Santiago Yaitepec Eastern Chatino [ctp] (YAI)
 - San Marcos Zacatepec Eastern Chatino [ctz] (ZAC)
 - Santa Lucía Teotepec Eastern Chatino [cya] (TEO)
 - Santa María Yolotepec Eastern Chatino [cly] (YOL)
 - San Miguel Panixtlahuaca Eastern Chatino [ctp] (PAN)
 - (About 9 others)

Figure 1.6: The Chatino varieties: External and internal relationships (E. Cruz & Woodbury, 2014)

Recently, Sullivant (under review) looked into the historical classification of Chatino in light of data from now-extinct Teojomulco Chatino that had not hitherto ever been considered in work on Chatino classification. He demonstrates that the now-extinct Teojomulco Chatino represents a more divergent Chatino language resulting in the internal relationship presented in figure 1.7.

⁵The bullet types (squares, dots, and circles) in this figure do not express hierarchy, it is just a way of presenting the data in an organized fashion. The subgrouping is shown by degree of indentation instead.

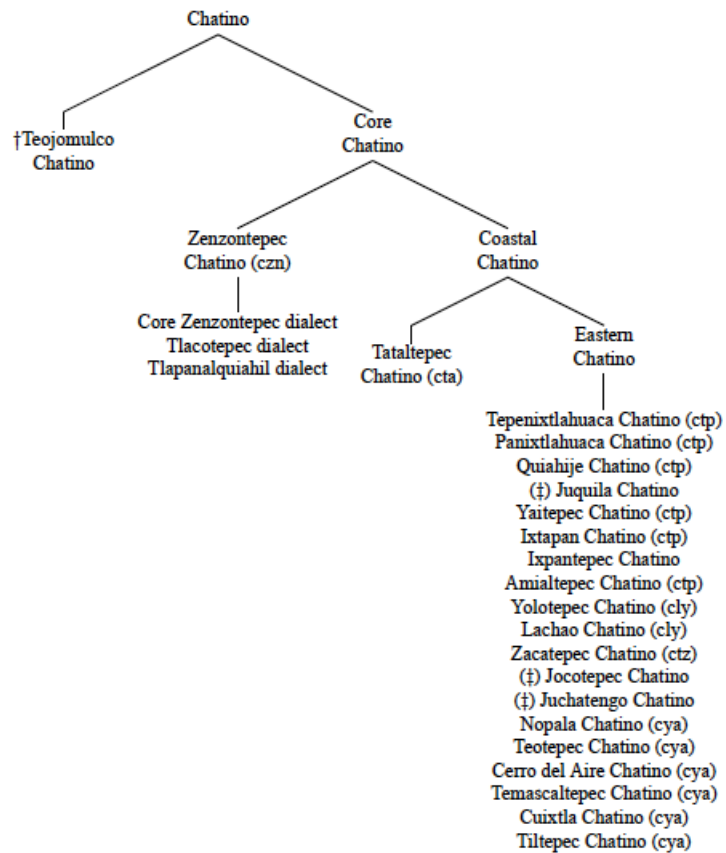


Figure 1.7: Internal structure of Chatino including the now extinct Teojomulco (Sullivant, under review)

1.2 Typological profile

As just noted, Chatino is an Otomanguean language, and as such falls within the the Mesoamerican language area (Campbell, Terrence Kaufman, & Thomas C. Smith Stark, 1986). It possesses all five features that define the Mesoamerican linguistic area : nominal possession of the form 'his-noun₁ noun₂', relational nouns expressing locative and related notions (often derived from body part nouns), vigesimal numeral system⁶, non-verb-final basic word order (ZAC's basic word order is VSO), and several widespread semantic calques (door: mouth of the house; wrist: neck of the hand etc.).

The Chatino language family is spread out in a fairly small area in the state of Oaxaca, and ZAC is only spoken in the small village of San Marcos Zacatepec. It is among the most morphologically conservative varieties of Chatino (together with Zenzontepec Chatino). Indeed, unlike all other documented Eastern Chatino varieties, ZAC conserves all non-final syllables of its roots.

Phonologically, ZAC presents voicing of non-continuant after nasals (§2.3), vowel harmony (§2.2.4), and contrastive nasal vowels (§2.2.2). Its phoneme inventory includes a set of typologically rather uncommon lamino-alveolar sounds (§2.3.3), lacks labial phonemes in its native inventory (§2.3.1), and its tonal inventory shows 4 levels of pitch (Low, Mid, High, and Super high). From these levels, there are five tones: /L,M, H, LH, LS/. These tones

⁶ZAC also has a secondary base number which is fifteen (see chapter 6)

link to moras⁷, but not all moras bear a linked tone, nor are all lexically-present tones linked to moras: instead, some lexically-present tones are unlinked or floating tones⁸ that link, under certain conditions, to tonally unspecified moras in the following word. ZAC presents fifteen specific Tonal Sequences that define fifteen Lexical Classes. These link only to available moras in the word (or if they contain a floating tone, the latter link forward to the next word). The Tonal Sequences are also among the entities that mark aspect and person in the inflectional system, so that alternations from one Tonal Sequence to another mark differences in the aspect or in person category of the inflected word.

Morphologically, ZAC is a head-marking language⁹. It is rather synthetic and somewhat analytic. Some functions are handled by mixed means; for example, person marking can be signaled through tone contrast and /or nasalization, encliticization, or also by a separate word. Verbal morphology is concatenative for aspect marking (typical of synthetic languages). The majority of ZAC morphemes are free morphemes rather than agglutinated particles (typical of analytic languages). Its verbal morphology features a large inventory of allomorphs of its aspectual morphemes, which makes

⁷The term 'link' means that the phonology specifies that the tone occurs simultaneously with any phoneme segments associated to that mora (§1.6).

⁸In ZAC, a floating tone is a tone that is underlyingly unassociated to any mora, but which is nevertheless postulated to exist because of its surface tonal effect on subsequent tonally unspecified moras.

⁹A head-marking language according to Nichols (1986) shows morphological marking of grammatical relations on 'the head' (nucleus) of the constituent rather than on the modifiers or dependents.

its verbal paradigms appear extremely irregular, but most of the irregularities can be explained through morphophonological processes (§5.3). Verbal paradigms also present tonal conjugation patterns which also appear at first to be unpredictable but which in fact, are quite orderly when examined taking into account a particular verb form (3s) considered the basis for deriving tonal paradigms (§5.3.2).

Syntax and meaning are shaped by use of particles and word order rather than by inflection (except for verbs, inalienable nouns, and predicative adjectives which can be inflected for person). The basic word order is VSO but other orders are present, and have specific pragmatic motivations. Juxtaposition is the preferred strategy for constructions such as alienable possession and non-verbal predication (adjectival, nominal and quantificational). Some morphemes such as the marker *?in* (§2.3.7) have various functions in the grammar, i.e, it is a dative marker that introduces human objects, indirect objects, and also marks alienable possession. Furthermore, the language uses a final particle *ǎ* (§3.1.1) rather than rising intonation for polar questions.

As a somewhat analytic language, compounding patterns play an important role in word formation. Furthermore, the use of combinations of ‘light nouns’ or semantically poor nouns and semantically rich adjectives (or nouns, although very rarely) is very prolific in the language. For example, the light noun *nu* ‘the one who’, often occurs as a head noun in noun phrases, as in *nu kī?yó* ‘man’ (the one who is male) or *nu kunā?án* ‘woman’

(the one who is female).

1.3 Previous work on Zacatepec Chatino

Up to recently, there was relatively little work on Chatino in general. In the past, some varieties were more studied than others, and bibliographies of such older studies may be found in respective Chatino varieties' recently published work, such as for Yaitepec Chatino (Rasch, 2002), San Juan Quiahije Chatino (E. Cruz, 2011; H. Cruz, 2014), Zenzontepec Chatino (Campbell, 2014), Tataltepec Chatino (Sullivant, 2015), and Teotepec Chatino (McIntosh, 2015).

As far as ZAC is concerned, outside of a few lexical items included in a dictionary of Panixtlahuaca Chatino (Pride & Pride, 2004), no prior work has been found.

Work on ZAC started in 2005 when Emiliana Cruz, Hilaria Cruz, and Anthony Woodbury began recording texts and wordlists, publishing an analysis of surface tone in the context of other Eastern Chatino cognates, and a preliminary orthography (H. Cruz & Woodbury, 2006). This analysis offered some insight into the surface tonal patterns of words in isolation but did not treat the sandhi patterns in phrasal context.

In 2008, a survey of ZAC was conducted as part of the Project for the Documentation of the Languages of Mesoamerica (PDLMA). The native speaker was Margarita González Hernández and the researchers were Hi-

laria Cruz and Emiliana Cruz. This is archived in the Zapotec and Chatino Survey Archive at the Max Plank Institute (Sicoli Mark A & Kaufman Terrence, 2010).

In the summer of 2006, I joined The Chatino Language Documentation Project (henceforth CLDP) at the University of Texas at Austin directed by Tony Woodbury, and continued the work he, with Emiliana Cruz and Hilaria Cruz, had initiated. A narrative of the CLDP's earlier work on ZAC can be found in E. Cruz and Woodbury (2014).

Since then, I have been documenting the language, and studying many areas of its grammar.

Its phonology presents a rich tonal system with a large inventory of phonemic tonal sequences as well as intricate sandhi patterns which have been the focus of various papers and presentations. A first study of ZAC's tonal system appeared in 2007 (Villard, 2007). It established most of the sandhi patterns but failed (along with the previous study) to distinguish low mora-linked tones versus unspecified moras. Subsequent studies (Villard, 2012; Villard & Woodbury, 2012) did account for that contrast, established a more complete tonal inventory, and demonstrated most sandhi patterns encountered in the language.

At the morphological level, ZAC verbal paradigms reveal, *prima facie*, a maze of irregularities which would provide any linguist endless endeavor. Villard (2009) applied Campbell's (Campbell, 2011) verb classifica-

tion for Zenzontepec Chatino to ZAC, and established a verbal classification system which was found to closely correspond to an older zapotecan classification system documented in Kaufman (2006). Villard (2012) established conjugation classes based on tonal patterns of the 3s completive verb forms. Furthermore, contrary to most other Chatino varieties, ZAC conserves all non-final syllables of its roots. The latter makes it the center piece of the Chatino language puzzle as its transparent morphology tells the story of the evolution of more innovative Chatino varieties: beyond simply revealing lost segments, it provides polymoraic structures that host clear sequences of tones that are not discernable in the simpler, monosyllabic/monomoraic varieties.

In the area of syntax, an early grammatical sketch was published in 2008 (Villard, 2008), followed by a study on non-verbal predicates (McIntosh & Villard, 2011), and a study on property concepts (adjectives and related constructions) (Villard, 2013).

In the area of fieldwork and language endangerment, a recent study describes the issues related to language documentation in a community with a high migration rate (Villard & Sullivant, under review).

1.4 Fieldwork narrative

1.4.1 Zacatepec Chatino Documentation Project

As already mentioned, my fieldwork started in 2006 with an exploratory trip along with other CLDP researchers in the Chatino region,

visiting a few communities in addition to San Marcos Zacatepec. One of the reasons why I picked Zacatepec as my field site in the first place was due to the immediate and overwhelming interest and willingness of the community members to share their knowledge of their language with the total stranger that I was. One way to meet people and bond with the community in general was to hold daily public workshops in the center of town where I would share, with whomever wanted to attend, my little knowledge of the language. Sometimes, the topic would divert to my native French language or English about which they were very curious. The main purpose of these meetings was to demonstrate to the community members that contrary to what they may have been led to believe, ZAC indeed was a full-fledged language, that it could be written if one wanted to, just as the languages of wider communication. This venue was also helping me identify individual community members particularly interested in language documentation and maintenance issues.

From 2007 to 2010, my fieldwork was funded by Woodbury's Major Documentation Project grant (MDP0153 Woodbury) from the *Endangered Languages Documentation Programme* (ELDP) major grant from the *School of Oriental and African Studies* (SOAS) at the University of London, United Kingdom. It allowed me to spend every summer in the field during those three years. Then, in June 2010, I was awarded an Individual Graduate Scholarship (IGS0102 Villard) from ELDP to fund my research and fieldwork for the next three years (Nov 2010-Nov 2013). During those years, I spent

a significant amount of time in San Marcos Zacatepec at various times of the year, collecting natural discourse data and training native speakers to conduct linguistics documentation of their own language. Those two grants allowed for a sustained (intermittent) presence in the field for a period of more than six years.

Over the years, I have become friends with many people in the community, and nurtured close relationships with a few. I worked closely with four individuals who ended up being central to the documentation project. To follow is a presentation of each of them¹⁰.

Margarita González Hernández is 71 years old , and has been working with me on the documentation of her native language since 2006. She is a *fluent speaker* according to Grinevald and Bert (2011). Chatino is still her main medium of communication as her social circle is mainly composed of people her age with a similar language profile. In that way, she represents the ideal language consultant typically sought by linguists working on the description of endangered languages. Margarita is very social and enjoys a constant flow of visitors who come to sit down at her house to chat for a while. She joined the project in 2006, first as a language consultant, i.e. helping me figure out the grammar of the language sitting through long hours of elicitation and transcription sessions. After a year of learning about various aspects of field linguistics research by attending linguistics

¹⁰Some parts of these individuals' descriptions can also be found in Villard and Sullivant (under review).

workshops and conferences in Oaxaca, by accompanying me to different recording locations within the community, and by participating in numerous conversations about the grammar of her native language, Margarita was ready to be a documentary linguist herself. She was trained to collect natural speech using a digital recorder and to keep metadata records for all sound files in a notebook. She was also responsible for compensating all participants to the text collection and keeping a detailed accounting book. Margarita has been the principal language documenter for the Zacatepec language documentation project and has excelled at her mission.

Anatolio Soriano Cortés is 65 years old, and he has been involved in the documentation project since he asked me to teach him to write ZAC in the summer of 2011. He is also a *fluent speaker* of Chatino. His speech is characteristic of male fluent speakers in that it tends to be conservative, and his attitude and commentaries are prescriptive. Soriano is an autodidact, having taught himself as a young man to earn a living fixing radios and all kinds of small appliances. He is a detail-oriented person, he is very patient and he can sit for hours trying to fix electric circuits even in the smallest objects. He met with me every day so that I could teach him how to write his native language. The learning process was difficult but his patience and his dedication allowed him to succeed in his new endeavor, and within a year he was a fluent reader and writer of ZAC. When I first met Anatolio, I had certain reservations about succeeding in teaching him to transcribe and translate natural discourse because of his advanced age. I decided to

train him in text collection as well, so that he could collect texts involving men only since Margarita was often collecting texts with women. Anatolio collected a few hours of texts with some of his acquaintances in the village but it became clear to me that he did not really enjoy this activity, and that he seemed to be a lot more interested in writing. Anatolio started focusing solely on his writing, and I trained him to transcribe and translate natural speech using a CD player and a simple notebook. During the period between 2011 and 2013, Anatolio spent endless hours listening to ZAC conversations on a CD player and has filled thirteen entire notebooks (all scanned and archived as part of the collection) with transcriptions and translations of many folktales and conversations from various members of the community.

María de Jesús Barrada is a 22-year-old *ghost speaker* of ZAC (Grinevald & Bert, 2011) who approached me during the summer of 2012 to be part of the ongoing documentation project in Zacatepec. I had known María for a couple of years because her mother Matilde Barrada had been involved in the project as a prolific story teller. María had always hidden her ZAC skills from me (as well as others) who assumed they were non-existent just as was apparently the case of all people her age within the community. One day, Matilde told me that María wanted to learn how to write ZAC to become a language transcriber like Anatolio. At first, I thought teaching her would be difficult if not impossible since I was not aware of her language skills, having never heard her utter a word in ZAC, and more importantly, she had always led me to believe that she did not speak ZAC at all. Never-

theless, I invited her to sit down with me everyday that summer so that she could start to learn a little about the language. We worked on individual ZAC words and how they could be written, and fairly quickly I realized that she could understand pretty much everything that was being uttered in the recordings we would listen to. We started working on transcriptions fairly quickly. I had a lot of recordings of her mother, I picked one of them and figured that she would understand her mother's speech best. At first, we had Matilde sit with us and repeat each utterance at a slower pace so that María could transcribe the words. We spent the summer working together on transcribing the story, and by the end of my stay María was competent at transcribing without my assistance. She was transcribing and translating in a notebook just like Anatolio. It turns out she is a much better speaker of ZAC than she initially advertised.

Then, the next year, I asked María if she would be interested in learning how to transcribe texts with a computer instead of a notebook. She had been interested in learning to use a computer, but the nearest computer classes were in the town of Río Grande and too far away to attend. I gave her a small notebook computer and taught her how to use the ELAN transcription software.¹¹ María transcribed and translated some three hours of speech and in doing has increased her own skills and fluency in ZAC. As a result of this additional exposure and interaction with ZAC, María has be-

¹¹Max Planck Institute for Psycholinguistics, <http://tla.mpi.nl/tools/tla-tools/elan/>.

come less inclined to hide her ZAC skills around her peers--though she is still too shy to claim to ZAC around older community members. She reported to me that she talks about her work with her friends and that the majority of them say that they would also like to be trained to read and write in ZAC. Economic opportunities for young people are practically nonexistent within the community and language documenting could be seen as a lucrative non-manual part-time job.

Javier Ayuso González is a 42-year-old *semi-speaker* of ZAC (Grinevald & Bert, 2011). Javier predominantly speaks Spanish but has very high levels of ZAC comprehension. As a *semi-speaker*, Javier is socially fully integrated within the ZAC *fluent speakers* group despite the fact that they know he is not a *fluent speaker*. *Fluent speakers* (who are all bilingual in Spanish and ZAC) will switch to Spanish to accommodate *ghost speakers*, but will not switch to accommodate *semi-speakers*, despite the fact that *semi-speakers* in these conversations may produce only Spanish. I have witnessed many such conversations where Javier was a Spanish-speaking participant in otherwise ZAC conversations.

He is very interested in and knowledgeable of the community's history. He is part of the local authorities and he enjoys spending time with elders talking about local history and traditions. He knows the geography of the area very well because he has traveled through the region extensively, and he entered the project as a cultural consultant and cartographer. He drafted a map of the community with its surroundings (see map 1.2), which

served as a stimulus in interviews with elders about local geography and history. Language use in these particular interviews varies. The usual scenario is that Javier speaks Spanish and the interlocutor responds in ZAC, there is a lot of code-switching that occurs during these interviews. Despite the fact that he is not a *fluent speaker*, he is the ideal candidate for this type of research because of his excellent relationship with most elders in the community and also because of his genuine passion for the region's history and geography.

The Zacatepec documentation project unfolded in ways that I had not anticipated. Each new participant would steer the project in exciting new directions. The participation of María was unexpected, as she is the youngest person ever to learn to read and write ZAC. She was the first *ghost speaker* to openly show interest in learning more Chatino. Her story motivated others in the community to want to follow in her footsteps.

1.5 Corpus and data collection

To date, the corpus of texts contains 195 hours of natural discourse with a total of 116 speakers, men and women ranging from 40 to 87 years old.¹² 95% of these recordings were collected independently by Margarita González Hernández while I was away from Zacatepec. The large number of

¹²This corpus is archived at the Endangered Languages Archive (ELAR) (<http://elar.soas.ac.uk/deposit/0256>) and at the Archive of Indigenous Languages of Latin America (AILLA) ([http://www.ailla.utexas.org/search/view_resource.html?lg_id=231 CTZ005](http://www.ailla.utexas.org/search/view_resource.html?lg_id=231%20CTZ005)).

speakers means that about one third of the ZAC speakers in the community have participated in the documentation of Zacatepec Chatino. The range of genres and topics includes among other things, conversations, personal narratives, folk tales, descriptions of traditional political system, culinary practices, and ritual speech. This breadth and volume of documentation could not have been achieved without the involvement of native speakers and community insiders who had been trained as language documenters. Many community members were eager to share and preserve their personal narrative. Most recordings in this corpus represent a particular individual's *tranche de vie* or 'slice of life'.

In the last three years of the documentation project, I collected about 6 hours of videos of conversations with about 10 different speakers. At first I was not sure whether speakers would be willing to be filmed at all, but it turned out that they did not seem to be bothered at all by the camera. The setting is always the same: they are sitting on low chairs, not quite facing each other, as Chatino people in general would rather not directly face each other when having a conversation. Instead they sit side by side, slightly turned toward each other, and don't generally look at each other either when they speak. The angle is wide enough to capture hand gestures, and the sound is captured by both the external mike of video camera as well as by an independent digital recorder. This participation formation is well documented in Mesoamerica from Zapotec to Mayan (Brown (2010); Brown, Sicoli, and LeGuen (2010)), and seems to represent a broader dis-

course feature in Mesoamerica. Furthermore, the fact that backchanneling uses repetition instead of head nods, can function to show involvement where visible backchannels afforded by mutual gaze like head nods are not ecologically afforded by the side-by-side participant formation (Mark Sicoli, p. c., April 2015).

The work of transcription and translation was achieved by five different people all introduced in the previous section: Anatolio Soriano Cortés, María de Jesús Barrada with her mother Matilde Barrada, and me with Margarita González Hernández.

As noted in the previous section, I trained Anatolio Soriano Cortés to read and write ZAC over the summer of 2011. After that training period, when I was away from the field, he transcribed/translated texts alone, using a CD player to listen to the recordings, and a notebook to transcribe texts (Anatolio is an older person and is not familiar with computers). Between 2011 and 2013, he transcribed about eight hours of texts (without tones), of which about five hours were reviewed and revised together during my stay in the field.

As also noted earlier, María de Jesús Barrada was trained to write ZAC over the summer of 2012. She transcribed texts that feature her mother's voice only. At first, she transcribed with her mother's help who repeated every utterance at a slower pace but little by little she was able to work by herself, and only asked for her mother's help occasionally. The translation work is also done with her mother's help when needed. María started tran-

scribing/translating on notebooks and then moved on to transcribing using *Elan*. She has transcribed about three hours of text (without tones) of which about two hours were reviewed and revised together.

As for me, the work of transcription and translation was always done with the help of Margarita González Hernández. Because of ZAC's intricate tonal system, this is an exercise that has to be done with the help of a native speaker whose task is to re-speak each utterance at a slow pace, and also to repeat each word in isolation first, and then in a specific tonal environment in order to consider the effect of the floating tones and determine the tonal class of the word in question. This process was very slow and tedious at first when a lot of new words kept coming up, but became less so over time when new words were only encountered every so often. Together, Margarita and I have transcribed about five hours of texts but reviewed and revised about seven hours of Anatolio's and María's work for a total of eleven hours of transcriptions.

As of 2015, my ZAC lexicon includes about one thousand non-verbal words, and a verb database counting about 320 simplex and complex verb roots conjugated in all four aspects (Completive, Progressive, Habitual and Potential) and six persons (1s, 2s, 3s, 1PLIN, 1PLEX, 2PL) amounting to a total of about six thousand recorded verb forms (not all paradigms are complete).

The variety of the data and width of the genres collected offer not only an excellent base for linguistic documentation but also a good glance

at the cultural environment of the language. One way of documenting the culture in question was achieved through the variety of texts recorded including genres and topics such as description of culinary, agricultural, and ritualistic practices. Documenting of culture is also achieved through the information found in the lexical database. As often as possible, both the basic and the derived meaning of a word are provided. For example, body parts often function as relational nouns, or designate specific parts of the structure of the house. The lexicon also contains terms specific to certain activities related for example to different phases of cultivation of plants and processing of harvest, etc. This information would allow the ethnographer to obtain information on the various stages of agricultural work.

"The Zacatepec Chatino Documentation Project's Collection" archived at AILLA (<http://www.ailla.utexas.org>) is among the largest archived corpora of natural discourse collected by native speakers in Mesomerica, and it has the potential to fuel an indefinite number of scholarly studies in linguistics and related fields in the future. It includes 195 hours of audio, 5 hours of video, and 597 pages of digital text with 0% restricted access.

There are other very large Mesoamerican collections which have also been collected by native speakers and can be found archived at AILLA such as the "Tojolab'al Collection" which includes 40 hours of audio, 62 hours of video, and 2076 pages of digital text with 83% restricted access, or the "Oxlajuuj Keej Maya' Ajtz'iib' Mayan Languages Collection" which includes 520 hours of audio, 15 hours of video, and 20042 pages of digital text with

0% restricted access.

1.6 Theoretical framework

Before delving into the description of the contrastive phonemic inventory, it is important to first present the theoretical background on which ZAC's surface phonological representation is based. The principles of Autosegmental phonology (Goldsmith, 1976) are helpful to describe ZAC's surface representation because they allow phonological processes such as tone and vowel harmony to be independent of, and extend beyond individual consonants and vowels. Autosegmental phonology treats phonological representations as multi-dimensional by showing multiple tiers which are linked to each other by association lines which indicate how the segments on each tier are to be pronounced at the same time.

The way ZAC's surface phonological representation is treated in this work is inspired by the analysis of the structure of tone in Japanese in Pierrehumbert and Beckman (1988). The surface phonological representation they propose is an autosegmental prosodic tree, to which substantive elements such as tones are linked by autosegmental association. In their prosodic trees, a node can have any number of daughter nodes, and only nodes of phonologically distinguished types (such as the mora, the syllable, the word, and the various levels of intonation phrase) appear in the tree. Furthermore, autosegmental links can be made not only to minimal tone bearing units at the bottom of the tree but also to any higher-level node.

A multi-dimensional representation of the prosodic features of ZAC allows us to distinguish between the domain of (or hosting of) a given feature, versus the actual locus of realization of that feature. For example, as is shown in figure 1.8, the domain of the mora for the extra vowel in the case of long vowels is the ω ¹³, but its locus of realization is the final syllable.

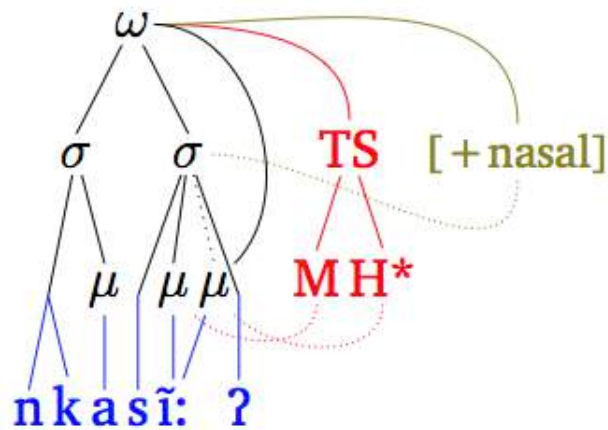


Figure 1.8: Autosegmental representation of prosodic features: *nkasiĩn?* 'he/she squeezed it'

¹³For now I am assuming a morphological/morphophonological domain " ω " which is basically any simplex (non-compound) word (minus enclitics). The ω is the domain for the tonal sequence (TS) discussed in chapter 4.

The autosegmental representation in figure 1.8 includes four different tiers. The prosodic tier (in black), the nasal tier (in green), the segmental tier (in blue), and finally the tonal tier (in red).

In the representation, some lines are solid and some are dotted. The solid lines are linkages pre-defined in the lexical representations (and might be termed “hosting”); the dotted lines are filled in by Linking rules, and are variable from one lexical representation to another. For example, the /M/ tone of the Tonal Sequence¹⁴ (henceforth TS) /M-H/ may or may not actually get linked¹⁵ depending on the moraic shape of the word.

In ZAC, the * marks the final linkable tone in the TS, and the tone after it (if one) is a lexically unlinked floating tone. The rule is to link the linkable tones, from right to left¹⁶, starting with the * marked tone, to the moras of the lexeme in a one-to-one fashion.

The prosodic tier (in black) includes the word (ω), the mora (μ), and the syllable (σ).

- ω hosts syllables, the final mora, the [+Nasal] feature, as well as the

¹⁴A Tonal Sequence (TS) is composed of up to three mora-linked tonal elements and may include a floating tone. TS's define Lexical Classes in the lexicon, they are morphological entities that pertain to simplex words whereas tones are phonological entities that pertain to moras (§4.6).

¹⁵All through this work, when it is said of a tone that it is linked to (associated with) a mora, it means that the phonology specifies that it occurs simultaneously with any phoneme segments associated to that mora.

¹⁶It is common in linguistics to use the terms 'right' and 'left' when referring to processes that actually occur in time rather than space. The statement in question could also be stated in terms of time, using the term 'preceding'. Both types of referents are used in this work.

tone sequence (TS). The ω -hosted extra mora (in the case of long vowels), and the [+nasal] feature both link (dotted line) to the last syllable.

- σ hosts moras, and consonants including ? (only one ? allowed per simplex word).

The nasal tier (in green) includes the [+Nasal] feature which links (dotted line) to the final syllable, and which is hosted by the ω .

The segmental tier (in blue) includes all segments but the mora hosts only vowel segments.

The tone tier (in red) includes the tonal elements (in this case /M/ and /H/), and each link to a mora (dotted line) in the last syllable. The tonal elements form the TS which is hosted by the ω .

As shown in figure 1.8, the moras are at the lowest level in the prosodic tree, and the mora is the minimal element which can be associated to a segment. In the tonal analysis presented in this work, the mora is also the minimal Tone Bearing Unit (henceforth TBU). We will see in Chapter 4 that not all moras are linked to a tone despite the fact that their surface F_0 contour looks like a well-defined tone. Indeed, as discussed in detail in chapter 4, a tone may phonetically spread rightward to all adjacent tonally unspecified moras in the next word and beyond, creating a slight contour (a slight downdrift of the F_0). In this case, the structural change

makes reference to phonetic parameters (i.e. the pitch level) requiring it to be maintained with a slight declination.

Chapter 4 explains in depth the surface representation of the tonal system in ZAC, but for the sake of clarity, the tonal tier is explained a bit more here also. As already mentioned, the TBU is the mora, as opposed to the syllable as the language has both monomoraic as well as dimoraic syllables, and the latter differ in the number of tones they can bear. Words with more than one mora may have a tone on each mora. It doesn't matter if the two moras are in separate syllables or in the same syllable (as in the example shown in figure 1.8). Monomoraic syllables can only have one tonal element¹⁷ but dimoraic syllables can bear two tonal elements.

As we can observe in figure 1.8, the word *nkasín?* 'he/she squeezed it' is a trimoraic disyllabic word where the antepenultimate mora in the penultimate syllable is not linked to any tone, the penultimate mora is linked to a /M/ tone (dotted line), and the final mora is linked to a /H/ tone (dotted line). This shows that a mora can be tonally linked or unlinked (unspecified for tone). Tonally unspecified moras can be affected by preceding tones, but when unaffected, they surface with a default [L] pitch, and sound the same as a /L/ tone (see figure 4.1 on page 148 on page 148).

¹⁷There is one Tone Class that is defined by the sequence /M-M-L/, and in that Tone Class alone, two tones link to a single mora when the associated word is monomoraic as on the word *xkà* 'another' (§4.7). Since there is no room on the vowel to mark both tones, the diacritic for the low tone is placed on top of the diacritic for the mid tone. Furthermore, *xkà* is a contraction of the word *chikà* where the mid tone is associated to the first vowel and the low tone is associated with the final vowel.

Now that the phonological representation for the prosodic features has been presented and discussed, we may turn to the description of the contrastive phonemic inventory.

Chapter 2

Segmental phonology

This chapter describes in detail ZAC's segmental sound system. ZAC also presents three contrastive supra-segmental features: nasalization, vowel length and tone. Nasal vowels and long vowels are described in this chapter together with oral vowels whereas tone, is dealt with in detail in chapter 4.

This chapter is organized as follows: §2.1 describes the general orthographical conventions in the practical orthography. §2.1 also allows for comments about the use of the practical orthography by native speakers during the documentation project. §2.2 discusses the vocalic system of ZAC presenting all vowel qualities as illustrated in figure 2.4. It describes the distribution of each phoneme and its allophonic variations. It also presents examples of all vowel types (oral, nasal, long and short) to show their contrastiveness, and discusses their respective distributional constraints. The consonant inventory which consists of twenty-two consonants (six of which almost exclusively occur in Spanish loans) as shown in table 2.3 is dealt with in §2.3. The consonant phonemes and their allophones are described grouped by place of articulation instead of by manner of articulation, because this mode of grouping leads to more generalizations about the con-

sonantal system in general. For example, we will see that the category of bilabials is vacant in the native sound system, the lamino-alveolars are copies of the apico-dentals, and finally the velars are asymmetrical.

Finally, all examples in this chapter are presented using both the practical orthography and IPA transcriptions. The latter are broad transcriptions in so far as they only show the pronunciation of segments and do not include tone pronunciation. The mora-linked tones are marked with diacritics on the vowels in the words written in the practical orthography.

2.1 Practical orthography

Because I rely on the practical orthography to express the phonemic representations, the relationship between the symbols and phonemics of the language ought to be made clear from the beginning.

The practical orthography reflects the phonemic system of the language, as a result, the examples in this chapter are presented using the practical orthography only, as opposed to using a conventional phonemic representation using the forward slashes (/ /)¹. In this work, the examples in plain Roman type (i.e not in italic) show the underlying (phonemic) representations, and the examples in brackets are phonetic representations.

Each graph is also introduced along with the description of each

¹Phonemic representations are used to present examples in §2.2.4.1 because in the cases discussed, the practical orthography is not entirely faithful to the actual phonemic representation.

phoneme in §2.2 and §2.3. This section describes the main characteristics of the practical orthography used in this work, and also allows for the discussion of some issues the proposed orthography presents to speakers.

All graphs used in the practical orthography are presented in figure 2.1 for the vowels, and in table 2.1 for the consonants. In figure 2.1, the vowel digraphs including an *n* represent the nasal vowels.

Figure 2.2 presents the phonemic vocalic inventory, and table 2.3 shows the phonemic consonant inventory.

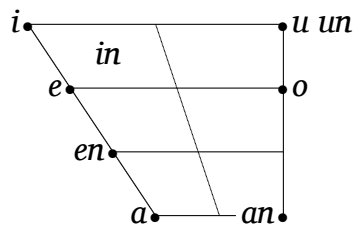


Figure 2.1: Practical orthography: vowels

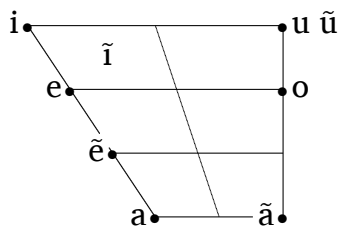


Figure 2.2: Phonemic inventory: vowels

	Bilabial	Apico-dental	Lamino-alveolar	Palatal	Velar	Labio-velar	Glottal
Stops	<i>p b</i>	<i>t d</i>	<i>tʲ</i>		<i>k</i>	<i>kw</i>	<i>ʔ</i>
Affricates		<i>ts</i>	<i>ch</i>				
Fricatives		<i>s</i>	<i>x</i>				<i>j</i>
Nasals	<i>m</i>	<i>n</i>	<i>nʲ</i>				
Laterals		<i>l</i>	<i>lʲ</i>				
Tap		<i>r</i>					
Trill		<i>rr</i>					
Approximant				<i>y</i>		<i>w</i>	

Table 2.1: Practical orthography: consonants

	Bilabial	Apico-dental	Lamino-alveolar	Palatal	Velar	Labio-velar	Glottal
Stops	(p) (b)	t (d)	<u>t</u>		k	k ^w	ʔ
Affricates		<u>ts</u>	<u>tʃ</u>				
Fricatives		s	ʃ				h
Nasals	(m)	n	<u>n</u>				
Laterals		l	<u>l</u>				
Tap		(r)					
Trill		(rr)					
Approximant				j		w	

Table 2.2: Phonemic inventory: consonants

Many of the graphs are also found in the Spanish alphabet. For the sounds lacking in the Spanish inventory, new graphs (or digraphs) are introduced. The palatal fricative /ʃ/ is written *x* following traditional Spanish practice and many other writing systems in Mesoamerica. The lamino-alveolar counterparts of the apico-dentals (/t/, /l/, /n/) are written *tʲ*, *lʲ*, *nʲ* respectively, and the consonant clusters composed of /t, l/ + /j/ are written *ty*, *ly* respectively.

This solution is ideal in this work or in scientific work in general

because it allows for a clear distinction between consonant clusters and single phonemes, but it is less than ideal anywhere else as the superscript symbol is hard to make with a keyboard. An easy solution to this issue that speakers have been using is writing the laminal sounds followed by a simple *y*, and the consonant clusters are written separated by an apostrophe as in : *sīlyá?* [siḷaʔ] 'cotton' and *sīlyā'* [silja] 'police'.

Contrastive vowel length is represented by doubling the vowel graph of the vowel in question. Although nasalization is a vowel feature, nasal vowels are written using the same grapheme *n* used for the nasal stop /n/, and it is placed after the vowel. This solution is more esthetically pleasing as well as easier to process for the reader (as opposed to using an ogonek under the vowel) because it avoids crowding the vowels with many different diacritics (tones are marked with up to two diacritics on the vowel already). Nasal vowel digraphs do not present any particular ambiguity in the orthography as firstly, the glottal stop is the only syllable final consonant allowed in native words in the language (word finally only), and secondly, nasal vowels only occur underlyingly in word final position (see §2.2 on nasal vowels). Any vocalic nasalization occurring in non-final syllables is the result of the Translaryngeal Vowel Harmony or of Nasal Spreading (§2.2.4.1, §2.2.4.2).

All word-initial non-continuants in native words undergo a voicing assimilation process when preceded by /n/. Nevertheless, a contrast exists between /t/ and /d/ and /p/ and /b/ in this environment in Spanish loans

so it is necessary to include a graph in the practical alphabet for these voiced consonants.

Finally, ZAC presents an intricate tonal system bearing lexical and grammatical functions. It has an inventory of five contrastive mora-linked tones which are represented in the orthography with a diacritic on the vowels where the grave accent $\grave{\text{}}$ marks a low tone /L/, the macron $\bar{\text{}}$ marks a mid-tone /M/, the acute accent $\acute{\text{}}$ marks a high tone /H/, the inverted caret $\check{\text{}}$ marks a rising contour tone /LH/, and finally the double acute accent ¨ marks a super-high tone /LS/. The language also presents floating tones which are marked on the right edge of words also with diacritics: a /L/ floating tone is marked with a grave accent $\grave{\text{}}$, a /H/ floating tone is marked with an acute accent $\acute{\text{}}$, a /LS/ floating tone is marked with a double acute accent ¨ .

For example: *kī́* (/M (H)/) 'grass' where $\bar{\text{}}$ marks a mora-linked mid-tone /M/, and $\acute{\text{}}$ marks a high floating tone /H/.

An in-depth description of the tonal system of ZAC is discussed in chapter 4. In the following sections, each phoneme is discussed describing its distribution and its allophonic variations. First, the vowels are discussed followed by the consonants.

2.2 Vocalic system

ZAC has a phonemic segmental inventory of five non-nasal vowels, and corresponding to them, 4 nasal vowels, as illustrated in figure 2.4. However, when vowel length is considered, then the contrastive vocalic inventory is even larger. As shown in the autosegmental representation in figure 2.3 (which was already presented and discussed in detail in §1.6 as figure 1.8), nasalization and vowel length only occur underlyingly in a very restricted domain, i.e the (final) prominent syllable², and may stretch over different segments or even different syllables, they are better analyzed as supra-segmental features. Nevertheless, in order to demonstrate their contrastiveness and the restrictions on their distribution, all vowel types are introduced and described in detail in this chapter.

For clarity and convenience purposes, some of the concepts related to the autosegmental analysis of the vocalic system which were already explained in §1.6 are reiterated here.

The autosegmental representation in figure 2.3 (which was already introduced in chapter 1 as figure 1.8) includes four different tiers. The prosodic tier (in black), the nasal tier (in green), the segmental tier (in blue), and finally the tonal tier (in red).

In the representation, some lines are solid and some are dotted. The solid

²The prominence is based on the level of contrastiveness. The final syllable is the most prominent syllable in ZAC because this is where the most contrast occurs at the segmental level as well as at the prosodic level.

lines are linkages pre-defined in the lexical representations (and might be termed “hosting”); the dotted lines are filled in by Linking rules, and are variable from one lexical representation to another.

In ZAC, the * marks the final linkable tone in the TS, and the tone after it (if one) is a lexically unlinked floating tone. The rule is to link the linkable tones, from right to left, starting with the * marked tone, to the moras of the lexeme in a one-to-one fashion.

The prosodic tier (in black) includes the word (ω), the mora (μ), and the syllable (σ).

- ω hosts syllables, the final mora, the [+Nasal] feature (as well as the TS). The ω -hosted extra mora (in the case of long vowels), and the [+nasal] feature both link (dotted line) to the last syllable.
- σ hosts moras, and consonants including ?.

The nasal tier (in green) includes the [+Nasal] feature which links (dotted line) to the final syllable, and which is hosted by the ω .

The segmental tier (in blue) includes all segments but the mora hosts only vowel segments.

The tone tier (in red) includes the tonal elements (in this case /M/ and /H/), and each link to a mora (dotted line) in the last syllable. The tonal elements form the TS which is hosted by the ω .

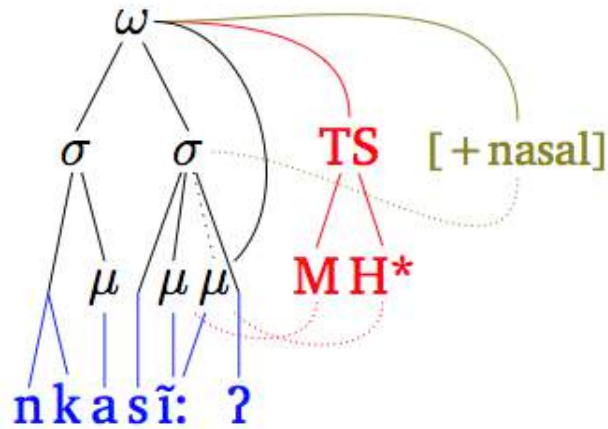


Figure 2.3: Autosegmental representation of prosodic features: *nkasĩn?* 'he/she squeezed it'

Figure 2.4 presents the nine vowel phonemes. This figure was already presented in §2.1 for convenience when discussing the corresponding graph for each vowel phoneme in the practical orthography.

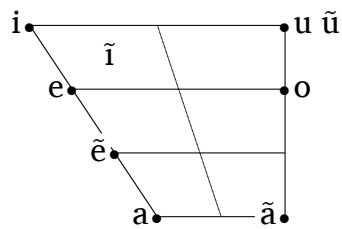


Figure 2.4: Phonemic vowel inventory

Each vowel is discussed separately by stating first, its distribution, second, its allophones and the rules that govern them, and third by giving

minimal pairs or near minimal pairs to distinguish it from other vowels.

Examples of each vowel are presented below in a variety of environments, i.e. in final as well as non-final syllables of roots followed or not by a /ʔ/. Furthermore, examples of each vowel in prefixes in antepenultimate syllables in prefixes are also included when applicable.

2.2.1 Oral vowels

2.2.1.1 /a/

/a/ does not present any restrictions in its distribution. It occurs in final as well as non-final syllables of roots followed or not by a /ʔ/ as well as in prefixes in antepenultimate syllables. As was shown in figure 2.3, only word-final syllables can be long, and as a result /a/ may be long in final syllables but is always short in non-final syllables. /a/ is pronounced [a] and may be slightly nasalized and surface as [ã] after an /n/ but this slight phonetic change is not marked in the phonetic transcriptions as the latter are broad transcriptions.

nǎ [na]	<i>thing</i>
pǎ [pa]	<i>dad</i>
kwǎ [k ^w a]	<i>already</i>
mpaǎ [mba:]	<i>godfather</i>
Wyǎǎ [bja:]	<i>Santos Reyes Nopala, Oaxaca</i>
chǎʔ [tʃaʔ]	<i>word</i>

jakwa [hak ^w a]	<i>four</i>
tu?wa [tu?wa]	<i>his/her mouth</i>
mòjā [moha]	<i>nun</i>
mùl ^y ā [mu _l a]	<i>mule</i>
sit ^y a [sit ^y a]	<i>his/her fontanelle</i>
ntsuwaà? [ndzuwa:ʔ]	<i>hierba santa (piper auritum)</i>
papà ^y ā [papaja]	<i>papaya</i>
tatsin [tatsĩ]	<i>empty</i>
kwana [k ^w ana]	<i>mirror</i>
pàn ^y ūn [pa _n ũ]	<i>rebozo</i>
màl ^y ī [ma _l i]	<i>godmother</i>
wa?ā [ba?a]	<i>tamarind</i>
na?an [nã?ã]	<i>house</i>
watā [bata]	<i>cattle</i>
yaka [jaka]	<i>tree, wood</i>
tra?wé [tra?we]	<i>middle</i>
yùwā [juwa]	<i>mare</i>
ja?wǎ [ha?wa]	<i>banana</i>
tijl ^y àkwǎ [tij _l ak ^w a]	<i>fourteen</i>
ntikyākwén [ndikjak ^w ẽ]	<i>he/she is raising it</i>
nka-y-ata [ŋgajata]	<i>he/she bathed</i>
nka-yūjwī [ŋgajuhmi]	<i>he/she killed it</i>
nka-te?en [ŋgatẽ?ẽ]	<i>he/she got married</i>
kutùnǎ? [kutunaʔ]	<i>he/she will lose it</i>
nkutyāā́ tí? [ŋgutja: tiʔ]	<i>he/she liked it</i>

Notice that /a/ in *na?an* [nã?ã] 'house' surfaces as [ã]. This results from Translaryngeal Vowel Harmony which is discussed in more detail in §2.2.4.1.

Below are presented minimal or near minimal pairs for /a/ versus all other vowels:

/a/ ≠ /e/:	kaa [ka:]	nine	kee [ke:]	stone
/a/ ≠ /i/:	kaa [ka:]	nine	kiĩ [ki:]	grass
/a/ ≠ /o/:	tʷa [ʧa]	corn cob	Tʷo [ʧo]	Pedro
/a/ ≠ /u/:	nkalukwă [ŋgalukʷa]	he/she swept	nkulukwă [ŋgulukʷa]	it got swept
/a/ ≠ /ã/:	kaa [ka:]	nine	kaàn [kã:]	he/she goes home
/a/ ≠ /ẽ/:	xāá [ʃa:]	luminosity	xēēn [ʃẽ:]	wide
/a/ ≠ /ĩ/:	kaa [ka:]	nine	kiin [kĩ:]	hematoma
/a/ ≠ /ũ/:	kaa [ka:]	nine	kūūn [kũ:]	sweet potato

2.2.1.2 /e/

/e/ has a restricted distribution in ZAC. Firstly, it never occurs after the nasal stop /n/, and secondly it never occurs underlyingly in non-final syllables of simplex roots³. As a result there is no prefix in the language presenting /e/.

This restriction is due to a historical sound change. Campbell (2013) demonstrates comparing data from conservative Zenzontepec Chatino with ZAC as well as with other Chatino varieties, that "a historical sound change occurred in ZAC where the penultimate *e became i, and the antepenultimate *e became a" (p406).

Spanish borrowings with /e/ in penultimate syllables in the donor language present an /i/ in that position, as in the word *mìsã* 'table' (from Spa. *mesa*)⁴. Furthermore, /e/ only surfaces in penultimate syllables result-

³/e/ may occur in antepenultimate syllables of compounds as in 'bees wax' *kejoʔo*. /ke/ corresponds to the first element of the compound (first element could be *kee* 'stone').

⁴The borrowed word for 'melon' *melòni* [meloni] does not present an /a/ as expected. May be in this particular case, the word was borrowed after the sound change had run its course, or may be the word is reanalyzed as a compound like the word for 'bees wax'.

ing from the Translaryngeal Vowel Harmony across a laryngeal (§2.2.4.1) as shown in *cheʔḗ* [tʃeʔe] 'rooster' and *nkweje* [ŋg^wehe] 'epazote' .

/e/ may be long in final syllables but is always short in non-final syllables as shown in autosegmental representation in figure 2.3.

chē [tʃe]	<i>buddy</i>
kē [ke]	<i>his/her head</i>
wa nteḗ [ba nde:]	1 PLEX
kee [ke:]	<i>stone</i>
cheʔḗ [tʃeʔe]	<i>rooster</i>
nkweje [ŋg ^w ehe]	<i>epazote</i>
melòní [meloni]	<i>melon</i>
lutseʔ [lutseʔ]	<i>his/her tongue</i>
ntukèʔ [ndukeʔ]	<i>he/she cooks it</i>
skuwe [skuwe]	<i>his/her penis/vagina</i>
tikēé [tike:]	<i>his/her stomach</i>
sin ^y eʔ [siŋeʔ]	<i>his/her sons/daughter</i>
jl ^y iwēʔē [jliβeʔe]	<i>its wing</i>
jn ^y ākē [hŋake]	<i>his/her head</i>
traʔwḗ [traʔwe]	<i>middle</i>
tikèʔ [tikeʔ]	<i>aroused</i>
siyěʔ [sijeʔ]	<i>dressed up</i>
tsaʔwě́ [tsaʔwe]	<i>good</i>
nkyaseʔ [ŋgjaseʔ]	<i>it got deflated</i>
nkyanè [ŋgjanē]	<i>he/she sprayed it</i>
nkyawè [ŋgjaʔwe]	<i>it got split</i>

Because of the restricted distribution of /e/ and /u/ (§2.2.1.4) in the language, it is difficult to find a minimal pair that would contrast them in the same environment. Indeed, /e/ generally occurs in final syllables whereas /u/ generally occurs in non-final syllables. Below are presented minimal or near minimal pairs for /e/ versus other vowels:

/e/ ≠ /a/:	kee [ke:]	stone	kaa [ka:]	nine
/e/ ≠ /i/:	kweeʔ [k ^w e:ʔ]	crab	kwiiʔ` [k ^w i:ʔ]	ring
/e/ ≠ /o/:	kee [ke:]	stone	kōō [ko:]	fog
/e/ ≠ /ā/:	kee [ke:]	stone	kaàn` [kā:]	he/she goes home
/e/ ≠ /ẽ/:	kiche [kit _ɛ]e	agave fiber	kichen [kit _{ɛ̃}]	village
/e/ ≠ /ĩ/:	kee [ke:]	stone	kiin [kĩ:]	hematoma
/e/ ≠ /ũ/:	kee [ke:]	stone	kūūn [kũ:]	sweet potato

2.2.1.3 /i/

/i/ occurs in final as well as non-final syllables of roots followed or not by a /ʔ/ as well as in prefixes in antepenultimate syllables. It is slightly restricted in its distribution as it does not occur after the nasal stop /n/ nor the palatal glide /j/. As was demonstrated in the autosegmental representation in figure 2.3, only word-final syllables can be long, and as a result /i/ may be long in final syllables but is always short in non-final syllables.

pí [pi]	poult
pí [pi:]	fair skinned, pale
lʔiʔ [liʔ]	parrot
mpíʔ [mbiʔ]	dram
kiiʔ [ki:ʔ]	fire

tiji [tihi]	<i>stingy</i>
chit ^y i [tʃiʈi]	<i>his/her village village</i>
suti [suti]	<i>his/her father</i>
ntujwì [nduhmi]	<i>he/she kills it</i>
sin ^y eʔ [siŋeʔ]	<i>his/her son/daughter</i>
jl ^y iwēʔē [jliβeʔe]	<i>its wing</i>
tikèʔ [tikeʔ]	<i>aroused</i>
kwīnéʔ [k ^w inēʔ]	<i>young</i>
siyěʔ [sijeʔ]	<i>dressed up</i>
kwil ^y oʔo [k ^w iɔʔo]	<i>his/her spouse</i>
liʔya [liʔja]	<i>his/her tooth</i>
sit ^y a [siʈa]	<i>his/her fontanelle</i>
chikǎnʔ [tʃikǎʔ]	<i>his/her shirt</i>
tijn ^y ān [tīhṅǎ]	<i>his/her bone</i>
yānī [janī]	<i>his/her neck</i>
kuʔwī [kuʔwi]	<i>drunk</i>
kuliyǎʔ [kulijaʔ]	<i>rich</i>
melòní [melonī]	<i>melon</i>
nkatichoʔ [ŋgatitʃoʔ]	<i>he/she defecated</i>
nti-l ^y aja [ndiɭaja]	<i>it gets emptied</i>
nti-kùtí [ndikuti]	<i>it gets softer</i>

Notice that /i/ in *tijn^yān* [tīhṅǎ] 'his/her bone' surfaces as [ī]. This results from Nasal Spreading which is discussed in more detail in §2.2.4.2.

Below are presented minimal or near minimal pairs for /i/ versus all other vowels:

/i/ ≠ /a/:	tiʔi [tiʔi]	<i>sick</i>	taʔa [taʔa]	<i>party</i>
/i/ ≠ /e/:	kwiiʔ [k ^w i:ʔ]	<i>ring</i>	kweeʔ [k ^w e:ʔ]	<i>crab</i>
/i/ ≠ /o/:	kiĩ [ki:]	<i>grass</i>	kōō [ko:]	<i>fog</i>
/i/ ≠ /u/:	chiĩ [tʃi:]	<i>chicken rump</i>	chūú [tʃu:]	<i>Jesus</i>
/i/ ≠ /ã/:	kiĩ [ki:]	<i>grass</i>	kaàn` [kã:]	<i>he/she goes home</i>
/i/ ≠ /ẽ/:	kichi [kitʃi]	<i>metate</i>	kichen [kitʃẽ]	<i>village</i>
/i/ ≠ /ĩ/:	kiĩ [ki:]	<i>grass</i>	kiin [kĩ:]	<i>hematoma</i>
/i/ ≠ /ũ/:	kiĩ [ki:]	<i>grass</i>	kūūn [kũ:]	<i>sweet potato</i>

2.2.1.4 /u/

The distribution of /u/ is highly restricted. /u/ in final syllables in monosyllabic words is very rare (2 examples only in the whole corpus), and there is no /u/ in final syllables of polysyllabic words in native words. So /u/ is pretty much reserved for non-final syllables⁵. But because it is found in contrastive environments in regard to all other vowels (even if in very few examples), /u/ is analyzed as a phoneme just like all other vowels in the inventory. Similarly to the fact that /i/ does not occur after the palatal glide /j/, /u/ does not occur after the labio-velars /k^w/ or /w/ (§2.3.5). /u/ does not occur either after the nasal stop /n/, just like all the other non-low oral vowels in the inventory (/e, i, o/). /u/ may be long in final syllables but is always short in non-final syllables.

⁵Campbell (2013) offers some historical information about the status of /u/ in Chatino languages: "The infrequency of /o/ in penultimate syllables is probably due to a very old change where /o/ merged with /u/ in non-final syllables. No known Chatino language significantly contrasts /o/ and /u/ outside of root-final syllables. The picture of /o/ and /u/ is not all clear in Zapotec either, so the pattern is possibly as old as proto-Zapotecan or earlier" (p88).

Examples below present /u/ in final (1 native example only: *xǔ?*) as well as non-final syllables of roots followed or not by a /ʔ/ as well as in prefixes in antepenultimate syllables. In Spanish borrowings /u/ does appear in final syllable as shown in the words for 'donkey' and 'asunto' presented below. So a clearer phonemic status of /u/ may be a recent phenomenon.

<i>xǔ?</i> [ʃuʔ]	<i>oldster</i>
<i>chūú</i> [tʃu:]	<i>Jesus</i>
<i>sùntǔ</i> [suntu]	<i>issue</i> (from Spa. <i>asunto</i>)
<i>bùrrǔ</i> [buʀu]	<i>donkey</i> (from Spa. <i>burro</i>)
<i>kuʔwǐ</i> [kuʔwi]	<i>drunk</i>
<i>suti</i> [suti]	<i>his/her father</i>
<i>tuʔwa</i> [tuʔwa]	<i>his/her mouth</i>
<i>lutseʔ</i> [lutseʔ]	<i>his/her tongue</i>
<i>skuwe</i> [skuwe]	<i>his/her penis/vagina</i>
<i>kyula</i> [kjula]	<i>male</i>
<i>kula</i> [kula]	<i>old</i>
<i>xulʔà</i> [ʃulʔa]	<i>jealous</i>
<i>nkūjwī</i> [ŋguhmi]	<i>he/she died</i>
<i>nkūjwīn</i> [ŋgūhmī]	<i>I died</i>
<i>nkūwēn</i> [ŋgūwē]	<i>ripe</i>
<i>kuliyǎʔ</i> [kuliʔaʔ]	<i>rich</i>
<i>nkayūkwīnʔ</i> [ŋgajuk ^{wī} ʔ]	<i>he/she smelled it</i>
<i>tukuʔwà</i> [tukuʔwa]	<i>cold</i>
<i>lukūtí</i> [lukuti]	<i>soft</i>
<i>nkasuwǐʔ</i> [ŋgasuwiʔ]	<i>he/she turned it off</i>
<i>ntikùtí</i> [ndikuti]	<i>it gets softer</i>
<i>nku-laja</i> [ŋgulaha]	<i>it got emptied</i>
<i>nku-lukwǎ</i> [ŋguluk ^w a]	<i>it got swept</i>
<i>nku-nuʔun</i> [ŋgunǔʔũ]	<i>it got broken</i>

Note that /u/ in *nkūjwīn* [ŋgūhmī] 'I died' and *nkūwēn* [ŋgūwē] 'ripe' surfaces as [ū]. This results from Nasal Spreading which is discussed in more detail in §2.2.4.2.

Below are presented minimal or near minimal pairs for /u/ versus all other vowels. Because of the restrictions on the distribution of /u/ (/u/ tends to occur in non-final syllables) and nasal vowels (final syllables) minimal pairs to contrast them are not available:

/u/ ≠ /a/:	nkulukwǎ [ŋguluk ^w a]	<i>it got swept</i>	nkalukwǎ [ŋgaluk ^w a]	<i>he/she swept</i>
/u/ ≠ /i/:	kunà [kuna]	<i>he/she will cry</i>	kina [kina]	<i>sandal</i>
/u/ ≠ /o/:	xǔʔ [xuʔ]	<i>oldster</i>	xòʔ [xoʔ]	<i>broody</i>

2.2.1.5 /o/

/o/ has quite a restricted distribution also⁶: it does not occur after the nasal stop /n/, and it may occur in non-final syllables only if ALL vowels in ALL syllables are also /o/⁷. /o/ surfaces as [ɔ] when followed by a /ʔ/. Furthermore, /o/, just as is the case for /u/, does not occur after the labio-velars /k^w/ or /w/ (§2.3.5). /o/ may be long in final syllables but is always short in non-final syllables.

⁶As was mentioned in a footnote in §2.2.1.4, the infrequency of /o/ in penultimate syllables is probably due to a very old change where /o/ merged with /u/ in non-final syllables (Campbell, 2013)

⁷An exception to this rule is the word borrowed from Spanish *monja* 'nun': mòjǎ̃ [mōha]

lo [lo]	<i>type</i>
Tʸǝ [tɔ]	<i>Pedro</i>
kōō [ko:]	<i>fog</i>
yo [jo]	<i>guy</i>
yoo [jo:]	<i>soil</i>
pìxǝ [piʃo]	<i>peso</i> (from Spa. <i>peso</i>)
nkālǝ̀ [ŋgalo:]	<i>he/she removed it</i>
nkayoǝ [ŋgajo:]	<i>he/she ground it</i>
tyèmpǝ [tjempo]	<i>time</i> (from Spa. <i>tiempo</i>)
sumilǝ [sumilo]	<i>hat</i> (from Spa. <i>sombrero</i>)
rrumèyǝ [rume:jo]	<i>remedy</i> (from Spa. <i>remedio</i>)
sundàǝ [sundao]	<i>soldier</i> (from Spa. <i>soldado</i>)
mòjà [mōha]	<i>nun</i>
melǝnĩ [melonĩ]	<i>melon</i>
nkayako [ŋgajako]	<i>he/she ate</i>

When /o/ is followed by a glottal stop it is realized as [ɔ] (no other vowel is affected by an adjacent glottal stop). In cases where the glottal stop is also followed by an /o/, a Progressive Translaryngeal Vowel Harmony (§2.2.4.1) process takes place where the final /o/ also lowers to [ɔ] as shown in examples below:

/o/ --> [ɔ] / ___ /ʔ/:

xǝʔ [ʃɔʔ]	<i>oldster</i>
nkatichoʔ [ŋgatitʃɔʔ]	<i>he/she defecated</i>

Examples of Progressive Translaryngeal Vowel Harmony:

joʔǝ́ [hɔʔɔ]	<i>saint</i>
kwilʸoʔo [kwiɭɔʔɔ]	<i>his/her spouse</i>
nkotǝʔó [ŋgotɔʔɔ]	<i>he/she went out</i>

/o/ can only surface in non-final syllables of words (prefixes included) if and only if ALL syllables are also /o/. In the words presented below, *nko-tso* 'it burst', *nko-tǝʔó* 'he/she went out', the underlying form of

the prefix is /nku/, but the latter surfaces as [o] because of the /o/ Vowel Harmony. Then in the words *nt-olòó* 'he/she scratches it' and *k-olòó* 'he/she will scratch it', it is the u- causative morpheme (§5.3.1.3.1) which surfaces as [o] instead of [u] because of the /o/ Harmony Rule.

Examples of /o/ Vowel Harmony:

<i>koló</i> [kolo]	<i>color</i> (from Spa. <i>color</i>)
<i>nko-tso</i> [ɲgotso]	<i>it burst</i>
<i>nt-olòó</i> [ndolo:]	<i>he/she scratches it</i>
<i>k-olòó</i> [kolo:]	<i>he/she will scratch it</i>
<i>nko-tóó</i> [ɲgotóó]	<i>he/she went out</i>

Below are presented minimal or near minimal pairs for /o/ versus all other vowels:

/o/ ≠ /a/:	kōō [ko:]	<i>fog</i>	kaa [ka:]	<i>nine</i>
/o/ ≠ /e/:	kōō [ko:]	<i>fog</i>	kee [ke:]	<i>stone</i>
/o/ ≠ /i/:	kōō [ko:]	<i>fog</i>	kií [ki:]	<i>grass</i>
/o/ ≠ /u/:	xò? [ʃɔ?]	<i>broody</i>	xǔ? [ʃu?]	<i>oldster</i>
/o/ ≠ /ã/:	kōō [ko:]	<i>fog</i>	kaàn [kã:]	<i>he/she goes home</i>
/o/ ≠ /ẽ/:	kwītō [k ^w ito]	<i>hen</i>	kwītēn? [k ^w itē?]	<i>possum</i>
/o/ ≠ /ĩ/:	kōō [ko:]	<i>fog</i>	kiin [kĩ:]	<i>hematoma</i>
/o/ ≠ /ũ/:	kōō [ko:]	<i>fog</i>	kūūn [kũ:]	<i>sweet potato</i>

2.2.2 Nasal vowels

2.2.2.1 /ã/

/ã/ (written *an* in the practical orthography) may only occur underlyingly in final syllables of roots, and /ã/ may be long in final syllables but is always short in non-final syllables as illustrated in figure 2.3 on page 51.

It may be followed or not by a /ʔ/. Nasalization changes the quality of the vowel and as a result /ã/ surfaces phonetically as [ã̃].

nan [nã̃]	1 PLINCL SUBJ
kaàn` [kã:]	<i>he/she goes home</i>
n^yāān [nã:]	<i>poison</i>
nkaànʔ [ŋgã:ʔ]	<i>booger</i>
rã` kãnʔ [ra kãʔ]	<i>then</i>
tsaan [tsã:]	<i>day</i>
tāān [tã:]	<i>lard</i>
kitán [kitã]	<i>hammock</i>
tijn^yān [tĩhã̃]	<i>his/her bone</i>
kin^yanʔ [kiŋãʔ]	<i>my feet</i>
ntin^yan [ndiŋã̃]	<i>comal</i>
tuʔwān [tuʔwã̃]	<i>my mouth</i>
sit^yān [sit ^y ã̃]	<i>my fontanelle</i>
ntixikwan [ntiʃik ^w ã̃]	<i>he/she plucks it</i>
nkayātán [ŋgajatã̃]	<i>I bathed</i>

[ã̃] may occur in penultimate syllables resulting from Nasal Spreading across a /w/ (§2.2.4.2) and Translaryngeal Vowel Harmony across a laryngeal (§2.2.4.1) as shown in examples below.

kawen [kãwẽ]	<i>it will ripen</i>
n^yaʔàn` [nãʔã̃]	<i>how</i>
naʔan [nãʔã̃]	<i>house</i>
n^yajan [nãhã̃]	<i>year</i>
jn^yaʔan [hŋãʔã̃]	<i>my mother</i>
kinaʔan [kinãʔã̃]	<i>a lot</i>
nkwichàʔān [ŋg ^w itʃãʔã̃]	<i>he/she changed clothes</i>
ntâtsàʔān [ntatsãʔã̃]	<i>he/she is changing clothes</i>

Below are presented minimal or near minimal pairs for /ã/ versus all other vowels (except /ã/ versus /u/ which has not been encountered):

/ã/ ≠ /a/:	kaàn` [kã:]	<i>he/she goes</i> <i>home</i>	kaa [ka:]	<i>nine</i>
/ã/ ≠ /e/:	kaàn` [kã:]	<i>he/she goes</i> <i>home</i>	kee [ke:]	<i>stone</i>
/ã/ ≠ /i/:	kaàn` [kã:]	<i>he/she goes</i> <i>home</i>	kii´ [ki:]	<i>grass</i>
/ã/ ≠ /o/:	kaàn` [kã:]	<i>he/she goes</i> <i>home</i>	kōō [ko:]	<i>fog</i>
/ã/ ≠ /ẽ/:	kīchān? [kitʃãʔ]	<i>his/her hair</i>	kichen [kitʃẽ]	<i>village</i>
/ã/ ≠ /ĩ/:	kaàn` [kã:]	<i>he/she goes</i> <i>home</i>	kiin [kĩ:]	<i>hematoma</i>
/ã/ ≠ /ũ/:	kaàn` [kã:]	<i>he/she goes</i> <i>home</i>	kūūn [kũ:]	<i>sweet potato</i>

2.2.2.2 /ẽ/

/ẽ/ (written *en* in the practical orthography) may only occur underlyingly in final syllables of roots, and /ẽ/ may be long in final syllables but is always short in non-final syllables as illustrated in figure 2.3 on page 51. It may be followed or not by a /ʔ/. Nasalization changes the quality of the vowel and as a result /ẽ/ surfaces phonetically as [ẽ̃].

neʔ [nɛʔ]	person
nēē [nē:]	he/she said
xēēn [ʃɛ:]	wide
kwīnéʔ [kwɪnɛʔ]	young
saně [sanɛ]	guitar
nkyanè [ŋgjanɛ]	he/she sprayed it
lutsenʔ [lutsɛʔ]	my tongue
skuwen [skūwɛ]	my penis/vagina
tikēén [tikɛ:]	my stomach
ntùkénʔ [ndukɛʔ]	I cook it
kichen [kitʃɛ]	village
nkūwēn [ŋgūwɛ]	ripe
kwītēnʔ [k ^w itɛʔ]	possum
lūwēn [lūwɛ]	I am little
natènʔ [natɛ]	people
kutixēn [kutiʃɛ]	daughter in law

[ɛ] may occur in penultimate syllables resulting from Translaryngeal Vowel Harmony across a laryngeal (§2.2.4.1) as shown in examples below.

seʔen [sɛʔɛ]	place
xūnéʔèn [ʃunɛʔɛ]	scorpion
tixēʔèn [tiʃɛʔɛ]	his/her intestines
jn ^y eʔen [hŋɛʔɛ]	its tail
nkateʔen [ŋgatɛʔɛ]	he/she got married

Below are presented minimal or near minimal pairs for /ɛ/ versus all other vowels (except /ē/ versus /u/ which has not been encountered):

/ɛ/ ≠ /a/:	xēēn [ʃɛ:]	wide	xāá [ʃa:]	luminosity
/ɛ/ ≠ /e/:	lūwēn [lūwɛ]	I am little	lūwē [luwe]	he/she is little
/ɛ/ ≠ /i/:	tēʔēn [tɛʔɛ]	jug	tiʔi [tiʔi]	sick
/ɛ/ ≠ /o/:	kwītēnʔ [k ^w itɛʔ]	possum	kwītō [k ^w ito]	hen
/ɛ/ ≠ /ã/:	kichen [kitʃɛ]	village	kīchānʔ [kitʃãʔ]	his/her hair
/ɛ/ ≠ /ĩ/:	tēʔēn [tɛʔɛ]	jug	tiʔin [tiʔĩ]	heavy
/ɛ/ ≠ /ũ/:	xēēn [ʃɛ:]	wide	xū̀n [ʃũ:]	you will fight

2.2.2.3 /ĩ/

/ĩ/ (written *in* in the practical orthography) may only occur underlyingly in final syllables of roots, and /ĩ/ may be long in final syllables but is always short in non-final syllables as illustrated in figure 2.3 on page 51. It may be followed or not by a /ʔ/. Nasalization changes the quality of the vowel and as a result /ĩ/ surfaces phonetically as [ĩ̃].

kiin [kĩ:]	<i>hematoma</i>
jiin' [hĩ:]	<i>music</i>
siin [sĩ:]	<i>dinner</i>
tsiinʔ [tsĩ:ʔ]	<i>small insect</i>
yānī [janĩ]	<i>his/her neck</i>
xunĩ [ʃunĩʔ]	<i>dog</i>
chit ^y in [tʃitĩ]	<i>my village village</i>
sutin [sutĩ]	<i>my father</i>
ntujwin [ndũhmĩ]	<i>I kill it</i>
tatsin [tatsĩ]	<i>empty</i>
nkūjwin [ŋgũhmĩ]	<i>I died</i>
Kinixin' [kinĩʃĩ]	<i>Santiago Yaitepec</i>
nuʔwin [nuʔwĩ]	<i>you (sg)</i>
n ^y ikwin [ŋik ^w ĩ]	<i>he/she will say it</i>
nkayūkwīnʔ [ŋgajuk ^w ĩʔ]	<i>he/she smelled it</i>

[ĩ̃] may occur in penultimate syllables resulting from Translaryngeal Vowel Harmony across a laryngeal (§2.2.4.1) and Nasal Spreading across a /w/ (§2.2.4.2) as shown in examples below.

kijin [kĩhĩ]	<i>leather</i>
tiʔin [tĩʔĩ]	<i>heavy</i>
nkajīʔín [ŋgahĩʔĩ]	<i>he/she hit it</i>
nkajiwīn [ŋgahĩβĩ]	<i>I whistled</i>

Below are presented minimal or near minimal pairs for /ĩ/ versus all other vowels (except /ĩ/ versus /u/ which has not been encountered):

/ĩ/ ≠ /a/:	kiin [kĩ:]	<i>hematoma</i>	kaa [ka:]	<i>nine</i>
/ĩ/ ≠ /e/:	kiin [kĩ:]	<i>hematoma</i>	kee [ke:]	<i>stone</i>
/ĩ/ ≠ /i/:	tiʔin [tĩʔĩ]	<i>heavy</i>	tiʔi [tiʔi]	<i>sick</i>
/ĩ/ ≠ /o/:	kiin [kĩ:]	<i>hematoma</i>	kōō [ko:]	<i>fog</i>
/ĩ/ ≠ /ã/:	kiin [kĩ:]	<i>hematoma</i>	kaàn` [kã:]	<i>he/she goes</i> <i>home</i>
/ĩ/ ≠ /ẽ/:	tiʔin [tĩʔĩ]	<i>heavy</i>	tēʔēn [tẽʔẽ]	<i>jug</i>
/ĩ/ ≠ /ũ/:	kiin [kĩ:]	<i>hematoma</i>	kūūn [kũ:]	<i>sweet potato</i>

2.2.2.4 /ũ/

/ũ/ (written *un* in the practical orthography) may only occur underlyingly in final syllables of roots, and /ũ/ may be long in final syllables but is always short in non-final syllables as illustrated in figure 2.3 on page 51. It may be followed or not by a /ʔ/.

chūnʔ [tʃūʔ]	<i>because</i>
nkùṅ [ŋgū]	<i>turtle</i>
kūūn [kū:]	<i>sweet potato</i>
jūún [hū:]	<i>thread</i>
rrsuṅ [ɾsū:]	<i>message (from Spa. razón)</i>
xùún [ʃū:]	<i>he/she will fight</i>
kwitun [kʷitū]	<i>bee</i>
tichūnʔ [titʃūʔ]	<i>his/her back</i>
tiʔnʷun [tiʔnū]	<i>fifteen</i>
mìxtʷún [miʃtū]	<i>cat</i>
lìstūṅ [listū]	<i>ribbon (from Spa. listón)</i>
stānù [stanū]	<i>grapefruit</i>
nkayuūnʹ [ŋgajū:]	<i>I ground it</i>
nkālúūn` [ŋgalū:]	<i>I removed it</i>
nkayākúūn [ŋgajakū]	<i>I ate it</i>

[ū] may occur in penultimate syllables resulting from Translaryngeal Vowel Harmony across a laryngeal (§2.2.4.1) or Nasal Spreading across a /w/ (§2.2.4.2) as shown in examples below.

nʷuʔun [nūʔū]	<i>it will break down</i>
lūʔún [lūʔū]	<i>with me</i>
kwilʷuʔun [kʷilūʔū]	<i>my spouse</i>
nkutūʔún [ŋgutūʔū]	<i>he/she went out</i>
nkunuʔun [ŋgunūʔū]	<i>it got broken</i>
nkūwēn [ŋgūwē]	<i>ripe</i>

Below are presented minimal or near minimal pairs for /ū/ versus all other vowels:

/ũ/ ≠ /a/:	kūūn [kũ:]	<i>sweet potato</i>	kaa [ka:]	<i>nine</i>
/ũ/ ≠ /e/:	kūūn [kũ:]	<i>sweet potato</i>	kee [ke:]	<i>stone</i>
/ũ/ ≠ /i/:	kūūn [kũ:]	<i>sweet potato</i>	kiĩ [ki:]	<i>grass</i>
/ũ/ ≠ /o/:	kūūn [kũ:]	<i>sweet potato</i>	kōō [ko:]	<i>fog</i>
/ũ/ ≠ /ã/:	kūūn [kũ:]	<i>sweet potato</i>	kaàn` [kã:]	<i>he/she goes home</i>
/ũ/ ≠ /ĩ/:	kūūn [kũ:]	<i>sweet potato</i>	kiin [kĩ:]	<i>hematoma</i>
/ũ/ ≠ /ẽ/:	xūùn [ʃũ:]	<i>you will fight</i>	xēēn [ʃẽ:]	<i>wide</i>

2.2.3 Vowel length

Vowel length is contrastive in ZAC but at a very limited level, and only occurs in final syllables⁸. The autosegmental representation of prosodic features presented in figure 2.3 accounts for vowel length as an extra mora hosted by the ω . This extra mora can extend the length of the ω -final vowel but not of any other vowel. So distributionally speaking, vowel length is a property of the simplex word, since it only pertains to a ω -final vowel. Thus, a word can be considered long if its final vowel is long; and short if its final vowel is short. As illustrated in figure 2.3, long words are represented by an extra mora linked to long stems, and that extra mora is linked to the final syllable, making it long. Short stems are represented without that extra mora.

Vowel length plays an important role in the tonal phonology because the tones are mora-linked, and long stems and short stems may differ in

⁸Sometimes, when Spanish words with a penultimate stress pattern are borrowed, the stressed syllable in Spanish gets lengthened in Chatino. For example, *rrumèyō* 'medicine' becomes [ʃume:jo]. This is not a phonological rule but a loan accommodation process which does not apply to all Spanish borrowings.

tonal patterns (chapter 4 §4.6.2)

In his description of Zenzontepec Chatino, Campbell offers some historical information about how vowel length contrastiveness came about in Chatino from proto-Chatino (Campbell, 2014):

'Despite the presence of long versus short monosyllables, vowel length was not distinctive in Proto-Chatino because it was predictable based on word class. Contrastive vowel length has come about in Zenzontepec Chatino due to some sporadic clippings of words and a sound change in which non-final syllables consisting of a simple coronal obstruent followed by a high vowel have reduced to /h/.'(p97)

The sound change mentioned above encountered in Zenzontepec Chatino did not occur in ZAC, but clipping of a couple of words whose penultimate syllable consisted of a glottal fricative /h/ followed by /i/, did occur, resulting in a minimal pair for vowel length: *kē* [ke] (from *jīkē* which is still encountered in the lexicon) 'his/her head' Versus *keē'* [ke:] 'flower'. This clipping phenomenon is actually extremely rare in ZAC. Another example of clipping is *?in* [ʔi] 'DAT' (from *ji?in* which is not encountered in the lexicon anymore). The latter did not result in any vowel length minimal pairs but did produce a word with an initial glottal stop which is extremely rare.

Below are presented examples of minimal or near-minimal pairs for length to demonstrate its contrastiveness in ZAC⁹ :

⁹*pí'* 'poult' refers to a young turkey.

nkūlá	[ŋgula]	<i>he/she was born</i>	nkulāá	[ŋgula:]	<i>he/she escaped</i>
kē	[ke]	<i>his/her head</i>	keé	[ke:]	<i>flower</i>
pí	[pi]	<i>poult</i>	pí	[pi:]	<i>white, fair</i>
yo	[jo]	<i>guy</i>	yoo	[jo:]	<i>soil</i>
xǔ?	[ʃuʔ]	<i>oldster</i>	chūú	[tʃu:]	<i>Jesus</i>

Below are presented examples of long vowels in monosyllabic as well as disyllabic words:

mpaà	[mba:]	<i>godfather</i>	
Wyàá	[bja:]	<i>Santos Reyes Nopala, Oaxaca</i>	
kaa	[ka:]	<i>nine</i>	
tʰāáʔ	[ʔa:ʔ]	<i>molasses</i>	
kaàn	[kã:]	<i>he/she goes</i>	
nkaànʔ	[ŋgã:ʔ]	<i>booger</i>	
nʸāān	[ŋã:]	<i>poison</i>	
kee	[ke:]	<i>stone</i>	
kweeʔ	[kʷe:ʔ]	<i>crab</i>	
xēēn	[ʃē:]	<i>wide</i>	
chií	[tʃi:]	<i>chicken rump</i>	11
kií	[ki:]	<i>grass</i>	
jiín	[hĩ:]	<i>music</i>	
kiin	[kĩ:]	<i>hematoma</i>	
kwiiʔ	[kʷi:ʔ]	<i>ring</i>	
tsiínʔ	[tsĩ:ʔ]	<i>small insect</i>	
tʰōó	[ʔo:]	<i>adobe</i>	
kōō	[ko:]	<i>fog</i>	
kūūn	[kũ:]	<i>sweet potato</i>	
jūún	[hũ:]	<i>thread</i>	
chūú	[tʃu:]	<i>Jesus</i>	

nkutyáá' tíʔ [ŋgutja: tiʔ]	<i>he/she liked it</i>	
ntsuwaàʔ [ndzuwa:ʔ]	<i>hierba santa (piper auritum)</i>	
tikēé [tike:]	<i>his/her stomach</i>	
tikēén [tikē:]	<i>my stomach</i>	
nkasiín [ŋgasĩ:]	<i>he/she squeezed it</i>	11
nkasuwīi [ŋgasuβi:]	<i>he/she sorted it</i>	
nkālóò [ŋgalo:]	<i>he/she removed it</i>	
nkayoó [ŋgajo:]	<i>he/she ground it</i>	
nkālúùn [ŋgalũ:]	<i>I removed it</i>	
nkayuūn [ŋgajũ:]	<i>I ground it</i>	

NB: Note that there are no words in which a non-final vowel is ever long.

2.2.4 Vowel harmony

2.2.4.1 Translaryngeal Vowel Harmony

Translaryngeal Vowel Harmony is partly a morpheme structure constraint, and a phonetic rule that works both progressively and regressively. As was discussed in §2.2, the only existing vocalic phonemic contrast in penultimate syllables is between /i/, /a/ and /u/. However, the oral vowels /e/ and /o/ do surface in penultimate syllables through a vowel harmony rule across laryngeals. Furthermore, as was mentioned in §2.2.2, nasal vowels do not occur underlyingly in penultimate syllables. This was discussed in the autosegmental phonological representation in figure 2.3. However, nasal vowels do surface in penultimate syllables through a vowel harmony rule across laryngeals. Figure 2.5 presents the Regressive Translaryngeal Vowel Harmony rule¹⁰.

¹⁰The curly brackets in the rule indicate "either/or".

$$\begin{aligned} \{ i, u \} &\rightarrow \{ e, o \} / \text{--- } G_{\text{lottal}} \{ e, o \} \\ \{ a, i, u \} &\rightarrow \{ \tilde{a}, \tilde{e}, \tilde{u} \} / \text{--- } G_{\text{lottal}} \{ \tilde{a}, \tilde{e}, \tilde{u} \} \end{aligned}$$

Figure 2.5: Regressive Translaryngeal Vowel Harmony rule

For example, in a word like /tiheʔ/¹¹ [teheʔ] 'salt', the /e/ in the final syllable is mirrored across /h/ into the penultimate syllable. In a word like /tuho/ [toho] 'squash plant' the /o/ in the final syllable is mirrored across /h/ into the penultimate syllable.

In a word like /siʔē/¹², /ē/ is mirrored across the laryngeal surfacing phonetically as [sēʔē]. In a word like /naʔā/, /ā/ is mirrored across the laryngeal surfacing phonetically as [nāʔā].

In the examples just discussed, the vowel harmony work regressively, from the final syllable to the penultimate syllable. However, this effect can also work progressively.

$$/o/ \rightarrow [ɔ] / ɔ G_{\text{lottal}} \text{---}$$

Figure 2.6: Progressive Translaryngeal Vowel Harmony rule

For example, in the word /huʔɔ/ [hɔʔɔ] 'saint', the [ɔ] in the penul-

¹¹In this particular case, i.e. when the penultimate vowel is /i/ but surfaces as [e], or when the penultimate vowel is /u/ but surfaces as [o] as in /tūhó/ [toho] 'squash plant', the practical orthography is not entirely faithful to the actual phonemic representation as they are actually underlyingly respectively: /tiheʔ/ and /tūhó/ but are written *tejeʔ* and *tōjó* respectively. These words have these representations because underlyingly only { i, u, a } are available in non-final syllables, as there are no minimal pairs of /i/ versus /e/, or /u/ vs /o/ in non-final syllables.

¹²In those cases also, when nasal vowels surface in the penultimate syllable, the practical orthography is not entirely faithful to the actual phonemic representation as [sēʔē] 'place' is phonemically /siʔē/ but spelled *seʔen*.

imate syllable is mirrored across /ʔ/ into the final syllable. As mentioned earlier (§2.2.1.5), when /o/ is followed by a glottal stop it is realized as [ɔ] (no other vowel is affected by an adjacent glottal stop) as in *xòʔ* [ʃɔʔ] 'oldster'. In this particular case, the ordering of the rules is as follows:

1. Regressive Vowel Harmony: /u/ → [o] / ___ G_{lottal} o
 /huʔõ/ → [hoʔo]
2. Pre-glottal Stop Lowering: /o/ → [ɔ] / ___ ʔ
 [hoʔo] → [hɔʔo]
3. Progressive Vowel Harmony: /o/ → [ɔ] / ɔ G_{lottal} ___
 [hɔʔo] → [hɔʔɔ]

This type of ordering of the three of the Harmony rules only occurs in cases similar to /huʔõ/ [hɔʔɔ] 'saint', i.e. when a stem presents the same /huʔo/ vowel configuration. In fact, the Progressive Harmony rule only occurs in this particular context because /o/ is the only vowel which gets affected when followed by a /ʔ/.

Figure 2.7 shows an autosegmental figure of the two processes (the Pre-glottal stop Lowering and the Progressive Tranlaryngeal Vowel Harmony) involved resulting in the surface phonetic output for the word *joʔõ* [hɔʔɔ].

On the other hand, Regressive Vowel Harmony, occurs in all cases where the initial vowel is { i, u } , and the vowel across the glottal consonant

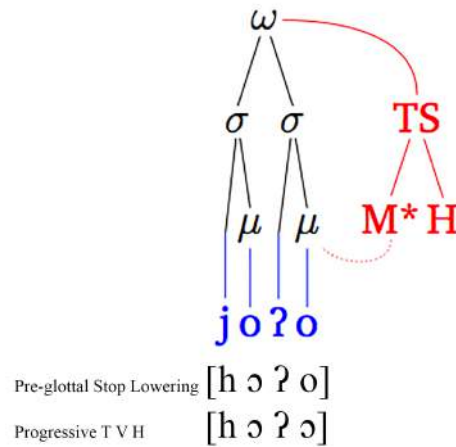


Figure 2.7: Autosegmental representation of Progressive Translaryngeal Vowel Harmony rule: $joʔ\acute{o}$ [hɔʔɔ]

is { e, o } ; or in all cases where the initial vowel is { a, i, u } , and the vowel across the glottal consonant is { ã, ě, ũ } . The list below presents more examples of words presenting a /CVG_{lottal}V/ shape showing their underlying phonemic representation and their respective phonetic output:

/taʔa/ [taʔa]	<i>his/her relative</i>
/naʔã/ [nãʔã]	<i>house</i>
/tiheʔ/ [teheʔ]	<i>salt</i>
/tiʔi/ [tiʔi]	<i>sick</i>
/tiʔa/ [tiʔa]	<i>water</i>
/tiʔĩ / [tĩʔĩ]	<i>heavy</i>
/siʔě/ [sěʔě]	<i>place</i>
/juʔō / [hɔʔɔ]	<i>saint</i>
/tūhó/ [toho]	<i>squash plant</i>
/k ^w iḷuʔũ/ [k ^w iḷũʔũ]	<i>my spouse</i>

The domain of this constraint is the root, and as a result it is sensitive to morpheme boundaries. Translaryngeal Vowel Harmony does not apply

to the form presented below where the glottal consonant starts the root and the vowel just before is part of the aspect morpheme:

ntī-ʔō [ndiʔo] *he/she is drinking it*

2.2.4.2 Nasal spreading

Nasalization from final nasal vowels regressively spreads from final syllables to penultimate syllables when the medial consonant is a /w/ or a cluster of the type /h + w/. This rule accounts for a lot of allophony for the underlyingly non-nasal penultimate vowels /u, i, a/ when they occur in a penultimate syllable in a word with a final nasal vowel. Note that this process is sensitive to morpheme boundaries as shown in example for 'I whistled' where the /a/ in the aspect prefix is not nasalized from spreading from final vowel across, first, across the /w/, then across the /h/, because the /a/ is not part of the verb stem:

kawen [kãwẽ]	<i>it will ripen</i>
nkūwēn [ŋgũwẽ]	<i>ripe</i>
nk-ūjwīn [ŋgũhĩ]	<i>I died</i>
nka-jiwin [ŋgahĩβĩ]	<i>I whistled</i>

In terms of autosegmental analysis, the [+nasal] links to both a final syllable and a non-final syllable, if certain conditions are met, i.e, if the medial consonant is a /w/, or a cluster of the type /h + w/. Note the two dotted lines leaving from the [+nasal] feature in figure 2.8. If those conditions are not met, by default, the [+nasal] autosegment only links to

the final syllable only as was shown in figure 2.3.

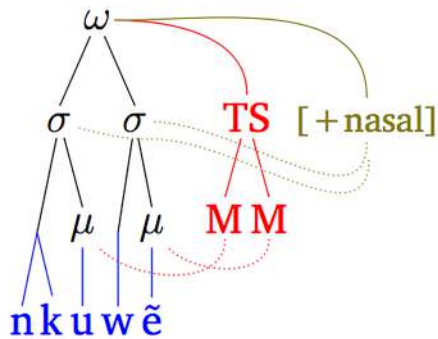


Figure 2.8: Autosegmental representation of Nasal Spreading rule: *nkūwēn* [ngūwē̃]

Also, final nasal vowels nasalize the palatal glide /j/ when encountered within the same syllable as shown in the pairs for 'his/her hand' and 'my hand', as well as across syllable boundaries as shown in the pairs for 'his/her feet' and 'my feet'. This constraint is parallel to the Vowel Harmony (2.2.4.1) just discussed, and is also sensitive to morpheme boundaries as shown in example for 'I ground it' where the glide is not nasalized because it is not part of the verb stem:

yaāʔ [ja:ʔ]	<i>his/her hand</i>
nʷàǎnʔ [n̥ǎ:ʔ]	<i>my hand</i>
ki.yaʔ [ki.jaʔ]	<i>his/her feet</i>
ki.nʷanʔ [ki.n̥ǎʔ]	<i>my feet</i>
nkay-uūnʔ [ŋga.jū:]	<i>I ground it</i>

2.3 Consonantal system

The ZAC consonant inventory is shown in table 2.3, and the corresponding symbols in the practical orthography are presented in table 2.4 (the latter was already presented in §2.1 but is reintroduced here for convenience). ZAC has twenty-two consonant phonemes, six of which are more marginal because they generally occur in Spanish borrowings. The latter appear in table 2.3 in between parentheses. As Spanish loans are a full-fledged part of the lexicon, they are presented along with native phonemes. However, it is worth noting that the bilabials, which are often considered to be universal, do not occur in native words.

	Bilabial	Apico-dental	Lamino-alveolar	Palatal	Velar	Labio-velar	Glottal
Stops	(p) (b)	t (d)	$\underset{t}{t}$		k	k ^w	ʔ
Affricates		$\underset{s}{ts}$	$\underset{ʃ}{tʃ}$				
Fricatives		s	$\underset{ʃ}{ʃ}$				h
Nasals	(m)	n	$\underset{n}{n}$				
Laterals		l	$\underset{l}{l}$				
Tap		(r)					
Trill		(r)					
Approximant				j		w	

Table 2.3: Phonemic inventory: consonants

In this section, the phonemes are presented according to their place of articulation, instead of by manner of articulation, because as was already mentioned in the introduction, this mode of grouping leads to more generalizations about the consonantal system in general. For example, we will

	Bilabial	Apico-dental	Lamino-alveolar	Palatal	Velar	Labio-velar	Glottal
Stops	<i>p b</i>	<i>t d</i>	<i>tʰ</i>		<i>k</i>	<i>kw</i>	<i>ʔ</i>
Affricates		<i>ts</i>	<i>ch</i>				
Fricatives		<i>s</i>	<i>x</i>				<i>j</i>
Nasals	<i>m</i>	<i>n</i>	<i>nʲ</i>				
Laterals		<i>l</i>	<i>lʲ</i>				
Tap		<i>r</i>					
Trill		<i>rr</i>					
Approximant				<i>y</i>		<i>w</i>	

Table 2.4: Practical orthography: consonants

see that the category of bilabials is vacant in the native sound system, the velars are asymmetrical, and the lamino-alveolars are historically related to the apico-dentals¹³. Furthermore, minimal pairs or near-minimal pairs are presented to illustrate contrast between phonemes. Each phoneme is discussed in terms of its distribution with respect to both vowels and consonants, as well as its corresponding allophonic variations. The examples in this section show the distribution of phonemes when they occur as single consonants as well as when they are part of consonant clusters. A summary of all consonant clusters allowed in the language is presented in §3.1.1.2.

Because of multi-syllabicity and tonal feature, true minimal pairs are scarce; as a result most pairs presented below differ in tone as well as in contrasting consonants. In any case, the phonemes are always presented in many different environments within the word in order to demonstrate their

¹³A single historical rule of laminalization after /i/ applied to all the apicals, which created the laminal class.

contrastiveness against other phonemes.

The non-continuants /p, t, ts, tʃ, k, k^w/ always undergo voicing assimilation in word-initial consonant clusters following a nasal segment as shown below in figure 2.9. As a result, [b, d, dz, dʒ, g, g^w] are allophones of /p, t, ts, tʃ, k, k^w/ respectively.

$$/p, t, ts, tʃ, k, k^w/ \rightarrow [b, d, dz, dʒ, g, g^w] / \# N_{ASAL} \text{ ---}$$

Figure 2.9: Voicing assimilation rule

mpaà [mba:]	godfather
ntaa [nda:]	bean
ntsil ^y e [ndzile]	bumblebee
nt ^y uùn [nḑū:]	he/she stands
nchakan [ndʒakã]	his/her ear
nkùn [ŋgũ]	turtoise
nkweje [ŋg ^w ehe]	epazote

Many Spanish borrowings do present a contrast between /t/ and /d/, /p/ and /b/, and /k/ and /g/ after a nasal. If the consonant is voiced in the donor language, it will generally also be voiced in ZAC. Note that syllabification in Spanish loans allows for syllable final nasal consonants (and other consonant types) word-medially (§3.1.1.2).

tyèmpō [tjem.po]	time (from Spa. <i>tiempo</i>)
mintilē [min.ti.le]	napkin (from Spa. <i>mantel</i>)
sandiyā [san.di.ja]	watermelon (from Spa. <i>sandía</i>)
sundàō [sun.dao]	soldier (from Spa. <i>soldado</i>)
dimìngō [di.miŋ.go]	sunday (from Spa. <i>domingo</i>)

Furthermore, /n/ undergoes a place assimilation process when occurring in word-initial consonant clusters in front of the bilabial stop /p/, the velar stops /k, k^w/ and the laminal stop /t̪/.

$$/n/ \rightarrow [\alpha\text{PLACE}] / \text{--- } C_{[\text{PLOSIVE}][\alpha\text{PLACE}]}$$

Figure 2.10: Place assimilation rule

mpíʔ [mbiʔ]	<i>dram (of liquor)</i>
nkasūkwaʔ [ŋgasukwaʔ]	<i>he/she shelled it</i>
nkwichàʔǎn [ŋg ^w it̪ǎʔǎ]	<i>he/she changed clothes</i>
nt ^y áá [ŋɖa:]	<i>he/she turns it in</i>

2.3.1 Bilabial consonants

Bilabial stops are scarce in ZAC, and are generally encountered in non-native words and sound symbolic words. Most of them correspond to a bilabial sound in Spanish words.

Minimal and near-minimal pairs for all bilabial consonants include the following:

/p/	vs	/m/	pǎ [pa]	<i>dad</i>	mǎ [ma]	<i>mom</i>
/p/	vs	/k ^w /	píí [pii]	<i>fair (color)</i>	kwíí [k ^w ii]	<i>star</i>
/p/	vs	/w/	pǎ [pa]	<i>dad</i>	wa [ba]	1PLEX SUBJ
/m/	vs.	/n/	mǎ [ma]	<i>mom</i>	nǎ [na]	<i>thing</i>
/m/	vs.	/w/	mǎ [ma]	<i>mom</i>	wa [ba]	1PLEX SUBJ

2.3.1.1 /p/

/p/ has two phonetic realizations: [p] and [b]. /p/ surfaces as [b] in word-initial consonant clusters after a /n/ (see figure 2.9).

/p/ occurs as a single consonant in all syllables, word-initially as well as post-vocally:

pá [pa]	<i>dad</i>
pànyún' [paŋũ]	<i>shawl (from Spa. pañuelo)</i>
papàyã' [papaja]	<i>papaya</i>
pí [pi:]	<i>fair (color)</i>
pìxõ' [piʃo]	<i>peso (from Spa. peso)</i>
tyèmpõ' [tjempo]	<i>time (from Spa. tiempo)</i>
lăpi [lapi]	<i>pencil (from Spa. lapiz)</i>

/p/ surfaces as [b] in word-initial consonant clusters following a homorganic nasal (see figure 2.9 and figure 2.10) as in:

mpaà' [mba:]	<i>godfather</i>
mpí? [mbi?]	<i>dram (of liquor)</i>

2.3.1.2 /b/

/b/ is an emerging sound in ZAC and it is found in Spanish loans, often in names where it corresponds to /b/ in donor language. It has two phonetic realizations: [b] and [β]:

/b/ --> [β] / V ___ V
 /b/ --> [b] / elsewhere

běto [be:to]	<i>Alberto</i> (from Spa. <i>alberto</i> [alberto])
bakǎ [baka]	<i>cow</i> (from Spa. <i>vaca</i> [βaka])
batǎ [bata]	<i>cattle</i> (from Spa. <i>vaca</i> [βaka])
běta [be:ta]	<i>Alberta</i> (from Spa. <i>alberta</i> [alberta])
bùrrū [buɾu]	<i>donkey</i> (from Spa. <i>burro</i> [βuro])
byerne [bjerne]	<i>friday</i> (from Spa. <i>viernes</i> [bjernes])
byolin [bjoli:n]	<i>violin</i> (from Spa. <i>violín</i> [bjolin])
àbrǐ [abri]	<i>April</i> (from Spa. <i>abril</i> [abril])
làmbreǎ [lambre]	<i>telephone</i> (from Spa. <i>alambre</i> [alambre])
jwèbǎ [hweβe]	<i>thursday</i> (from Spa. <i>jueves</i> [hweβes])
jwabǒ [hwaβo]	<i>favor</i> (from Spa. <i>favor</i> [faβor])
disyèmbreǎ [disjembre]	<i>December</i> (from Spa. <i>diciembre</i> [disjembre])

2.3.1.3 /m/

/m/ is also rather scarce, and like /p/, it does not usually occur in any native words . /m/ occurs as a single consonant word-initially as well as post-vocally. It may also surface in consonant clusters resulting from a place assimilation process of phoneme /n/ in front of the bilabial stop /p/ (see figure 2.9 and figure 2.10):

mǎ [ma]	<i>mom</i>
mìi [mi:]	<i>thousand</i> (from Spa. <i>mil</i>)
mě̀n? [mẽ̀?]	<i>puppy</i>
màl ^y i [maɭi]	<i>godmother</i>
melòní [melonĩ]	<i>melon</i> (from Spa. <i>melón</i>)
manse? [manse?]	<i>regional foreign language</i>
mintilē [mintile]	<i>napkin</i> (from Spa. <i>mantél</i>)
mòjǎ [moha]	<i>nun</i> (from Spa. <i>monja</i>)
mùlyǎ [muɭa]	<i>mule</i> (from Spa. <i>mula</i>)
dimìngō [dimiŋgo]	<i>sunday</i> (from Spa. <i>domingo</i>)
sumìlō [sumilo]	<i>hat</i> (from Spa. <i>sombrero</i>)
r̀rumèyō [r̀rume:jo]	<i>remedy</i> (from Spa. <i>remedio</i>)

/m/ occurs in homorganic consonant clusters with /p/:

mpaà [mba:]	<i>godfather</i> (from Spa. <i>compadre</i>)
mpí? [mbi?]	<i>dram of liquor</i>
tyèmpō [tjempo]	<i>time</i> (from Spa. <i>tiempo</i>)

2.3.2 Apico-dental consonants

There are eight apico-dental consonants, three of which are rather marginal in the language (/d/, /t/ and /t̪/) as they are only encountered in borrowings (/d/ and /t̪/) or as a free variant of /nt/ (/t/).

Minimal and near-minimal pairs for all apico-dentals versus other consonants include the following:

/t/	vs.	/n/	tīʔ [tiʔ]	his/her essence	nīʔ [nīʔ]	his/her bowels
/t/	vs.	/s/	tukwa [tukwa]	two	sukwa [sukwa]	six
/t/	vs.	/t̥/	tītā [tita]	shrimp	tʰiʔá [t̥iʔa]	squirrel
/t/	vs.	/ts/	tii [ti:]	ten	tʰii [t̥si:]	San Marcos Zacatepec
/t/	vs.	/t͡ʃ/	kita [kita]	tobacco	kicha [kit͡ʃa]	disease
/t/	vs.	/k/	tichen [tit͡ʃɛ]	scary	kichen [kit͡ʃɛ]	village
/n/	vs.	/l/	kunà [kuna]	he/she will run	kula [kula]	old
/n/	vs.	/ŋ/	naʔan [nãʔã]	house	nʰaʔàn [ŋãʔã]	how
/l/	vs.	/l̥/	leɛ [le:]	law	lʰèéʔ [l̥e:ʔ]	infant
/n/	vs.	/r/	nã [na]	thing	rã kãnʔ [ra kãʔ]	then
/r/	vs.	/r̥/	nteɛ [re:]	this	rré [r̥e]	king
/s/	vs.	/ʃ/	ska [ska]	one	xkà [ʃka]	other

2.3.2.1 /t/

/t/ has two phonetic realizations: [t] and [d]. /t/ surfaces as [d] after /n/ in word-initial consonant clusters (see figure 2.9 on page 80). It may occur as a single consonant word-initially as well as post-vocally, as well as in consonant clusters after /n/.

tāān [tã:]	lard
ti [ti]	just
tōōʔ [tɔ:ʔ]	cough
tanu [tanũ]	large
tejeʔ [teheʔ]	salt
tichöʔ [tit͡ʃɔʔ]	pineapple
tōjó [toho]	squash plant
tùnʰí [tuɲi]	money
lateʔ [lateʔ]	fabric
nkatakĩn [ngatakĩ]	he/she burned it
nkateʔen [ngatɛʔɛ]	he/she got married
kutixēn [kutiʃɛ]	daughter in law
nkotōʔó [ŋgotɔʔɔ]	he/she went out
kutùnãʔ [kutunaʔ]	he/she lost it
nkiwita [ŋgiβita]	he/she waited for it

/t/ undergoes a voicing assimilation process and occurs as [d] after in consonant clusters after /n/ (see figure 2.9 on page 80):

ntaa [nda:]	<i>bean</i>
ntātsī [ndatsi]	<i>bean (yellow type)</i>
ntin ^y an [ndiŋā]	<i>comal</i>
ntolòó [ndolo:]	<i>he/she removes it</i>
ntulā́ [ndula]	<i>peach</i>

In Spanish borrowings, when /t/ occurs after /n/ reflecting a /t/ in the donor language and when it occurs in a different syllable, it does not undergo the voicing assimilation process (see figure 2.9 on page 80):

kwèntō̄ [k ^w en.to]	<i>tale (from Spa. cuento[kwento])</i>
sùntū̄ [sun.tu]	<i>issue (from Spa. asunto [asunto])</i>

As discussed in §2.3.3 on page 96, the phonemes /t, n, l, ts, s/ all have lamino-alveolar counterparts /t̪, n̪, l̪, t̪ʃ, ʃ/ which began as allophones of /t, n, l, ts, s/ after /i/ but phonologized due to the loss of the conditioning environment.

This palatalization process is no longer active in ZAC, but it does occur systematically in the verb forms when a prefix ends with /i/ and a root starts with /t, n, l, ts, s/. In verb forms, one can still observe the conditioning environment for the old palatalization process of /t/ to [t̪] after /i/. The phoneme /t̪/ also exists in the language and is discussed in §2.3.3:¹⁴

¹⁴In the verb forms *nti-tʻa* and *nti-tʻi?* both verb roots start with the vowel /a/ but following the vowel elision rule in hiatus, the /a/ gets deleted against the /i/. Refer to §5.3.1.2 for a more detailed description of the vowel hierarchy.

nti-tʸa [ndiṭa] *he/she bathes*
 Versus
 k-ata [kata] *he/she will bathe*
 nti-tʸiʔ [ndiṭiʔ] *he/she sucks*
 Versus
 k-atʸiʔ [katiʔ] *he/she will suck*

/t/ can also occur in consonant clusters before /r/ and before the glide /j/.

Examples with these types of clusters are rare.

traʔwḗ [traʔwe] *middle*
 tyèmpṓ [tjempo] *time*
 nkutyáá' tíʔ [ŋgutjaa tiʔ] *he/she liked it*

/t/ can also occur in consonant clusters after /s/ and /ʃ/:

lìstūn̄́ [listū] *ribbon*
 stānù [stanū] *grapefruit*
 stijoʔṓ [stihɔʔɔ] *priest*
 stilyá́ [stilja] *Castille*
 nkwíxtikwí [ŋgʷiʃtikwi] *he/she hung it*

2.3.2.2 /d/

/d/ is an emerging sound in ZAC and it is found in Spanish borrowings. It often corresponds to [d] in donor words:

dimìngṓ [di.miŋ.go] *sunday*
 sundàó [sun.dao] *soldier* (from Spa. *soldado* [soldado])
 sandiyá́ [san.di.ja] *watermelon* (from Spa. *sandía* [sandija])

2.3.2.3 /ts/

/ts/ represents a single sound as opposed to a combination of /t/ and /s/, and is written *ts* in the practical orthography. Since the inventory only allows /t/ to be combined with fricatives /s/ or /ʃ/, then it makes sense to analyze /ts/ and /tʃ/ as single sounds allowing for a simpler syllable structure.

/ts/ has two phonetic realizations: [ts] and [dz]. /ts/ surfaces as [dz] after /n/ in consonant clusters (see figure 2.9 on page 80). It may occur as a single consonant word-initially as well as post-vocally, as well as in consonant clusters after /n/.

/ts/ as a single consonant word-initially as well as post vocally:

tsaan [tsā:]	day
tsiĩ [tsi:]	San Marcos Zacatepec
tsooʔ [tsɔ:ʔ]	his/her side
tsaʔwě [tsaʔwe]	good
tsinʸànʔ [tsiŋãʔ]	tick
kitsàʔ [kitsaʔ]	he/she will warn
titsāʔán [titsãʔã]	saucepan
tsòkʒʔ [tsokoʔ]	grasshopper
tsuna [tsuna]	three
kutsěʔ [kutseʔ]	pus
ntātsi [ndatsi]	bean (yellow)
nkotsòʔʹ [ŋgotsɔʔʹ]	mud
kutsikwĩn [kutsikwĩ]	he/she will shake it

/ts/ undergoes a voicing assimilation process after /n/ in word-initial consonant clusters and surfaces as [dz]:

ntsakwa [ndzakwa]	<i>chayote squash</i>
ntsil ^y e [ndzi _l e]	<i>bumblebee</i>
ntsukwàʔ [ndzukwaʔ]	<i>corn</i>

In verb forms, one can still observe the conditioning environment for the old palatalization process of /ts/ to [tʃ] after /i/. The phoneme /tʃ/ also exists in the language and is discussed in §2.3.3. It occurs in verb forms when a prefix ending with /i/ and the /ts/ from the verb root get combined:

nkwi-chàʔán [ŋg ^w itʃãʔã]	<i>he/she changed clothes</i>
Versus	
ntā-tsàʔán [ntatsãʔã]	<i>he/she is changing clothes</i>

2.3.2.4 /s/

/s/ has only one phonetic realization [s]. It occurs as a single consonant word-initially as well as post-vocally, and also occurs in consonant clusters before /k, k^w, t, l, j/.

siin [sĩ:]	<i>dinner</i>
soo [so:]	<i>beard</i>
saně [saně]	<i>guitar</i>
seʔen [sěʔě]	<i>place</i>
silyáʔ [siljaʔ]	<i>cotton</i>
sokóʔ [soko]	<i>small fish</i>
sul ^y ʔ [sul _i]	<i>pants</i>
misã [misa]	<i>table</i>
nkyaseʔ [ŋgjaseʔ]	<i>he/she deflated it</i>
lusí [lusi]	<i>butterfly</i>
kisó [kiso]	<i>avocado</i>
tūsīn ^y éʔ [tusīŋeʔ]	<i>his/her nostril</i>
ntusálá [ndusala]	<i>he/she opens it</i>
nkasūkwaʔ [ŋgasukwaʔ]	<i>he/she shelled it</i>

In verb forms, one can still observe the conditioning environment for the old palatalization process of /s/ to [ʃ] after /i/. The phoneme /ʃ/ also exists in the language and is discussed in §2.3.3. It occurs in verb forms when a prefix ending with /i/ and the /s/ from the verb root get combined:

nti-xikwan [ntiʃik^wã] *he/she plucks it*
 Versus
 nka-sikwan [ŋgasik^wã] *he/she plucked it*

/s/ can also occur in consonant clusters before /k, k^w, t, l, j/:

ska [ska]	<i>one</i>
skina [skina]	<i>his/her sandal</i>
skokoʔ [skokɔʔ]	<i>his/her elbow</i>
skuwe [skuwe]	<i>egg</i>
skwalàʔ [sk ^w alaʔ]	<i>its hoof</i>
stijoʔõ [stihɔʔɔ]	<i>priest</i>
stilyã [stilja]	<i>Castilla</i>
slākó [slako]	<i>'maw'</i>
karàsya [karasja]	<i>heart</i>

2.3.2.5 /n/

/n/ is among the most widespread phonemes in the language as it occurs as a single consonant but also in many types of consonant clusters with non-continuants (/p, t, ts, t̚, tʃ, k, k^w/) as well as with /ʔ/. /n/ has various phonetic realizations: [n], [m], [ŋ] and [ɲ] as it assimilates to the place of articulation of the following consonant in word-initial consonant clusters (see figure 2.10 on page 81).

Examples of /n/ as a single consonant word-initially and post-vocally are presented below:

nǎ [na]	<i>thing</i>
nāā? [na:ʔ]	<i>I</i>
neʔ [nẽʔ]	<i>people</i>
ni [nĩ]	<i>3 SACRED</i>
nu [nũ]	<i>the one who</i>
natènʷ [natẽ]	<i>people</i>
nĩʔán [nĩʔã]	<i>inside the house</i>
nuʔwin [nũʔwĩ]	<i>you (sg)</i>
kina [kina]	<i>sandal</i>
kinaʔan [kinãʔã]	<i>a lot</i>
tīnē [tinẽ]	<i>blood</i>
xūnéʔèn [ʃunẽʔẽ]	<i>scorpion</i>
xunĩ [ʃunĩʔ]	<i>dog</i>
Kinixīnʷ [kinĩʃĩ]	<i>Santiago Yaitepec</i>
tanu [tanũ]	<i>large</i>
nkunuʔun [ŋgunũʔũ]	<i>he/she broke it</i>

In borrowings (mostly from Spanish) /n/ may close a syllable:

sundàoʷ [sun.dao]	<i>soldier (from Spa. soldado)</i>
sandiyāʷ [san.dija]	<i>watermelon (from Spa. sandía)</i>
kwèntōʷ [k ^w en.to]	<i>tale (from Spa. cuento)</i>
sùntūʷ [sun.tu]	<i>issue (from Spa. asunto)</i>

In verb forms, one can still observe the conditioning environment for the old palatalization process of /n/ to [ɲ] after /i/. The phoneme /ɲ/ also exists in the language and is discussed in §2.3.3. It occurs in verb forms when a prefix ending with /i/ and the /n/ from the verb root get combined:

nti-n^yaʔàn [ndiṅãʔã] *he/she sees it*
 Versus
 ntā-nāʔàn [ndanãʔã] *he/she is seeing it*

nti-n^yee [ndiṅe:] *he/she confesses*
 Versus
 ntā-něè [ndanē:] *he/she is confessing*

/n/ may occur in consonant clusters after /ʔ/. The latter is the only consonant allowed in clusters with /n/ (the other glottal consonant /h/ does not occur in clusters with /n/).

/ʔ/ is analyzed as part of the onset of the following syllable because in the phonotactics of the language, /ʔ/ can only close a syllable in word-final position (see figure 2.3 on page 51). In the examples below, a period is used in the phonetic transcriptions in order to show the syllabification patterns.

t^yaʔnan [ʔa.ʔnã] *poor*
 kiʔnā́ [ki.ʔna] *plate*
 naʔni [na.ʔnĩ] *animal*
 kuʔnì [ku.ʔnĩ] *he/she will do it*

/n/ can also occur as the first consonant in clusters in word-initial position with /p, t, ts, tʃ, ʈ, k, k^w/, and the latter undergo voicing assimilation (see figure 2.9 on page 80). Also, /n/ assimilates to the place of articulation of the following consonant and surfaces as [ŋ] before /k/, as [m] before /p/ or as [ɲ] before /ʈ/ (see figure 2.10 on page 81).

ntaa [nda:]	<i>bean</i>
ntātsī [ndatsi]	<i>bean (yellow type)</i>
ntin^yan [ndiŋã]	<i>comal</i>
ntolòó [ndolo:]	<i>he/she removes it</i>
ntulā́ [ndula]	<i>peach</i>
ntusàlá [ndusala]	<i>he/she opens it</i>
ntsakwa [ndzakwa]	<i>chayote squash</i>
ntsil^ye [ndziḷe]	<i>bumblebee</i>
ntsukwàʔ [ndzukwaʔ]	<i>corn</i>
nchakan [ndʒakã]	<i>his/her ear</i>

mpaà [mba:] *godfather*
mpíʔ [mbiʔ] *dram (of liquor)*

nkasūk^{wá}ʔ [ŋgasukwaʔ] *he/she shelled it*
nkyaseʔ [ŋgjaseʔ] *he/she deflated it*
nkwichàʔán [ŋg^witʃãʔã] *he/she changed clothes*

nt^yáá [ŋða:] *he/she turns it in*
nt^yikaa [ŋðika:] *all*

2.3.2.6 /l/

/l/ has two phonetic realizations: [l] and the very rare devoiced counterpart [l̥]. Unlike the other sonorant /n/, /l/ does not occur after /ʔ/, and does not usually occur after the glottal fricative /h/ either. The only examples of /hl/ encountered so far are the verbs 'jump' and 'weave' as in *nkajlakāʔ* [ŋgahl̥akaʔ] 'he/she jumped', and *nkatājláʔ* [ŋgatahl̥aʔ] 'he/she weaved it' where /l/ gets devoiced after /h/.

Furthermore, /l/ occurs after /s/ in one example only: *slākó* [slako] 'maw'.

Examples of /l/ word-initially as well as post-vocally are presented below:

lāā [la:]	<i>church</i>
loo [lo:]	<i>its surface</i>
lateʔ [lateʔ]	<i>fabric</i>
lita [lita]	<i>couple</i>
lōʔó [lɔʔɔ]	<i>with it</i>
lūwē [luwe]	<i>little</i>
kila [kila]	<i>corn field</i>
yalǎ [jala]	<i>mean</i>
rrkàlě [rkale]	<i>mayor</i>
talōó [taloo]	<i>his/her face</i>
ntulakwà [ndulakwa]	<i>he/she counted it</i>
nkālěʔè [ngaleʔe]	<i>he/she licked it</i>
xkaliyō [ʃkalijo]	<i>mezcal</i>
melònĩ [melonĩ]	<i>melon</i>
nkalukwǎ [ŋgalukwa]	<i>he/she swept it</i>

In verb forms, one can still observe the conditioning environment for the old palatalization process of /l/ to [l̥] after /i/. The phoneme /l̥/ also exists in the language and is discussed in §2.3.3. It occurs in verb forms when a prefix ending with /i/ and the /l/ from the verb root get combined:

nti-l̥eʔè [ndil̥eʔe]	<i>he/she licks it</i>
Versus	
nkā-lěʔè [ŋgaleʔe]	<i>he/she licked it</i>

/l/ can occur in consonant clusters preceding a palatal glide /j/ but the latter generally occurs in Spanish loans. In the ZAC word, /j/ corresponds to the [j] in the Spanish word. It also seems to occur in a contracted

compounded form *lyōð* [ljo:] 'in the ground' where *yoo* means 'ground' and the /l/ may be the first consonant from first element *loo* 'on':

<i>lyōð</i> [ljo:]	<i>in the ground</i>
<i>silyaǎ</i> [silja:]	<i>police</i> (from Spa. <i>policía</i> [polisija])
<i>stilya</i> [stilja]	<i>Castille</i> (from Spa. <i>Castilla</i> [kasija])

2.3.2.7 /r/

The alveolar tap /r/ has only one phonetic realization [r]. It is written *r* in the practical orthography. It never occurs in native words, except as an alternative pronunciation of a common demonstrative *n̄teē* [re:] 'here'. It occurs in Spanish borrowings also corresponding to the alveolar tap [r] in the donor language. /r/ may occur as a single consonant and in consonant clusters after /b, t/. In the adverbial expression /rǎ́ kǎn?/ *then*, [ra] actually derives from the Spanish borrowing /wrǎ́/ [bra] *hour* (from Spa. *hora*).

/r/ occurs as a single consonant word-initially as well as post-vocally:

<i>rǎ́ kǎn?</i> [ra kǎ?]	<i>then</i>
<i>karǎsyǎ́</i> [karasja]	<i>heart</i> (from Spa. <i>corazón</i> [korason])
<i>kurùsǎ́</i> [kurusi]	<i>cross</i> (from Spa. <i>cruz</i> [krus])
<i>eněro</i> [ene:ro]	<i>January</i> (from Spa. <i>enero</i> [enero])

/r/ may also occur in consonant clusters after /b/ and /t/:

<i>àbrǎ́</i> [abri]	<i>April</i> (from Spa. <i>abril</i> [abril])
<i>disyěmbrě́</i> [disjembre]	<i>December</i> (from Spa. <i>diciembre</i> [disjembre])
<i>làmbřě́</i> [lambre]	<i>telephone</i> (from Spa. <i>alambre</i> [alambre])
<i>tra?we</i> [tra?we]	<i>middle</i>

2.3.2.8 /r̥/

The voiceless trill /r̥/ has only one phonetic realization: [r̥]. It is written *rr* in the practical orthography. It only occurs in Spanish borrowings and usually reflects the single sound [r] in the donor language. It occurs as a single consonant word-initially and post vocally as well as in word-initial consonant clusters before /s/ and /k/. /r̥/ is better analyzed as a single consonant as opposed to a cluster made of /h/ + /r/ because of the fact that it may be followed by /s/ or /k/. An analysis as a cluster would complicate the otherwise straight forward syllable structure which only allows two consonant clusters.

rrě [r̥e]	<i>king</i> (from Spa. <i>rey</i> [rej])
rrumeyo [r̥ume:jo]	<i>remedy</i> (from Spa. <i>remedio</i> [remedjo])
bùrrũ [bu̥ru]	<i>donkey</i> (from Spa. <i>burro</i> [buro])
rrsoðñ [r̥sũ:]	<i>message</i> (from Spa. <i>razón</i> [rason])
rrkàlě [rk̥ale]	<i>mayor</i> (from Spa. <i>alcalde</i> [alkalde])

2.3.3 Lamino-alveolar consonants

The phonemes /t, n, l, ts, s/ all have lamino-alveolar counterparts /t̪, n̪, l̪, tʃ, ʃ/ which began as allophones of /t, n, l, ts, s/ after /i/ but phonologized due to the loss of conditioning environment. Campbell (2014) offers historical information about how this process came about in Zenzontepec Chatino stating that " It began as an allophone of /t/ after /i/, during or around the time of proto-Chatino. At some point in time, this allophone phonologized due to the loss of the conditioning environment and some

Spanish loans (p59)."

Like in Zenzontepec Chatino, in ZAC, the lamino-alveolar phonemes originate from an ancient palatalization rule after /i/. The process is not active anymore but the conditioning environment is still visible in some verb forms as shown in section §2.3.2.

ZAC has five lamino-aveolar phonemes: /t̪, ɲ̪, l̪, ʃ, tʃ/ ([t̪, ɲ̪, l̪, ʃ, tʃ]). Lamino-alveolar sounds are made with the blade of the tongue on the alveolar ridge and the tip of the tongue resting on the ridge of the lower teeth. The first three (/t̪, ɲ̪, l̪/) are represented in the practical orthography by a combination of the corresponding coronal consonant letter with the superscript letter^y (*t^y, n^y, l^y*). /ʃ/ and /tʃ/ each have a separate grapheme (*x, ch*, respectively) following the general tendencies in practical orthographies for indigenous language in Mesoamerica.

Minimal and near-minimal pairs for all lamino-alveolar sounds are presented below:

/t̪/	vs.	/t/	t̪ ^y it̪ ^y á [t̪i̪ta]	<i>squirrel</i>	t̪it̪ā [t̪ita]	<i>shrimp</i>
/ɲ̪/	vs.	/n/	n̪ ^y aʔān [ɲ̪ãʔã]	<i>I will see it</i>	naʔān [nãʔã]	<i>I saw it</i>
/l̪/	vs.	/l/	til̪ ^y ǎ̃ [ti̪la]	<i>early morning</i>	til̪ǎ̃ [tila]	<i>noche</i>
/ʃ/	vs.	/s/	kixō̃ [kiʃo]	<i>cheese</i>	kisō̃	<i>avocado</i>
/tʃ/	vs.	/ʃ/	t̪ichōnʔ [t̪iʃũʔ]	<i>his/her back</i>	tixònʔ [tiʃũʔ]	<i>tasty</i>

2.3.3.1 /t̥/

/t̥/ is written *tʰ* in the practical orthography. It can occur as a single consonant as well as in consonant clusters after /n/ and /ŋ/.

/t̥/ has two phonetic realizations: [t̥] and [t̬]. Similarly to other non-continuants, in consonant clusters after /n/, /t̥/ undergoes a voicing assimilation process and surfaces as [d̥] (see figure 2.9 on page 80).

Examples below present /t̥/ occurring as a single consonant word-initially as well as post vocally:

tʰàá [t̥a:]	<i>intelligent</i>
tʰii [t̥i:]	<i>it will end</i>
tʰōó [t̥o:]	<i>adobe</i>
lītʰá [li̥t̥a]	<i>amaranth</i>
kitʰɿ [ki̥t̥i]	<i>paper</i>
tʰoloʔ [t̥oloʔ]	<i>cricket</i>
tʰūnū [t̥unū]	<i>crawfish</i>
tʰitʰun [ti̥t̥ũ]	<i>many</i>
tʰaʔan [t̥aʔã]	<i>he/she will walk around</i>
tʰikwà [t̥ikʷa]	<i>he/she will ride it</i>
katʰàkánʔ [kḁt̥akãʔ]	<i>he/she will get seen</i>
kwi̥tʰiʔin [kʷi̥t̥iʔi]	<i>surroundings</i>
ti̥tʰùkwá [ti̥t̥ukʷa]	<i>twelve</i>
nkwi̥tʰōʔò [ŋgʷi̥t̥oʔo]	<i>he/she resembled</i>

Examples below present /t̥/ occurring preceded by /n/ where /t̥/ undergoes a voicing assimilation process and surfaces as [d̥], and /n/ also assimilates in place of articulation with /t̥/ and surfaces as [n̥] (see figure 2.10 on page 81):

nt ^y áá [n̥ɗa:]	<i>he/she turns it in</i>
nt ^y uùn̄ [n̥ɗū:]	<i>he/she stands</i>
nt ^y ikaa [n̥ɗikaa]	<i>all</i>
nt ^y ikè? [n̥ɗikeʔ]	<i>it gets cooked</i>
nt ^y ikuʔwà [n̥ɗikuʔwa]	<i>it cools down</i>
nt ^y íʔyà [n̥ɗiʔja]	<i>it gets lowered</i>

Examples below present /t͡ʃ/ in consonant clusters after /ʃ/:

nīʔ xt ^y ōó [niʔ ʃto:]	<i>Santiago Jamiltepec, Oaxaca</i>
màxt ^y í [maʃti]	<i>machete</i>
kixt ^y àá [kiʃta:]	<i>he/she will put it</i>
mìxt ^y ón [miʃtũ]	<i>cat</i>

2.3.3.2 /t͡ʃ/

/t͡ʃ/ is written *ch* in the practical orthography. It has two phonetic realizations: [t͡ʃ] and [d͡ʒ]. It may occur as a single consonant and very rarely in consonant clusters after /n/. It undergoes a voicing assimilation process and surfaces as [d͡ʒ] when preceded by /n/ (see figure 2.9 on page 80). Examples below show /t͡ʃ/ as a single consonant word-initially as well as post-vocally:

chǎʔ [t͡ʃaʔ]	<i>word</i>
chiĩ [t͡ʃi:]	<i>chicken rump</i>
chōnʔ [t͡ʃũʔ]	<i>because</i>
kūchā [kut͡ʃa]	<i>sun</i>
kichi [kit͡ʃi]	<i>metate</i>
tichōʔ [tiʃoʔ]	<i>badger</i>
chayōʔ [t͡ʃajɔʔ]	<i>hummingbird</i>
chìnyún [t͡ʃiɲũ]	<i>turkey hen</i>
chuʔwi [t͡ʃuʔwi]	<i>there will be</i>
nkwichàʔǎn [ŋk ^w it͡ʃãʔã]	<i>he/she changed clothes</i>

Below the only example of /tʃ/ occurring preceded by /n/:

nchakan [ndʒakã] *his/her ear*

2.3.3.3 /ʃ/

/ʃ/ is written *x* in the practical orthography and has only one phonetic realization [ʃ]. It can occur as a single consonant as well as in consonant clusters after /t, ɬ, k, k^w/. Contrary to its affricate counterpart /tʃ/, /ʃ/ does not occur after /n/.

Examples below show /ʃ/ as a single consonant word-initially as well as post-vocally:

xǔʔ [ʃuʔ]	<i>oldster</i>
xòʔ [ʃɔʔ]	<i>mother (animal) with youngsters</i>
xēēn [ʃɛ:]	<i>wide</i>
xāá [ʃa:]	<i>light</i>
xòón [ʃú:]	<i>he/she will fight</i>
lìxǎ [liʃa]	<i>orange</i>
nkwxíxì [ŋg ^w iʃi]	<i>tomato</i>
jàxǒ [haʃo]	<i>garlic</i>
xaʔàn [ʃáʔǎ]	<i>bad</i>
xiʔn ^y án [ʃiʔŋan]	<i>bottle</i>
xunà [ʃuna]	<i>he/she will run</i>
kwixātō [k ^w iʃato]	<i>viper</i>
tixēʔèn [tiʃɛʔɛ]	<i>his/her intestines</i>
ntixiʔì [ndiʃiʔi]	<i>he/she buys it</i>
nkwxíxúʔwà [ŋg ^w iʃuʔwa]	<i>he/she turned it in</i>

Examples below show /ʃ/ in consonant clusters after /t, ɬ, k, k^w/:

nĩʔ xtʷōó [niʔ ʃto:]	<i>Santiago Jamiltepec, Oaxaca</i>
màxtʷí [mafʃi]	<i>machete</i>
kixtʷàá [kiʃta:]	<i>he/she will put it</i>
mìxtʷón [miʃtũ]	<i>cat</i>
xtʷááʔ [ʃta:ʔ]	<i>he/she will mix it</i>
nkwxlʷàkwí [ŋgʷiʃlakʷi]	<i>he/she boiled it</i>
xkùlā [ʃkula]	<i>chocolate</i>
xkwìʔ [ʃkʷiʔ]	<i>only</i>
xkwēé [ʃkʷe:]	<i>man (vocative)</i>
xkwilā [ʃkʷila]	<i>school</i>

2.3.3.4 /ŋ̃/

/ŋ̃/ is written *nʷ* in the practical orthography. It may occur as a single consonant as well as in consonant clusters after /j/ and after /ʔ/. This sound also occurs from another source: nasalization of the glide /j/ through regressive spreading from a final nasal vowel (see §2.2.4.2 for a more in-depth description of the phenomenon).

Examples below show /ŋ̃/ as a single consonant word-initially as well as post-vocalically:

nʷāā [[ŋ̃ā:]	<i>poison</i>
nʷajan [ŋ̃āhā]	<i>year</i>
tinʷǎn [tiŋ̃ǎ]	<i>work</i>
kinʷí [kiŋ̃i]	<i>bird</i>
tīnʷēʔ [tiŋ̃ēʔ]	<i>salty</i>
chìnʷún [tʃiŋ̃ũ]	<i>turkey hen</i>
nʷikwin [ŋ̃ikʷi]	<i>he/she will say it</i>
nʷuʔun [ŋ̃ũʔũ]	<i>it will break down</i>
ntinʷaʔàn [ndiŋ̃āʔā]	<i>he/she sees it</i>
ntinʷuʔun [ndiŋ̃ũʔũ]	<i>it breaks down</i>

Examples below show /ŋ/ in consonant clusters after /h/ word-initially as well as post-vocally:

j ^y āán [hŋā:]	<i>culture</i>
j ^y eě' [[hŋe:]	<i>snail</i>
j ^y ākē [hŋake]	<i>his/her head</i>
j ^y ātén [hŋatē]	<i>mosquito</i>
j ^y āʔán [jŋāʔā]	<i>his/her mother</i>
nij ^y ān [nīhŋā]	<i>palm tree vein</i>
tij ^y ān [tīhŋā]	<i>his/her bone</i>

Examples below show /ŋ/ after /ʔ/:

ʔn ^y án [ʔŋā]	<i>DAT.1s</i> (contraction of <i>ʔin nāāʔ</i> 'DAT I)
kiʔn ^y an [kiʔŋā]	<i>bed</i>
tiʔn ^y un [tiʔŋũ]	<i>fifteen</i>
xiʔn ^y ān' [xiʔŋā]	<i>bottle</i>

Examples below show the sound [ŋ] surfacing from regressive nasal spreading from a final nasal vowel:

kiyaʔ [kijaʔ]	<i>his/her foot</i>
Versus	
kin ^y anʔ [kiŋāʔ]	<i>my foot</i>
yaāʔ' [ja:ʔ]	<i>his/her hand</i>
Versus	
n ^y àánʔ [ŋā:ʔ]	<i>my hand</i>

2.3.3.5 /l̥/

/l̥/ has two phonetic realizations: [l̥] and [l̥̥] (devoiced [l̥]). It is written *l̥* in the practical orthography. Unlike the other sonorant /n/, /l̥/

does not occur after /ʔ/, but does occur after the glottal fricative /h/ as well as the laminal fricative /ʃ/ (although extremely rare). When /ɬ/ occurs following the glottal fricative /h/ in consonant clusters, /ɬ/ gets devoiced and surfaces as [ɬ̥].

Examples below show /ɬ/ as a single consonant word-initially as well as post-vocalically:

ɬʷāāʔ [ɬ̥a:ʔ]	<i>bitter</i>
ɬʷee [ɬ̥e:]	<i>very much</i>
ɬʷèéʔ [ɬ̥e:ʔ]	<i>baby</i>
ɬʷíʔ [ɬ̥iʔ]	<i>parrot</i>
ɬʷóʔ [ɬ̥ɔʔ]	<i>small</i>
tìɬʷá [tiɬ̥a]	<i>lunch time</i>
ntsìɬʷe [ndziɬ̥e]	<i>bumble bee</i>
tìɬʷó [tiɬ̥o]	<i>large</i>
ntsùɬʷíʔ [ndzuɬ̥iʔ]	<i>swing</i>
ɬʷitʷòʔʔ [ɬ̥iʔɔʔʔ]	<i>lime</i>
ɬʷeʔè [ɬ̥eʔe]	<i>he/she will lick it</i>
ɬʷūwā [ɬ̥uwa]	<i>annona, custard apple</i>
ntìɬʷaʔà [ndiɬ̥aʔa]	<i>it got split</i>
ntìɬʷeʔè [ndiɬ̥eʔe]	<i>he/she licks it</i>
kwiɬʷoʔo [kʷiɬ̥ɔʔɔ]	<i>his/her spouse</i>

Examples below show /ɬ/ in consonant clusters after the glottal fricative /h/:

ɬʷoo tīʔ [hɬ̥oo tiʔ]	<i>he/she knows it</i>
ɬʷakàʔ [hɬ̥akaʔ]	<i>he/she will jump</i>
ɬʷakwa [hɬ̥akʷa]	<i>even, flat</i>
ɬʷiwēʔē [hɬ̥iβeʔe]	<i>its wing</i>
tijɬʷākᵂā [tihɬ̥akʷa]	<i>fourteen</i>

The only examples of /ɬ/ in consonant clusters after the laminal fricative /ʃ/

are found in the verb forms of 'to boil' where *x* corresponds to the causative morpheme *-ix* as in:

xl^yāk_ḡwí [ʃ_ḡlakwi] *he/she will boil it*

2.3.4 Palatal consonants

Minimal and near-minimal pairs for palatal phonemes are presented below:

/j/	vs.	/tʃ/	yaʔ [jaʔ]	<i>occurence</i>	chǎʔ [tʃaʔ]	<i>word</i>
/j/	vs.	/ʃ/	yāá [ja:]	<i>cactus</i>	xāá [ʃa:]	<i>luminosity</i>
/j/	vs.	/l/	yaāʔ [ja:ʔ]	<i>his/her hand</i>	l ^y āāʔ [la:ʔ]	<i>bitter</i>
/j/	vs.	/ḡ/	yāʔàn [jǎʔǎ]	<i>I am going</i>	n ^y aʔàn [ḡǎʔǎ]	<i>how</i>
/j/	vs.	/w/	yāʔā [jaʔa]	<i>green</i>	waʔá [baʔa]	<i>tamarind</i>

2.3.4.1 /j/

The palatal glide can occur as a single consonant word-initially as well as post-vocally. It is written *y* in the practical orthography. One distributional restriction: /j/ does not occur before /i/ (refer to §2.3.5 where the labio-velar approximant /w/ has a similar distributional restriction with regard to /o/ and /u/). Similarly to other non-lateral sonorants in the inventory, /j/ may also occur in consonant clusters after the glottal consonants /h/ and /ʔ/. Furthermore, /j/ can also occur in clusters after /w/, /b/, /l/, /t/ and /s/. /j/ may undergo a regressive nasalization process before nasal vowels, in which case it surfaces as /ḡ/ (§2.2.4.2).

Examples below show /j/ as a single consonant word-initially as well as

post-vocalically:

yāá [ja:]	<i>nopal</i>
yeè [je:]	<i>orange (color)</i>
yoo [jo:]	<i>soil</i>
tīyē? [tijeʔ]	<i>sour</i>
kwàyō̃ [k ^w ajo]	<i>horse</i>
yaka [yaka]	<i>tree</i>
yùsín [jusĩ]	<i>turtle</i>
papàyā́ [papaja]	<i>papaya</i>
xkaliyō̃ [ʃkalijo]	<i>mezcal</i>
rrumèyō̃ [rume:jo]	<i>remedy</i>
nkayojó? [ŋgajɔhɔʔ]	<i>he/she poked it</i>
nkayulă [ŋgayula]	<i>he/she danced</i>

Examples below present /j/ in consonant clusters after the glottal consonants /h/ and /ʔ/:

Chijya? [tʃihjaʔ]	<i>Mexico</i>
lijya [lihja]	<i>sugar cane</i>
tijyō̃ [tihjo]	<i>comet</i>
kyòʔó tīʔ [hɔʔɔ tiʔ]	<i>he/she is embarrassed</i>
kaʔyo [kaʔjo]	<i>five</i>
kiʔyā́ [kiʔja]	<i>moutain</i>
sīʔyó [siʔjo]	<i>seed</i>
nkuʔya [ŋguʔja]	<i>cohune</i>
kusiʔyā [kusiʔja]	<i>large shrimp</i>

Examples below present /j/ in consonant clusters after /w/ (only one example), /b/, /t/, /s/ and /l/:

Wyää [bja:]	<i>Santos Reyes Nopala, Oaxaca</i>
byèrně [bjerne]	<i>friday (from Spa. viernes [bjernes])</i>
nkutyää́ tíʔ [ngutjaa tiʔ]	<i>he/she liked it</i>
tyèmpōó [tjempo]	<i>time</i>
karàsyā́ [karasja]	<i>heart</i>
stilyā́ [stilja]	<i>Castille</i>
silyā́ [silja]	<i>police</i>
lyōò [ljo:]	<i>in the ground</i>

Examples below present examples of nasalized /j/ due to regressive nasal spreading from final nasal vowels (see §2.2.4.2 for a more detailed description of phenomenon):

yaāʔ [ja:ʔ]	<i>his/her hand</i>
nʲàánʔ [ɲã:ʔ]	<i>my hand</i>
ki.yaʔ [ki.jaʔ]	<i>his/her feet</i>
ki.nʲanʔ [ki.ɲãʔ]	<i>my feet</i>

2.3.5 Velar consonants

There are three velar consonants in the language: the widespread velar plosive /k/, the labio-velar plosive /k^w/, and the labio-velar approximant /w/.

Minimal and near-minimal pairs for velar phonemes are presented below:

/k/	vs.	/k ^w /	kiĩ [kii]	<i>grass</i>	kwíi [k ^w ii]	<i>ring</i>
/w/	vs.	/k ^w /	waná [bana]	<i>secretly</i>	kwaná [k ^w ana]	<i>thief</i>

2.3.5.1 /k/

/k/ is the most widespread phoneme in the language. It can occur as a single consonant word-initially as well as post-vocally. Like other non-continuants in the language, /k/ has two phonetic realizations: [k] and [g]. When it occurs in word-initial clusters preceded by /n/, it undergoes a voicing assimilation process (see figure 2.9 on page 80). It can also occur in consonant clusters preceded by /s/ or /ʃ/ as well as followed by /j/.

Examples below show /k/ as a single consonant word-initially and post-vocally:

kaa [ka:]	<i>nine</i>
kee [ke:]	<i>rock</i>
kiĩ [ki:]	<i>grass</i>
kōō [ko:]	<i>fog</i>
nt ^y ikaa [nɔ̄ika:]	<i>all</i>
jn ^y ākē [hɔ̄ake]	<i>his/her head</i>
nkyakīn' [ɲɔ̄jakī]	<i>it got burned</i>
kati [kati]	<i>seven</i>
kōkō [koko]	<i>dove</i>
kicha [kitʃa]	<i>disease</i>
kiko [kiko]	<i>comb</i>
kula [kula]	<i>old</i>
kokòʔó [kokoʔo]	<i>he/she will paint it</i>
ntikaʔan [ndikāʔā]	<i>it sits</i>
ntsukùwíʔ [ndzukuwiʔ]	<i>charcoal</i>
tíkílà [tikila]	<i>hard</i>

Examples below show /k/ in consonant clusters preceded by /n/ where it undergoes a voicing assimilation process and surfaces as [g] (see figure 2.9 on page 80):

nkyāān [ŋgiā:]	<i>he/she is arriving</i>
nkùñ [ŋgū]	<i>turtoise</i>
nkìl ^y ǎ [ŋgi _l a]	<i>unit of measure (around 4kg)</i>
nkotso [ŋgotso]	<i>it bursted</i>
nkūlá [ŋgula]	<i>he/she was born</i>
nkūwēn [ŋgūwē]	<i>ripe</i>
nkasūk ^w wá? [ŋgasuk ^w a?]	<i>he/she shelled it</i>

Examples below show /k/ in word-initial consonant clusters preceded by /s/ and /ʃ/ as well as followed by /j/:

ska [ska]	<i>one</i>
skichǎ? [skitʃa?]	<i>his/her language</i>
skoko? [skokɔ?]	<i>his/her elbow</i>
skuwe [skuwe]	<i>egg</i>
xkaliyō [ʃkalijo]	<i>mezcal (from Spa. mezcal)</i>
xkà [ʃka]	<i>another</i>
kyoo [kjo:]	<i>rain</i>
kyo?o [kjo?ɔ]	<i>lime</i>
kyūkwén [kjuk ^w ē]	<i>bug</i>
kyula [kjula]	<i>male</i>
nkyase? [ŋgjase?]	<i>it got deflated</i>
ntikyākwén [ndikjak ^w ē]	<i>he/she is raising it</i>

2.3.5.2 /k^w/

The labio-velar plosive /k^w/ is written *kw* in the practical orthography. It may occur as a single consonant word-initially as well as post-vocally. Like other non-continuants /k^w/ has two phonetic realizations: [k^w] and [g^w]. When it occurs in word-initial clusters preceded by /n/, it undergoes a voicing assimilation process (see figure 2.9 on page 80) and surfaces as [g^w]. Similarly to the labio-velar approximant /w/, /k^w/ does

not occur before the rounded vowel /o/ nor /u/. It may also occur in consonant clusters preceded by /s/ or /ʃ/. This fact is the basis on which /k^w/ is analyzed as a single phoneme instead of a cluster of /k/ + /w/. This analysis allows for a simple syllable structure in native words where only two-consonants clusters occur.

Examples below show /k^w/ as a single consonant word-initially and post-vocally:

kwā́ [k ^w a]	<i>already</i>
kwēeʔ [k ^w e:ʔ]	<i>crab</i>
kwíí [k ^w ii]	<i>star</i>
kweēń [k ^w ē:]	<i>bat</i>
jakwa [hak ^w a]	<i>four</i>
tukwa [tuk ^w a]	<i>two</i>
jl^yakwa [h ₈ lak ^w a]	<i>even, flat</i>
ntsukwàʔ [ndzuk ^w aʔ]	<i>corn</i>
kyūkwén [kjuk ^w ē]	<i>bug</i>
xl^yāk^wí [ʃlak ^w i]	<i>it will get boiled</i>
lukwi [luk ^w i]	<i>tepache</i>
kwana [k ^w ana]	<i>mirror</i>
kwīkā [k ^w ika]	<i>left</i>
tij^yāk^wá [tij ₈ lak ^w a]	<i>fourteen</i>
ntikyāk^wén [ndikjak ^w ē]	<i>he/she is raising it</i>
kwixātō [k ^w iʃato]	<i>viper</i>
kwil^yuʔun [k ^w i ₈ ũʔũ]	<i>my spouse</i>
lakwichí [lak ^w itʃi]	<i>rabbit</i>
kutsik^wín [kutsik ^w ĩ]	<i>he/she will shake it</i>

Examples below show /k^w/ in word-initial consonant clusters preceded by /n/ where /k^w/ undergoes a voicing assimilation process and surfaces as [g^w]:

nkweje [ŋg ^w ehe]	<i>epazote</i>
nkwxì [ŋg ^w iʃi]	<i>tomato</i>
nkwxíúʔwà [ŋg ^w iʃuʔwa]	<i>he/she turned it in</i>
nkwxítikwí [ŋg ^w iʃtik ^w i]	<i>he/she hung it</i>
nkwichàʔán [ŋg ^w itʃãʔã]	<i>he/she changed clothes</i>
nkwit ^y ōʔò [ŋg ^w iʔoʔo]	<i>he/she resembled</i>
nkwxl ^y àkwí [ŋg ^w iʃlak ^w i]	<i>he/she boiled it</i>

Examples below show /k^w/ in word-initial consonant clusters preceded by /s/ or /ʃ/ :

skwalàʔ [sk ^w alaʔ]	<i>its hoof</i>
xkwìʔ [ʃk ^w iʔ]	<i>only</i>
xkwēé [ʃk ^w e:]	<i>man (vocative)</i>
xkwilàʔ [ʃk ^w ila]	<i>school</i>

2.3.5.3 /w/

The labio-velar approximant /w/ is widespread. It is written *w* in the practical orthography. /w/ is the most difficult segment to describe in the language because the environments for its allophones are very restricted. This is not a peculiarity of ZAC as Campbell (2014) presents similar issues and similar solutions to account for the complex distribution of /w/ for Zenzontepec Chatino.

/w/ has four phonetic realizations: [β], [b], [ɱ] and [w]. /w/ may occur as a single consonant word-initially as well as post-vocally. As a glide, and similarly to the other glide /j/, it occurs following the glottal consonants /ʔ/ and /h/. /w/ may even be followed by the palatal glide /j/ in a rare native example: /Wyàá/ [bja:] *Santos Reyes Nopala, Oaxaca*.

Furthermore, like the other labio-velar consonant /k^w/ (see §2.3.5.2 for the description of phoneme /k^w/), /w/ may be followed by all vowels except /o, u, ũ/ due to a restriction on rounded/labial segments within the same syllable. However, one exception to this rule was encountered in the corpus *lawoʔō* [laβɔʔɔ] 'coyote'.

/w/ → [β] / V ___ V
 jìwí [hiβi] *whistle*
 jɫʷiwēʔē [jɫiβeʔe] *its wing*
 lawoʔō [laβɔʔɔ] *coyote*

The rule stated above needs to be restricted a bit more for the /uw/ cases. When /w/ is preceded by the vowel /u/, it surfaces as [w]. Note that even if the /u/ and the /w/ are separated by the glottal fricative /h/, the rule still applies:

nkayūjwī [ŋkajuhmi] *he/she killed it*
 yùwā [juwa] *mare*
 ntsuwaàʔ [ndzuwa:ʔ] *hierba santa (piper auritum)*
 lūwē [luwe] *little*
 kūwēʔ [kuweʔ] *pig*
 kùwíʔ [kuwiʔ] *baby*
 luwinʷi [luwiŋi] *straight*

One counter example (presented below) was encountered in the corpus, and this could be considered evidence for a phonemic distinction between /v/ ([β]) and /w/ but because this is the only one, I decided not to create a new phoneme /v/ to account for it. So despite the fact that it seems that ZAC should have a phoneme /v/, neither the phonemic analysis nor the

practical orthography includes it.

In the first example presented below, the vowel /u/ is not root internal and /w/ surfaces as [β] whereas in the second one /u/ is part of the root and surfaces as [w]. The two following verb forms show a nice minimal pair for this contrast:

nka-s-u-wī́ [ŋkasuβii] *he/she sorted it*

Versus

nka-s-uwīʔ [ŋkasuwiʔ] *he/she turned it off*

/w/ → [β] / # ___ /i/

witʔí [βit̪i] *dry*

wixiʔ [βiʃiʔ] *blue*

wikeeʔ [βike:ʔ] *ice*

/w/ → [b] / # ___ /a/, /C/

waʔá [baʔa] *tamarind*

wa nteé [ba ndee] 1PLEXCL

Wyàá [bja:] *Santos Reyes Nopala, Oaxaca*

wrá [bra] *hour (from Spa. hora)*

/w/ → [m] / /h/ ___

jwèbě [hm̩eβe] *thursday (from Spa. jueves [h̩meβes])*

jwabõ [hmaβo] *favor (from Spa. favor [faβor])*

kajwě [kah̩me] *coffee (from Spa. café [kafe])*

/w/ → [w] / elsewhere

yaka wēn [jaka wē] *gumbo-limbo tree (bursera simaruba)*

jaʔwǎ [haʔwa] *banana*

skuʔwě [skuʔwe] *Juquila, Oaxaca*

traʔwé [traʔwe] *center*

2.3.6 Glottal consonants

ZAC's consonantal inventory includes two glottal consonants: the glottal stop /ʔ/ and the glottal fricative /h/. The phonological status of the glottal stop and the characteristics of laryngeal consonants in general are discussed in detail in §2.3.7. This section presents examples of the distribution of laryngeals.

Minimal and near-minimal pairs for glottal phonemes are presented below:

/ʔ/	vs.	/h/	kyoʔo [kʲɔʔɔ]	<i>lime</i>	kyōjō [kʲoɦo]	<i>squash</i>
/ʔ/	vs.	/k/	lōʔō [lɔʔɔ]	<i>with you</i> (sg)	lòkō' [loko]	<i>crazy</i>
/ʔ/	vs.	/t/	yaʔa [jaʔa]	<i>unripe</i>	yata [jata]	<i>he/she bathed</i>
/ʔ/	vs.	∅	koʔò [kɔʔɔ]	<i>he/she will</i> <i>drink it</i>	koò [ko:]	<i>he/she will</i> <i>grind it</i>
/h/	vs.	∅	kyōjō [kʲoɦo]	<i>squash</i>	kyoo [kjo:]	<i>rain</i>

2.3.6.1 /ʔ/

/ʔ/ is widespread in the language but its distribution is highly restricted: it (almost) never occurs word-initially, and only one /ʔ/ stop is allowed per word. It is the only consonant that can close a syllable word-finally (this constraint is accounted for by the autosegmental analysis presented in figure 2.3 on page 51). /ʔ/ is written ʔ in the practical orthography.

In this work, /ʔ/ is analyzed as a consonant as opposed to a feature of the vowel nucleus. Evidence for this analysis is discussed in detail in

§2.3.7.

The only word presenting a word-initial /ʔ/ is the dative morpheme *ʔin* along with a form that is derived from it that marks the 1s dative *ʔnʸǎn*.

Furthermore, When /ʔ/ is intervocalic within the same root, restrictions apply to the vowels surrounding /ʔ/ (see §2.2.4.1 for a detailed account of this phenomenon).

When /ʔ/ is intervocalic, it is analyzed as part of the onset of the following syllable because in the phonotactics of the language, /ʔ/ can only close a syllable in word-final position (see figure 2.3 on page 51).

Furthermore, /glottal + non-lateral sonorant/ clusters are the only type of clusters involving glottal consonants allowed in the language. In the examples below, a period is used in the phonetic transcriptions in order to show the syllabification patterns.

Examples below show /ʔ/ in word-final position and word-initial position, as well as inter-vocalically as a single consonant as well as in /glottal + non-lateral sonorant/ clusters:

neʔ [nẽʔ]	<i>people</i>
ʔin [ʔi]	<i>DAT</i>
nĩʔ [nĩʔ]	<i>his/her bowels</i>
xòʔ [ʃɔʔ]	<i>recent mother</i>
xǔʔ [ʃuʔ]	<i>old person</i>
chǎʔ [tʃaʔ]	<i>word</i>
laʔa [la.ʔa]	<i>side</i>
cheʔě [tʃe.ʔe]	<i>rooster</i>
tiʔì [ti.ʔi]	<i>poor</i>
lũʔún [lũ.ʔũ]	<i>with me</i>

ʔn ^y án [ʔnã]	DAT.1S
naʔni [na.ʔnĩ]	<i>animal</i>
t ^y aʔnan [ʔa.ʔnã]	<i>poor</i>
xiʔn ^y án´ [ʃi.ʔnan]	<i>bottle</i>
kiʔnã´ [ki.ʔna]	<i>plate</i>
kusiʔn ^y un [ku.si.ʔnũ]	<i>he/she will cut it</i>
liʔya [li.ʔja]	<i>his/her tooth</i>

Examples of the Translaryngeal Vowel Harmony involving a /ʔ/ (§2.2.4.1):

laʔa [la.ʔa]	<i>side</i>
cheʔe´ [tʃe.ʔe]	<i>rooster</i>
tiʔi´ [ti.ʔi]	<i>poor</i>
lũʔún [lũ.ʔũ]	<i>with me</i>

2.3.6.2 /h/

The glottal fricative /h/ is also widespread in the language, and its distribution is slightly less restricted than /ʔ/. It is written *j* in the practical orthography¹⁵. Unlike /ʔ/, /h/ may occur occur word-initially, but similarly to /ʔ/, only one /h/ may occur in a phonological word. It may also occur in consonant clusters preceding sonorants. /h/ never occurs as C₂ in consonant clusters.

When /h/ is intervocalic within the same root, the same restriction applies to the vowels surrounding /h/ as for the glottal stop (see §2.2.4.1 for a detailed account of this phenomenon).

¹⁵Despite the fact that the script representing this sound *j* is the same as the one use in the Spanish orthography to represent the velar fricative, there is absolutely no velar aspect to this glottal fricative in ZAC.

Examples below show /h/ in word-initial position as well as post-vocally as a single consonant:

jāāʔ [ha:ʔ]	<i>mat</i>
jūún [hũ:]	<i>thread</i>
jī [hi:]	<i>ash</i>
laja [laha]	<i>single</i>
tejeʔ [teheʔ]	<i>salt</i>
tiji [tihi]	<i>new</i>
tōjó [toho]	<i>squash plant</i>
jàxōʔ [haʃo]	<i>garlic</i>
jīkē [hike]	<i>his/her head</i>
joʔōʔ [hɔʔɔ]	<i>saint</i>
julāā [hulaa]	<i>civil servant</i>
nka-jīʔín [ŋgahĩʔĩ]	<i>he/she hit it</i>
nko-jōʔó [ŋkohɔʔɔ]	<i>he/she was ashamed</i>

Examples of the Translaryngeal Vowel Harmony involving a /h/ (§2.2.4.1).

Note that because this is a constraint which is restricted to the root, when the vowels across /h/ are in different morphemes, the constraint does not apply as demonstrated in the example for *he/she hit it*:

laja [laha]	<i>single</i>
tejeʔ [teheʔ]	<i>salt</i>
tiji [tihi]	<i>new</i>
joʔōʔ [hɔʔɔ]	<i>saint</i>
tōjó [toho]	<i>squash plant</i>
nka-jīʔín [ŋgahĩʔĩ]	<i>he/she hit it</i>

Examples below show /h/ in /glottal + sonorant/ clusters. Note that unlike /ʔ/, /h/ occurs in /glottal + lateral/ clusters in which case the lateral gets devoiced and surfaces as [l̥] or [l̥̥] (a devoiced [l̥̥]) (see §2.3.2.6

and §2.3.3.5). Furthermore, when /h/ occurs before /w/, the latter also gets devoiced and surfaces as [ɱ] (see §2.3.5.3):

nkwa j ^l ᵛōō tīʔ [ŋg ^w a h _o : tiʔ]	<i>he/she knows it</i>
j ⁿ ᵛeě [h _ɲ e:]	<i>snail</i>
chijyaʔ [tʃihja]	<i>Mexico</i>
jyòʔó tīʔ [hjoʔo tiʔ]	<i>he/she will get embarrassed</i>
j ⁿ ᵛāʔán [h _ɲ āʔā]	<i>his/her mother</i>
j ⁿ ᵛākē [h _ɲ ake]	<i>his/her head</i>
tīj ⁿ ᵛān [tīh _ɲ ā]	<i>his/her bone</i>
j ⁿ ᵛeʔen [h _ɲ ēʔē]	<i>its tail</i>
tij ^l ᵛàkwá [tih _ɲ ak ^w a]	<i>fourteen</i>
j ^l ᵛiwēʔē [j _l iβeʔe]	<i>its wing</i>
nkayūjwī [ŋgajuh _ɱ i]	<i>he/she killed it</i>

2.3.7 The phonological status of laryngeals

In the descriptions of various Otomanguean languages, laryngeals have been analyzed with different statuses in their respective languages. They have been analyzed as segments in Trique (intervocalically) (DiCanio, 2008), as features of vowels in certain Zapotec varieties (Coatlán-Loxicha Zapotec, Beam de Azcona (2004)) as features of tones (in final position, Trique, DiCanio (2008)), as features of a morpheme for a Mixtec variety (Macaulay and Salmons (1995)), or finally as features of a prosodic unit (syllable, foot) for some other Mixtec variety (Macken and Salmons (1997)).

In ZAC, the glottal stop is analyzed as a true consonant in the glottal-final syllables (/CVʔ/). It is also analyzed as such when found intervocalically (/VʔV/) as opposed to being considered a type of vowel nucleus. This

analysis is supported by several kinds of evidence.

The best evidence for the segmental analysis is found in the prosody of the language.

In ZAC, certain tone Classes do not occur on long stems (/CVV/). For example, the tone Class 6 (/L-M/) only occurs on short stems (/CV.CV/) as shown with the verb form *nkalè?ē* /L-M/ 'you licked it' (CV.?V). The mere fact that this /CV.?V/ stem occurs with tone Class 6 is a proof that at the prosodic level, the glottal stop is treated as a segment, and not as a characteristic of the vowel.

Furthermore, tone Class 8 (/LH/) includes short stems (/CV.CV/) only, and no long stems (/CVV/). It marks the final syllable of short stems—which is always monomoraic—with a rising tone (/LH/), as in *lutĩ* 'rope'. But tone Class 8 includes many words of the shape /CV.?V/, such as *nkala?ǎ* 'he/she blew in it'. The inclusion of such stem types in tone class 8, and the fact that the rising tone lands after the glottal stop show that /CV.?V/ is being treated as two monomoraic syllables and not as one dimoraic syllable proving that /?/ is being treated as a consonant.

Some other facts of the phonotactics also favor the segmental analysis of the /?/.

If /V?V/ represented a single vowel nucleus, then ZAC should have CV.CV.CV?V words. The absence of such a pattern suggests that /V?V/ sequences are parsed into distinct syllables. DiCanio (2008) uses this ar-

gument to support his analysis of /VʔV/ as separate syllables for Itunyoso Trique.

Comparing the laryngeals in the language, /ʔ/ and /h/ are somewhat different—they also have some unique commonalities.

/ʔ/ does not occur word initially except in one case: *ʔin* 'DAT'. However, this word comes from the historically dissyllabic word *jiʔin* 'DAT' still encountered in Zenzontepec Chatino (Campbell, 2014). While /h/ occurs in onsets of both final and non-final syllables, /ʔ/ occurs in onsets of final syllables only. /ʔ/ is the only consonant allowed word finally.

Another distribution issue regarding laryngeals in ZAC is the fact that they are the only consonants allowed as onsets of clusters where C₂ is a sonorant. This is not entirely surprising as we have seen that laryngeals are indeed attracted by other high sonority segments such as vowels. Considering /ʔ + C/ a sequence of two segments, is unproblematic because there already exists a large series of complex onsets in ZAC. In Table 3.1 on page 133, all the consonant clusters allowed in the language are presented, and one can note that, again, the glottal stop and the glottal fricative do not occur necessarily with the same consonant: /ʔ/ does not occur with /l/ nor /ɭ/.

The characteristics of the glottal stop and the glottal fricative are very similar. They are contrastive in the consonant inventory, they both obey the Translaryngeal Vowel Harmony (§2.2.4.1), but only /h/ is transparent to

Nasal Spreading (§2.2.4.2). They both form similar types of clusters (except that /ʔ/ does not occur with lateral sonorants). Vowel harmony rules across laryngeals are well attested in a number of Otomanguean languages (Zenzontepec Chatino (Campbell, 2014); Mixtec (Macaulay & Salmons, 1995). As stated in Macaulay and Salmons (1995), this phenomenon is based on the fact that "the glottal stop does not have any supralaryngeal specifications at all, so it can easily be transparent to other features in adjacent segments". In ZAC, the distribution and characteristics of laryngeals are presented in table 2.5 and table 2.6 respectively:

	Onset of words	Onset of non-final syll.	Onset of final syll.	clusters with sonorants	Word final coda	Only one per word
/ʔ/	1 ex	X	✓	(non-lateral sonorants only)	✓	✓
/h/	✓	✓	✓	✓	X	✓

Table 2.5: The distribution of laryngeals

	Phonemic contrast	Translaryngeal Vowel Harmony	Transparent to Nasal Spreading
/ʔ/	✓	✓	X
/h/	✓	✓	✓

Table 2.6: The characteristics of laryngeals

This chapter has presented the segmental phonemic inventory of ZAC describing each phoneme's distribution as well as its allophonic variations. It contains historical information about the historical development of some phonemes when available, which for the most part came from the description of the conservative Zenzontepec Chatino (Campbell, 2014). Two of the three autosegmental features (nasalization and vowel length; except tone, which is discussed in Chapter 4) have also been fully described here in order to demonstrate the contrastiveness of long and nasal vowels as well as to discuss the restrictions on their distribution. Now that the segmental phonemic system has been established, we can turn to the basic phonotactics of the language.

Chapter 3

Phonotactics

The previous chapter dealt with the non-tonal phonemic inventory showing that the segmental contrastive system consists of vowels and consonants, and that the autosegmental inventory includes vowel nasality and vowel length. This chapter describes the distributions of those contrastive elements within the syllable first and then within the word. Although many of the distributional patterns were discussed in the previous chapter in order to show their contrastiveness, this chapter aims at providing a more unified analysis by combining the information already discussed together with a few more facts about the constraints applying to the contrastive system.

This chapter is organized as follows: §3.1 discusses the syllable structure describing syllable onsets (§3.1.1) including simple onsets (§3.1.1.1) and consonant clusters (§3.1.1.2). §3.1.2 presents the types of syllable nuclei, and gives examples of all possible simplex word shapes present in the language. Finally, §3.2 describes the phonemes distribution within the simplex word.

Since the autosegmental analysis presented and discussed in detail in chapter 1 §1.6 is quintessentially phonotactic, it is crucial to reiterate

some of the important concepts it aims to convey. Indeed, it accounts for many of the existing phonotactic constraints in the language. It explains the distribution of vowel nasality (§2.2.2) and vowel length (§2.2.3), as well as the distribution of the glottal stop.

Figure 3.1 shows that the ω -hosted extra mora (in the case of long vowels), and the [+nasal] autosegment both link (dotted line) to the last syllable which is the locus of realization for these two features. Both the [+nasal] autosegment and the extra mora are hosted (solid line) by the ω showing that it is their domain of realization. Long vowels and nasal vowels only occur underlyingly in word-final position.

Furthermore, the (optional) word-final glottal stop is hosted by the final syllable (only one ? allowed per simplex word)

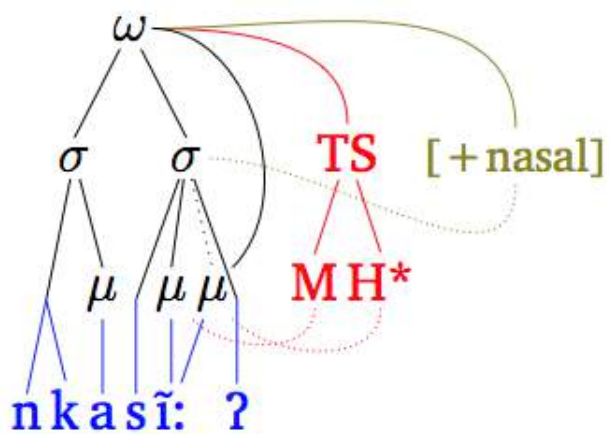


Figure 3.1: Autosegmental representation of prosodic features: *nkasĩn?* 'he/she squeezed it'

3.1 Syllable structure

3.1.1 Syllable onsets

ZAC's native lexicon prefers syllables with onsets, and /ʔ/ is the only consonant allowed to close a syllable (word-finally only) as shown in figure 3.1. Spanish borrowings on the other hand, allow syllable final consonants word-medially but do not allow word final consonants. As a result, the Spanish word *sandía* [san.di.ja] 'watermelon' gets borrowed as *sandiyā* [san.di.ja] in ZAC where /n/ is part of the first syllable. Furthermore, onsetless syllables are also generally confined to Spanish borrowings, and there is considerable variation among speakers (and even within an individual's speech) for the pronunciation of those words. For example, the Spanish word *alma* [alma] 'soul' may be borrowed in ZAC as: *ʔimā* [ʔima] or *ʔalʔimā* [ʔaʔima] or even (more rarely) *alʔimā* [aʔima]. The only native onsetless syllable is encountered in the polar question particle *á* which always occurs sentence finally, and as a result never really starts a syllable.

3.1.1.1 Simple onsets

All consonants may occur as a simple onset word-initially as well as word-medially. The column on the left shows each consonant in the inventory as a word-initial onset and the right column shows it as a word-medial onset. A period is used in the phonetic transcription to show the syllable boundary:

pìxǒ [pi.fo]	<i>peso</i>	lǎpi [la.pi]	<i>pencil</i>
bùrrǔ [bu.ru]	<i>donkey</i>	jwabǒ [h̥ma.βo]	<i>favor</i>
melòní [me.lo.nĩ]	<i>melon</i>	rrumèyǒ [ʁu.me:.jo]	<i>remedy</i>
teje? [te.heʔ]	<i>salt</i>	late? [la.teʔ]	<i>fabric</i>
dimìngǒ [di.min.go]	<i>sunday</i>	sandìyǎ [san.di.ja]	<i>watermelon</i>
natèn [na.tẽ]	<i>people</i>	kina [ki.na]	<i>sandal</i>
wa reé [ba re:]	1PLEX	karàsyǎ [ka.ra.sja]	<i>heart</i>
rrumeyo [ʁu.me:.jo]	<i>remedy</i>	bùrrǔ [bu.ru]	<i>donkey</i>
loo [lo:]	<i>its surface</i>	talóo [ta.lo:]	<i>his/her face</i>
n ^y ajan [n̥ã.hã]	<i>year</i>	tin ^y ǎn [ti.n̥ã]	<i>work</i>
t ^y aʔan [t̥ã.ʔã]	<i>he/she will walk around</i>	līt ^y á [li.t̥a]	<i>amaranth</i>
l ^y āāʔ [l̥a:ʔ]	<i>bitter</i>	ntil ^y aʔà [ndi.l̥a.ʔa]	<i>it got split</i>
tsaan [tsã:]	<i>day</i>	titsāʔán [ti.tsã.ʔã]	<i>saucepan</i>
saně [sa.nẽ]	<i>guitar</i>	mìsǎ [mi.sa]	<i>table</i>
chǎʔ [tʃaʔ]	<i>word</i>	kūchā [ku.tʃa]	<i>sun</i>
xaʔàn [ʃã.ʔã]	<i>bad</i>	nkwxì [nk ^w i.ʃi]	<i>tomato</i>
yāá [ya:]	<i>nopal</i>	yaka [ya.ka]	<i>tree</i>
kōo [ko:]	<i>fog</i>	kiko [ki.ko]	<i>comb</i>
gùsyǎ [gu.sja]	<i>justice</i>	dimìngǒ [di.min.go]	<i>sunday</i>
kwixātō [k ^w i.ʃa.to]	<i>viper</i>	xl ^y ākwi [ʃl̥a.k ^w i]	<i>it will get boiled</i>
ʔin [ʔi]	<i>DAT</i>	joʔǒ [h̥o.ʔo]	<i>saint</i>
jaʔwǎ [ha.ʔwa]	<i>banana</i>	laja [la.ha]	<i>single</i>

3.1.1.2 Complex onsets

ZAC does not allow syllable final consonants in native words (except word-final /ʔ/), so all consonant clusters occur as syllable onsets.

In native words, three major types of clusters which always syllabify as complex onsets occur: /GS/ (Glottal consonant followed by a Sonorant), /N n-C/ (Nasal consonant followed by a non-Continuant) and /kj/. A fourth type, more marginal and not found too often is a Sibilant followed by any non-Sibilant non-Nasal consonant. Then, some isolated examples of clusters like /tj/, /wj/ and /tr/ have been encountered in the lexicon.

Below are presented examples of each type of cluster in final as well

as non-final syllables when allowed. The column on the left shows clusters in final syllables and the column on the right presents them in non-final syllables.

Glottal consonant + Sonorant: /h, ʔ + l, ɭ, n, ŋ, j, w/

As the distribution of /ʔ/ is more restricted than /h/ (§2.3.7), and since clusters only occur as onsets, when this type of cluster includes a glottal stop as its first consonant, it is only found word-medially (the only exception is ʔnʷǎn 'DAT.1S'). Furthermore, not all combinations of a glottal consonant with a sonorant occur. Indeed, the following clusters never occur: /ʔm/, /hm/, /ʔr/, /hr/, /hn/, /ʔl/, /ʔɭ/.

The dashes --- mean that a particular cluster is not found in a specific position within word:

nkātājláʔ [ŋga.ta.h̥laʔ]	<i>he/she weaved</i>	---	
jlʷōō tíʔ [h̥lo: tíʔ]	<i>he/she knows it</i>	jlʷiwēʔē [h̥li.βe.ʔe]	<i>its wing</i>
tijnʷǎn [t̥i.h̥ŋǎ]	<i>his/her bone</i>	jnʷātén [h̥ŋa.tē]	<i>he/she came</i>
chijya [t̥ʃi.hja]	<i>Mexico</i>	jyðʔǒ t̥iʔ [h̥jɔ.ʔɔ tíʔ]	<i>he/she will get embarrassed</i>
nkūjwī [ŋgu.h̥mi]	<i>he/she died</i>	---	
ʔnʷǎn [ʔŋǎ]	<i>DAT.1S</i>	---	
jaʔwǎʔ [ha.ʔwa]	<i>banana</i>	---	
naʔni [na.ʔni]	<i>animal</i>	---	
liʔya [li.ʔja]	<i>his/her tooth</i>	---	

Nasal stop + non-Continuant: /n + p, t, ts, t̥, t̥ʃ, k, kʷ/

This type of cluster only occurs word-initially in native words. As it was discussed earlier (see figure 2.9 on page 80), when a word-initial nasal stop is followed by a non-continuant, the latter undergoes a voicing

assimilation process, and the nasal assimilates to the place of articulation of the following consonant (see figure 2.10 on page 81).

mpaà [mba:]	<i>godfather</i>	---	
ntaa [nda:]	<i>bean</i>	ntaʔan [ndã.ʔã]	<i>corncob</i>
ntsiin [ndzi:]	<i>guava</i>	ntsakwa [ndza.k ^w a]	<i>chayote squash</i>
nt^yáá [nda:]	<i>he/she turns it in</i>	nt^yikaa [ɲdi.ka:]	<i>all</i>
---		nchakan [ndza.kã]	<i>his/her ear</i>
nkùn [ɲgũ]	<i>turtle</i>	nkata [ɲgata]	<i>black</i>
nkwa [ɲg ^w a]	<i>he/she was</i>	nkweje [ɲg ^w e.he]	<i>epazote</i>

/kj/:

This type of cluster is widespread in ZAC. It has been analyzed as a single phoneme for Zenzontepec Chatino by Campbell (Campbell, 2014) despite its restricted distribution in order to keep a very straight forward syllable structure in native words. All of ZAC's clusters are two-consonants only, but /kj/ does occur in three consonant clusters with /n/ in word initial position making /nkj/ the only three-consonant cluster allowed in the language's native lexicon. However, when /kj/ occurs word-medially or preceded by a nasal stop, the complex onset /nkj/ and word-medial /kj/ are always heteromorphemic as /j/ corresponds to a derivational prefix (§5.3.1.3). /kj/ does not occur followed by /e/ nor /ẽ/. Unlike the single phoneme /k^w/, the cluster /kj/ is not found following /s/ or /ʃ/.

kyoōʔ [kjoʔʔ]	<i>century plant</i>
kyula [kju.la]	<i>male</i>
kyūkwén [kju.k ^w ẽ]	<i>bug</i>
kyoʔo [kjo.ʔo]	<i>lime</i>
nkyaà [ɲgja:]	<i>he/she left</i>
nkyaàn` [ɲgjã:]	<i>he/she came</i>
nkyaseʔ [ɲgja.seʔ]	<i>it got deflated</i>
nkyanè [ɲgja.nẽ]	<i>he/she sprayed it</i>
nkyawè [ɲgja.ʔwe]	<i>it got split</i>
nkyunǎ [ɲgju.na]	<i>he/she is crying</i>
nti-k-y-āsèʔ [nti.kja.seʔ]	<i>it is getting deflated</i>
nti-k-y-ākwén [ndi.kja.k ^w ẽ]	<i>it is getting raised</i>

The following types of clusters are more marginal as they only occur in very rare examples, and some of them result from morphophonological processes.

/s, ʃ + t, t̚, l, l̚ k, k^w/:

Not all combinations of /s, ʃ + t, t̚, l, l̚ k, k^w/ occur. For example, /st̚/, /sl̚/ or /ʃl̚/ never occur. Furthermore, the clusters /ʃl̚/ and /sk^w/ are fairly rare such as in *xl̚ākwí* 'it will get boiled' and *xkwaān* 'he/she will throw it away'. These two examples result from an ancient palatalization process where the root consonants /l/ and /s/ respectively were historically preceded by a prefix ending with *i* and palatalized to /l̚/ and /ʃ/. Others, are morphologically complex and include the causative prefix *xi-* as in *nkwi-x(i)-k-ākō* 'he/she fed it' and *x(i)-l̚iyēʔ* 'lemon', or the possessive prefix *s-* as in *s-kwalàʔ* 'its hoof'.

lìstūn' [li.stũ]	<i>ribbon</i>	stānù [sta.nũ]	<i>grapefruit</i>
---		slākó [sla.ko]	<i>maw</i>
---		nkwixtìkwí [ŋg ^w i.ti.k ^w i]	<i>he/she hung it</i>
mìxt ^y ú'n [mi.ʃtũ]	<i>cat</i>	xt ^y iyēʔ [ʃti.jeʔ]	<i>lemon</i>
---		xl ^y āk ^w í [ʃlak ^w i]	<i>it will get boiled</i>
míxkùn` keʔēn'	<i>junebug</i>	nkwixkākō [ŋg ^w i.ʃka.ko]	<i>he/she fed it</i>
	[mi.ʃkũn kē.ʔē]		
nkūskéʔ tiʔ [ŋgu.skeʔ tiʔ]	<i>he/she had a</i>	skuʔwě [sku.ʔwe]	<i>Juquila, Oaxaca</i>
	<i>bad feeling</i>		
nkaskwāān' [ŋga.sk ^w ā:]	<i>he/she threw</i>	skwalàʔ [sk ^w a.laʔ]	<i>its hoof</i>
	<i>it away</i>		
xkwaān' [ʃk ^w ā:]	<i>he/she will throw</i>	ntixkwaān' [ndi.ʃk ^w ā:]	<i>he/she throws</i>
	<i>it away</i>		<i>it away</i>

/tj/:

/tj/ is only encountered in three verb roots: *arrive here (at base)*, *arrive there (not base)* and *like it* as shown in the examples below. One may wonder if this cluster is not actually the syllable /tij/ where the vowel /i/ is particularly short. If it were the case, the medial consonant /j/ would sound slightly geminated just as any other consonant in that position.

nkutyāà [ŋgu.tja:]	<i>he/she arrived (at base)</i>
nkutyāàn [ŋgu.tjã:]	<i>he/she arrived (not base)</i>
nkutyāà tiʔ [ŋgu.tja: tiʔ]	<i>he/she liked it</i>

/w + j/:

The word presented below is the only example of a /wj/ cluster encountered in the lexicon. Since it is a toponym, it may actually be a borrowing.

Wyàǎ [bja:] *Santos Reyes Nopala, Oaxaca*

/t + r/:

Another isolated example of a cluster (/tr/) was encountered in the corpus occurring in a possibly native noun.

traʔwě [traʔwe] *center, middle*

As ZAC finds itself in a stage of advanced language shift, it has a large inventory of Spanish loans in its lexicon, and for this reason, they should not be omitted from this synchronic phonological description of the language. Nevertheless, Spanish loans obey different phonotactic constraints than native words as they allow up to two consonants to occur syllable final word-medially as found in: *instrumētō* [ins.tru.men.to] *instrument*, and also present cluster types not found in native words¹. Following this demarcation, clusters which only occur in Spanish loans are treated separately from clusters in native words.

Often, the phonological processes affecting Spanish words when entering the language give an insight into the phonotactics of ZAC. For example, the fact that *escuela* 'school' gets borrowed as *xkwilā* [ʃk^wila], or *alcalde* 'mayor' as *rrkálē* [ʀkale], shows that ZAC present a constraint against vocalic onsets, and also that the most widespread and basic word shape is a disyllabic word. Furthermore, the Spanish word *dios* gets adapted in ZAC

¹This is true of all loans. As far as tone is concerned, loans are easily recognizable and they usually occur with tone Class 7 which is exclusive to Spanish borrowings.

as *ntyòsĩ* [ndjo.si] 'god' which shows that the language disfavors word-final consonants (other than /ʔ/).

The consonant clusters only present in Spanish borrowings are presented below (/pr/, /np/, /ns/, /br/, /ndj/, /bj/, /sj/, /lj/, /ɾk/, /ɾs/):

presidèntě [pre.si.den.te]	<i>president</i> (from Spa. <i>presidente</i>)
mpǎ [mba]	<i>godfather</i> (from Spa. <i>compadre</i>)
instrumèntõ [ins.tru.men.to]	<i>instrument</i> (from Spa. <i>instrumento</i>)
lambrě [lam.bre]	<i>wire</i> (from Spa. <i>alambre</i>)
ntyòsĩ [ndjo.si]	<i>god</i>
byèrně [bjer.ne]	<i>Friday</i> (from Spa. <i>viernes</i>)
karàsyǎ [ka.ra.sja]	<i>heart</i> (from Spa. <i>corazón</i>)
syèntũ [sjen.tu]	<i>hundred</i> (from Spa. <i>cien</i>)
silyǎ [si.lja]	<i>police</i> (from Spa. <i>policía</i>)
rrkàlě [ɾka.le]	<i>mayor</i> (from Spa. <i>alcalde</i>)
rrsòn [ɾsũ]	<i>message</i> (from Spa. <i>razón</i>)

Table 3.1 below summarizes the two-consonant sequences allowed in the language².

The clusters in between () only occur in Spanish borrowings:

²The only three-consonants complex onsets are /ntj/ as in: **ntyòsĩ** [ndjo.si] *god*, and /nkj/ as in: **nk-y-unǎ** [ŋgju.na] *he/she is crying*. (the latter is heteromorphemic)

	p	t	ts	s	n	l	r	t̥	tʃ	ɳ	l̥	j	k	kʷ	w
p															
b							(pr)					(bj)			
t							(br)					tj			
s						sl	(tr)					(sj)	sk	skʷ	
n		st						n̥t̥	ntʃ			(lj)	nk	nkʷ	
l	(np)	nt	nts												
r̥				(rs)									(rk)		
ʃ		ʃt						ʃt̥					xk	xkʷ	
k												kj			
w												wj			
h					hl				hn̥	hn̥	hl̥	hj			hw
ʔ					ʔn					ʔn̥	ʔj	ʔj			ʔw

Table 3.1: Two-consonant clusters

3.1.2 Syllable nuclei

The only allowed syllable nucleus in ZAC is the vowel. The latter is accounted for in the autosegmental representation in figure 3.1 where moras only host vowel segments and not consonants. A nucleus may be monomoraic or dimoraic (in the case of long vowels). There are no syllabic consonants in the language. Even the nasal stop /n/ preceding non-continuant in word-initial position is not considered syllabic. The evidence of the non-syllabicity of those nasal stops is encountered in the prosody of the language, and more precisely in the tonal system. As the system is mora-linked, if it were the case that those word-initial nasals were syllabic, tones would link to the syllabic nasal but this does not occur.

Any vowel type (long, short, nasal, oral) occurs as a syllable nucleus. Note that the glottal stop is not analyzed as part of the syllable nucleus but rather as a coda consonant (§2.3.7). This is accounted for in the autosegmental representation in figure 3.1 by the fact that /ʔ/ is hosted by the syllable just as any other consonant in the language, but also that /ʔ/ is hosted by the final syllable only. Furthermore, phonemic nasal vowels only occur in the final syllable of a word. The latter is accounted for in figure 3.1 by the fact that the [+nasal] feature links (dotted line) to the final syllable and is hosted by the ω (solid line). Nasalization occurs in non-final syllables through Nasal Spreading (§2.2.4.2) or Translaryngeal Vowel Harmony (§2.2.4.1).

Below, examples of different types of syllable nuclei are presented:

Monomoraic non-nasal:

t ^y a [t̥a]	corncob	yaka [ja.ka]	tree
neʔ [nẽʔ]	person	tejeʔ [te.heʔ]	salt
l ^y ʔ [l̥iʔ]	parrot	sit ^y iʔ [si.t̥iʔ]	milk
lo [lo]	type	kōkō [ko.ko]	dove
xǔʔ [ʃuʔ]	oldster	kula [ku.la]	old

Monomoraic nasal:

kānʔ [kãʔ]	DEM	naʔan [nã.ʔã]	house
ménʔ [mẽʔ]	puppy	tēʔēn [tẽ.ʔẽ]	jug
chìnʔ [t̥ɪʔ]	few	kijin [kĩ.hĩ]	leather
nkùnʔ [ŋũ]	tortoise	t ^y ūnū [t̥u.nũ]	crawfish

Dimoraic non-nasal:

xāá [ʃa:]	clarity	kwitaāʔ [k ^w i.ta:ʔ]	fox
nteēʔ [nde:]	here	kwixēēʔ [k ^w i.ʃe:ʔ]	raccoon
jīi [hi:]	ash	nkut ^y ii [ŋgu.t̥i:]	it ended
kōō [ko:]	fog	talōó [ta.lo:]	his/her face
chūú [t̥u:]	Jesus	---	

Dimoraic nasal:

tāān [tã:]	lard	nkataan [ŋga.tã:]	I gave it
kweēnʔ [k ^w ẽ:]	bat	tixēēn [ti.ʃẽ:]	daughter in law
kiin [kĩ:]	hematoma	tukwīín [tu.k ^w ĩ:]	path
jūún [hũ:]	thread	nkasūún [ŋga.sũ:]	they argued

ZAC presents asymmetries in the distribution of its consonant and vowel types. In effect, the greatest phonemic contrast exists within final syllables. Table 3.2 on page 140 summarizes the distribution of phonemes within the word.

The syllable minimally consists of a consonant, a vowel. In native words, syllables may contain a set of onset clusters as shown in table 3.1 on page 133. Spanish loans may present three-consonant clusters word-medially. A word may contain up to two different laryngeal elements (such as /ʔ/ and /h/ that is to say not /ʔ/ and /ʔ/ nor /h/ and /h/³), but the distribution of the glottal stop is more restricted than the glottal fricative (§2.3.7). Only one glottal consonant per word is allowed in the language, and it generally only occurs in the final syllable (see figure 3.1).⁴

Examples showing all possible simplex word shapes are presented below:

Short monosyllabic words⁵:

ʔin [ʔi]	<i>DAT</i>
nǎ [na]	<i>thing</i>
nkùṅ [nkũ]	<i>tortoise</i>
nĩʔ [nĩʔ]	<i>his/her bowels</i>
ménʔ [mɛʔ]	<i>puppy</i>
chìnʔ [tʃiʔ]	<i>a little</i>
mpíʔ [mbiʔ]	<i>dram of liquor</i>
wráʔ [bra]	<i>hour</i>
ʔnʲǎn [ʔnǎ]	<i>DAT.1S</i>
xkwìʔ [ʃkʷiʔ]	<i>only</i>
nkwān' [nkʷǎ]	<i>I was</i>

Long monosyllabic words:

³One Spanish loan contains two /h/: *jojòlĩ'* 'sesame seeds' from Spanish *ajonjolì*

⁴The only words with a glottal stop as an onset are *ʔin* 'DAT' and *ʔnʲǎn* 'DAT.1S'.

⁵There seems to be no examples for nCVʔ word in the lexicon.

kaa [kaa]	<i>nine</i>
nkāán [ŋgã:]	<i>cohune</i>
ntsee [ndze:]	<i>suddenly</i>
ntsiin̄ [ndzi:]	<i>guava</i>
kōō [ko:]	<i>fog</i>
kūūn [kū:]	<i>sweet potato</i>
xaāʔ [ʃa:ʔ]	<i>luxurious</i>
nkaànʔ [ŋgã:ʔ]	<i>booger</i>
nkyaà [nkja:]	<i>he/she left</i>
nkyaāʔ [nkja:ʔ]	<i>it got made</i>
ntyūún [ndjū:]	<i>I grind it</i>
nkyaàn [nkjã:]	<i>he/she came</i>
kyoōʔ [kjo:ʔ]	<i>century plant</i>
nkyaàʔ [nkja:ʔ]	<i>it gets made</i>
xkwaān̄ [ʃkʷã:]	<i>he/she will throw it away</i>

Short disyllabic words:

sokö [so.ko]	<i>small fish</i>
yānán [ja.nã]	<i>copal</i>
bùrrū [bu.ru]	<i>donkey</i>
yawèʔ [ja.weʔ]	<i>curse</i>
loʔö [lɔ.ʔɔ]	<i>cattle pen</i>
kwīnāʔ [kʷi.naʔ]	<i>his/her flesh</i>
nkjună [nkju.na]	<i>he/she is crying</i>
xkwilā [ʃkʷi.la]	<i>school</i>
ntsulʔiʔ [ndʒu.ʔiʔ]	<i>swing</i>
laʔwě [la.ʔwe]	<i>sapote</i>
traʔwě [tra.ʔwe]	<i>center</i>

Long disyllabic words:

nkatāá [ŋga.ta:]	<i>he/she gave it</i>
tixeen [ti.ʃɛ:]	<i>daughter in law</i>
tilōō [ti.lo:]	<i>skirt</i>
nkasūún [ŋga.sū:]	<i>he/she fought</i>
kwitʸiiʔ [kʷi.ʈi:ʔ]	<i>frog</i>
nkasīínʔ [nka.sĩ:ʔ]	<i>he/she squeezed it</i>
tukwīín [tu.kʷĩ:]	<i>path</i>
nkaskwaān [ŋga.skʷã:]	<i>he/she threw it away</i>

Short trisyllabic words:

tʸūkùwí [ʈu.ku.wi]	<i>magpie</i>
titsāʔán [ti.tsã.ʔã]	<i>saucepan</i>
ntíkyāsèʔ [ndi.kja.seʔ]	<i>it is getting deflated</i>
nkayākún [ŋga.ja.kũ]	<i>I ate</i>
kusiʔnʸun [ku.si.ʔnũ]	<i>I will cut it</i>
similóʻ [si.mi.lo]	<i>hat</i>

3.2 Phoneme distribution within the word

Table 3.2 shows the distribution of phonemes according to manner of articulation within the word. It clearly shows how the final syllable is the most prominent, as it is the position in the Word where the most contrast occurs.

Many of the phonotactic constraints are best captured with reference to the autosegmental analysis presented and discussed in detail in chapter 1. The autosegmental representation was reintroduced again in this chapter for convenience, as figure 3.1 on page 124.

The Word (ω) is the domain at the end of which the optional coda (/ʔ/) may occur. There is a constraint against two identical glottal conso-

nants occurring within the Word (§2.3.6). There are very few examples of words starting with /ʔ/: *ʔin* 'DAT' and *ʔnʷán* 'DAT.1S', another example is the negation *ʔà*, and finally the emphatic particle *ʔá*.

Moreover, the distributions of mid vowels (/e/ and /o/), nasal vowels, and long vowels are also best described in reference to the position within the Word (i.e. word-finally). /e/ never occurs underlyingly in non-final syllables of roots (§2.2.1.2), and /o/ may occur in non-final syllables only if ALL vowels in ALL syllables are also /o/ (§2.2.1.5). Furthermore, the only example of a vowel initial word in the native lexicon is the question particle *á* which always occurs at the end of sentences. Nasal vowels only occur underlyingly word-finally, but may surface in penultimate syllables because of the Translaryngeal Vowel Harmony (§2.2.4.1) and Nasal Spreading (§2.2.4.2). As for long vowels (§2.2.3), they similarly only occur word-finally.

	Syll. onset	Syll. coda	Antepenult. syll.	Penult. syll.	Final syll.
Stops (excl. /ʔ/)	✓	---	✓	✓	✓
/ʔ/	3 ex	✓	---	---	✓
/h/	✓	---	---	✓	✓
/N + non-Continuant/	✓	---	✓	✓	✓
Affricates	✓	---	---	✓	✓
Fricatives (excl. /h/)	✓	---	✓	✓	✓
Approximants	✓	---	✓	✓	✓
Oral vowels	1 ex	---	✓	✓	✓
			(NOT /e/, /o/)	(NOT /e/, /o/)	
Nasal vowels	---	---	---	---	✓
Long vowels	---	---	---	---	✓

Table 3.2: Phoneme distribution within the word

This chapter together with chapter 2 provided an in-depth account of the distribution, as well as the restrictions on the distribution of the contrastive elements of ZAC (except tone which is dealt with next in chapter 4). The analysis presented in chapter 2 for the contrastive features of vowel nasality and vowel length, and the analysis presented here for the phonotactics of the language are guided by a proposal of an autosegmental representation of the prosodic features (see chapter 1 §1.6 for a detailed description of this theoretical framework). This mode of representation proves to be the most elegant for the overall phonological analysis for ZAC because it allows for the entire contrastive system which includes twenty-two consonant phonemes, five non-nasal vowels and, corresponding to them, 4 nasal vowels, vowel length, vowel nasalization and five tones to be encapsulated in one single analysis of phonological representation. This autosegmental analysis is also particularly useful to represent the tonal system which is addressed next.

Chapter 4

Tone in simplex words

4.1 Introduction

The hallmark of Otomanguean languages is tone, and within the family, the diversity of the tonal inventories is particularly great. Some languages show as few as two or three tones, such as Zenzontepec Chatino (Campbell, 2014), Pame (Berthiaume, 2012), some Zapotec varieties (Sicoli, 2007), while others offer inventories with as many as fourteen, like San Juan Quiahije Chatino (E. Cruz, 2011) or even nineteen, like for Chichahuaxtla Trique as cited in DiCano (2008). Chatino languages present a great diversity in tonal inventories, but also vary in their typological features such as whether or not tones form tonal sequences, whether or not the inventory includes floating tones, or whether tones align to moras or to syllables/stems.

This chapter describes the phonology of the ZAC tonal system, discussing the distribution of tone as well as describing in detail all the phonetic realizations for each Tone Class for simplex words only. The terminology 'simplex word' (or even just 'word') and 'simplex inflected stem' is used interchangeably to mean the same thing, i.e. non-compound words. This chapter only deals with tone distribution in simplex words because they are

the natural domain for the TS. It excludes inflected complex stems (compound words), because in the latter, each component word is a separate tonal domain. It also excludes enclitics, because enclitics too, form their own separate tonal domain.

Before delving into the description of ZAC's tones, the reader should be informed that this chapter takes him through the methodology and the discovery path of the complexities of this tonal system, as opposed to solely exposing the facts and its characteristics. What is being demonstrated here, is how an entire system works, how each part of the 'machine' functions in some semi-autonomous way. Ultimately, the whole system is exposed. At times, some special complexities have to be left out in order to establish the basic patterns. Moreover, there are points which overgeneralize on the basis of the data presented, but which get revisited and modified further on as needed to account for the data newly presented. What is being shown by taking this approach is the dynamic characteristics of the system.

As a result, at first, the contrastiveness of some elements have to be taken on face value. The following discussions and demonstrations of data emphasize that tonal contrasts can only be established after controlling for all of the factors that can affect how a tone is realized. ZAC's tonal inventory is represented in a complex system which cannot be described and established by means of minimal pairs for various reasons. First of all, lexical tonal contrastiveness cannot be proven through a series of words placed in isolation because this context results in tonal neutralization of various Tone

Classes. Secondly, ZAC presents floating tones which are only revealed in specific environments, so that as a result, supporting underlying tonal contrast with minimal pairs would not only be inaccurate but absolutely misleading (Snider (2014) likewise gives arguments against the use of minimal pairs for establishing tonal contrasts, for many of the same reasons).

Instead, because the contrasts are based on actual comparable data which has been controlled for all the factors affecting underlying tone patterns, they allow for a more convincing generative analysis.

However, the conclusions and the main facts of the analysis are presented here so that the reader is aware of where he is eventually taken to, and so that he may keep those facts in mind along the way as the system is being exposed.

The ZAC tonal system is intricate because it involves four levels of pitch represented in five tones arranged in many tonal sequences (TS)¹ which become the signatures for Lexical Tone Classes. Furthermore, polysyllabicity allows for many moraic shapes resulting in a variety of possible phonetic realizations of the TS's which mark the Tone Classes. Once the linking rules and the alignment of the tones in different word shapes are understood, establishing the tones of individual lexemes at the context-free word level is a fairly straight forward matter. What is challenging, and yet

¹As already explained in chapter 1 §1.6, a Tonal Sequence is composed of up to three mora-linked tonal elements and may include a floating tone. TS's define Lexical Tone Classes in the lexicon, they are morphological entities that pertain to simplex words (whereas tones are phonological entities that pertain to moras)

possible, is fully accounting for the surface tonal realization of ZAC's lexemes, since they are significantly affected by surrounding tones in phrasal context.

ZAC presents five mora-linked tones² (/L/, /M/, /H/, /LH/ and /LS/) realizing four levels of pitch (Low, Mid, High and Super High), and three floating tones³ (/L)/, /(H)/, /(LS)/. Not all moras in a specific word are linked to a tone, some are unspecified for tone (marked as X in table 4.1). When a mora is unspecified for tone, it surfaces phonetically with a default low pitch, which may be altered by a preceding tone in phrasal context. As a result, a mora may occur with one of the six tonal possibilities, i.e. either one of the five tonal elements (/L/, /M/, /H/, /LH/ and /LS/) or as a tonally unspecified mora.

Tonal representation	Notation	Mora-linked realization
X	v	mora is low, slightly falling (by default)
L	ṽ	mora is low, slightly falling
M	ṁ	mora is mid, leveled
H	ḥ	mora is high, leveled
LH	ḽ	mora rises from low to mid-high
LS	ḽ̄	mora rises from low to super-high

Table 4.1: Tonal representation

²As already explained in chapter 1 §1.6, all through this work, when it is said of a tone that it is linked to (associated with) a mora, it means that the phonology specifies that it occurs simultaneously with any phoneme segments associated to that mora.

³In ZAC, a floating tone is a tone that is underlyingly unassociated to any mora, but which is nevertheless postulated to exist because of its surface tonal effect on subsequent tonally unspecified moras.

The five tonal elements, are combined to form TS's which in turn define Lexical Tone Classes in the lexicon. Some TS's include floating tones⁴ (marked in between parentheses in table 4.2). There are a total number of fifteen Tone Classes in the language as shown in table 4.2. Note that Tone Class 1 is actually unspecified for tone as the TS shows no mora-linked tonal elements (/ /).

Now that the basic facts about this tonal system have been exposed, we can turn to demonstrating how the whole system actually works.

This chapter is organized as follows: §4.2 presents the language's tonal inventory; §4.3 establishes the mora as the Tone Bearing Unit (henceforth TBU) for the tones, and the Word as the domain for the TS; §4.4 describes the prosodic shapes of simplex words; §4.5 describes tonal realization at the sentence level, discussing the main post-lexical tonal rules of the language, including the rules that account for tone sandhi⁵; §4.6 presents the occurrence of the TS according to prosodic shapes; §4.7 abstracts the TS for each Tone Class, and demonstrates how they link to words of various prosodic shapes; §4.8 describes the distributions of the different prosodic shapes per Tone Class; §4.9 summarizes the distribution of all tones within words; §4.10 discusses all of the fifteen Lexical Tone Classes indicating their

⁴The floating tones marked on the right edge of words also with diacritics: a /L/ floating tone is marked with a grave accent ` , a /H/ floating tone is marked with an acute accent ´ , a /LS/ floating tone is marked with a double acute accent ˇ .

⁵Sandhi: a phonological process which happens between words resulting in a tonal change.

Class	Word	Gloss	TS
1	nkajin ^y an	<i>I asked for it</i>	/ /
2	ntikalǎ́	<i>cloud</i>	/L (LS)/
3	ntusanè`	<i>he/she sprays it</i>	/L (L)/
4	nkayakwēn´	<i>he/she vomited it</i>	/M (H)/
5	nkajil ^y ān	<i>I farted</i>	/M/
6	nkajil ^y ā	<i>you farted</i>	/L-M/
7	mintilǎ́	<i>napkin</i>	/L-M (LS)/
8	nkalukwǎ	<i>he/she swept it</i>	/LH/
9	ntijìn ^y ǎn	<i>he/she asks for it</i>	/L-LS/
10	nkayūjwī	<i>he/she died</i>	/M-M/
11	nkajìn ^y ǎn	<i>he/she asked for it</i>	/M-H/
12	ntāsālàn	<i>I am opening it</i>	/M-M-L/
13	ntāsǎnè`	<i>he/she is spray- -ing it</i>	/M-LS-L (L)/
14	ntājín ^y ān	<i>he/she is asking for it</i>	/M-H-M/
15	ntòlò`	<i>you remove it it</i>	/L-M-L/

Table 4.2: The ZAC Tone Classes

prevalence in different areas of the lexicon; §4.11 presents a more complete description of tonal realization at the sentence level, including a more detailed description of Spreading when the subsequent word is linked with (associated to) tone, and an account of floating tone behavior in subsequent words linked with tone; and finally §4.12 offers a grand summary of the characteristics of ZAC's tonal system offering a typological perspective.

4.2 The tonal inventory

Figures 4.1 and 4.2 illustrate the realization of each of the five tones on monomoraic monosyllabic words⁶. The line labelled X shows the default low pitch level of unspecified moras. In figure 4.1, the pitch level of the unspecified mora labelled /X/ is a little bit higher than the pitch level of /L/ tone mora labelled /L/. In fact, when looking at pitch tracks, their respective F₀ are not discernible from each other.

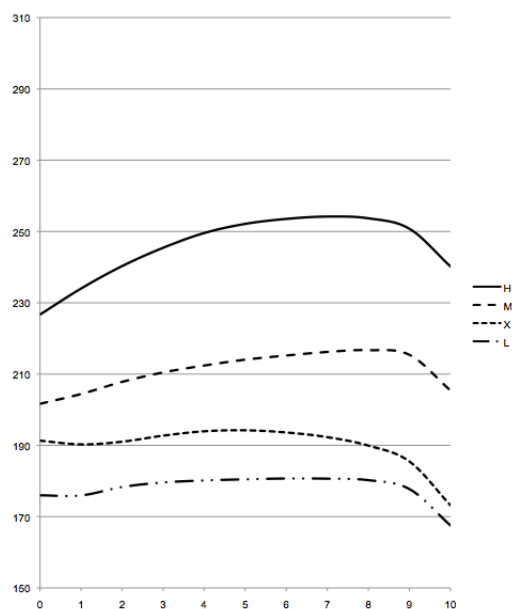


Figure 4.1: Monomoraic words with level outcomes

⁶Graphs are time-normalized averages of pitch over five words per tone, six tokens per word.

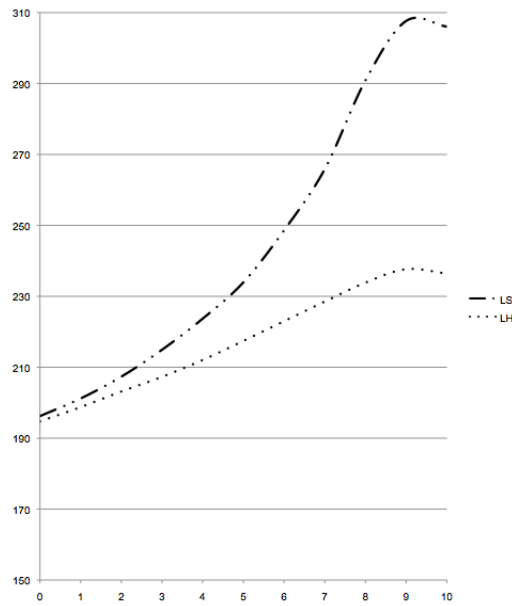


Figure 4.2: The ZAC rising tones on monomoraic words

4.3 The mora as the Tone Bearing Unit

This section establishes two important facts regarding ZAC's tonal system: (1) the mora is the TBU for the tones; but (2) the Word (ω) is the domain for tonal sequences.

Figure 4.3 below was first introduced and discussed in detail in chapter 1 (as figure 1.8) to discuss the theoretical framework used in this work. Then, it was re-introduced in chapter 2 (as figure 2.3) to discuss the supra-segmental features of the vocalic system. It was presented again in chapter 3 (as figure 3.1) to discuss some contrastive elements' distributional constraints, and finally it is included here again (as figure 4.3) to discuss the different domains and loci of realization of the tonal system.

As was discussed in more detail in §1.6, this autosegmental representation allows for the distinction between the domain of (or hosting of) a given feature, versus the actual locus of realization of that feature. For example, the ω is the domain for the tonal sequence (TS), but its tonal element(s) are realized on the mora. In other words, tone is specified at the word level and realized on the mora.

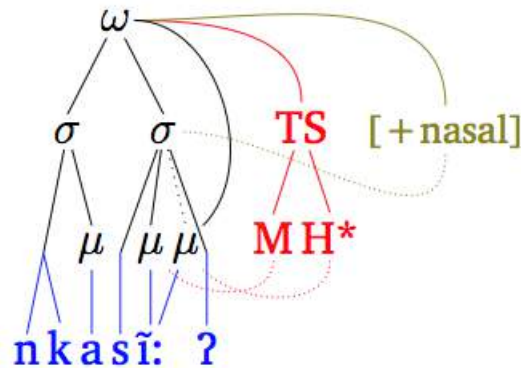


Figure 4.3: Autosegmental representation of prosodic features: *nkasiĩn?* 'he/she squeezed it'

For convenience, the way the phonological representation is expressed within figure 4.3 is explained again here. It includes four different tiers. They are: the prosodic tier (in black), the nasal tier (in green), the segmental tier (in blue), and finally the tonal tier (in red).

In the representation, some lines are solid and some are dotted. The

solid lines are linkages pre-defined in the lexical representations (and might be termed “hosting”); the dotted lines are filled in by Linking rules, and are variable from one lexical representation to another. For example, the /M/ tone of the TS /M-H/ may or may not actually get linked depending on the moraic shape of the word (§4.7).

In ZAC, the * marks the final linkable tone in the TS, and the tone after it (if one) is a lexically unlinked floating tone. The rule is to link the linkable tones, from right to left, starting with the * marked tone, to the moras of the lexeme in a one-to-one fashion.

The prosodic tier (in black) includes the word (ω), the mora (μ), and the syllable (σ).

- ω hosts syllables, the final mora, the [+Nasal] feature, as well as the Tone Sequence (TS). The ω -hosted extra mora (in the case of long vowels), and the [+nasal] feature both link (dotted line) to the last syllable.
- σ hosts moras, and consonants including ?.

The nasal tier (in green) includes the [+Nasal] feature which links (dotted line) to the final syllable, and which is hosted by the ω .

The segmental tier (in blue) includes all segments but the mora hosts only vowel segments.

The tone tier includes the tonal elements (in this case /M/ and /H/), and each link to a mora (dotted line) in the last syllable. The tonal elements form the Tone Sequence (TS) which is hosted by the ω .

As we can observe in figure 4.3, the word *nkasĩn?* 'he/she squeezed it' is a trimoraic disyllabic word where the antepenultimate mora in the penultimate syllable is not linked to any tone, the penultimate mora is linked to a /M/ tone (dotted line), and the final mora is linked to a /H/ tone (dotted line). The latter shows that a mora can be tonally linked or unlinked, i.e. unspecified for tone. Tonally unspecified moras can be affected by preceding tones, but when unaffected, they surface with a default [L] pitch, and sound the same as or similar to an /L/ tone (see figure 4.1 on page 148).

The TBU is the mora, as opposed to the syllable as the language has both monomoraic as well as dimoraic syllables, and the latter differ in the number of tones they can bear. Words with more than one mora may have a tone on each mora. It doesn't matter if the two moras are in separate syllables (as in the example shown in figure 4.4) or in the same syllable (as in the example shown in figure 4.3). Monomoraic syllables can only have one tonal element⁷ but dimoraic syllables can bear two tonal elements.

⁷There is one Tone Class that is defined by the sequence /M-M-L/, and in that Tone Class alone, two tones link to a single mora when the associated word is monomoraic as on the word *xkà* 'another'. Since there is no room on the vowel to mark both tones, the diacritic for the low tone is placed on top of the diacritic for the mid tone. Furthermore, *xkà* is a contraction of the word *chikà* where the mid tone is associated with the first vowel and the low tone is associated with the final vowel.

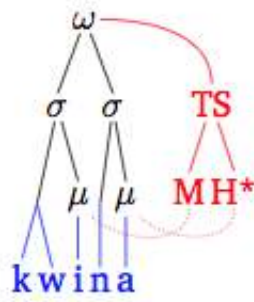


Figure 4.4: Linking of tone in a disyllabic dimoraic word: *kwīná* 'snake'

4.4 Prosodic shapes of words

The majority of simplex words are dimoraic, and most inflected verbs are dimoraic or trimoraic whereas monomoraic words are very rare in the language, and are generally limited to function words. Figure 4.3 showed how moras link to syllables taking as an example a trimoraic disyllabic word. Figure 4.5 shows how the moras link to syllables in words of various shapes. Simplex words in ZAC have all the shapes presented below.

4.5 Tone realization at the sentence level

In the lexicon, the majority of words are associated with a TS whose tonal elements may be linked (associated) or unlinked (not associated, also called floating). Before delving into the TS's and how they associate to different prosodic shapes, it is essential to show the realization of the tones themselves in connected speech. In this section, the sentence examples presented show the three major processes in effect: the behavior of moras un-

	Monomoraic	Dimoraic	Trimoraic
Monosyllabic	/σ/ μ	/σ/ ^ μ μ	--
Disyllabic	--	/σσ/ μ μ	/σ σ/ ^ μ μ μ
Trisyllabic	--	--	/σσσ/ μ μ μ

Figure 4.5: Prosodic shapes of simplex words (Modified from (Villard & Woodbury, 2012))

specified for tone, the persistence or spreading of /H/, /LH/ and /LS/ tones into moras unspecified for tone, and finally the behavior of three of the five tones as lexically unlinked or floating tones into subsequent words with tonally unlinked moras.

Because this section describes tonal realization at the sentence level, the main post-lexical tonal rules of the language, including the rules that account for tone sandhi are discussed here.

4.5.1 Moras unspecified for tone and spreading

The pitch track with the corresponding autosegmental representation in figure 4.6 presents a sentence where all words are unspecified for tone, illustrating the default low pitch level (slightly descending) of unlinked moras when undisturbed. This sentence serves as a frame for all the subsequent

examples where each of the five tones is introduced to this frame in order to observe the behavior of the posited unspecified moras.

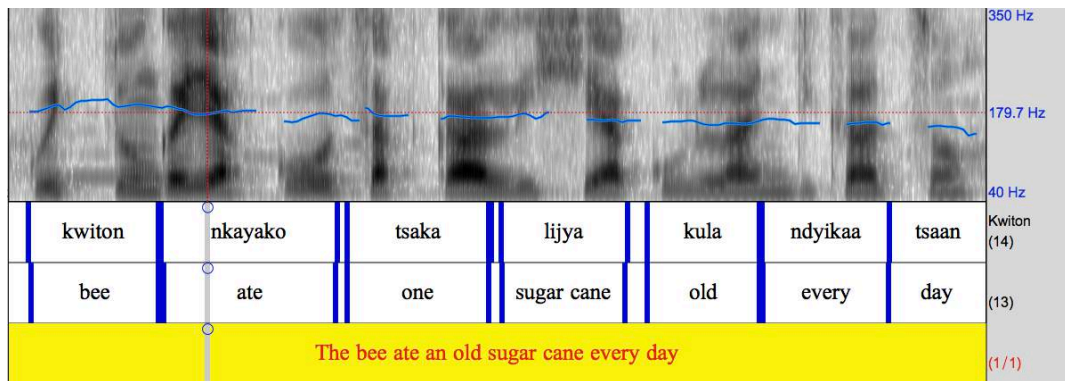
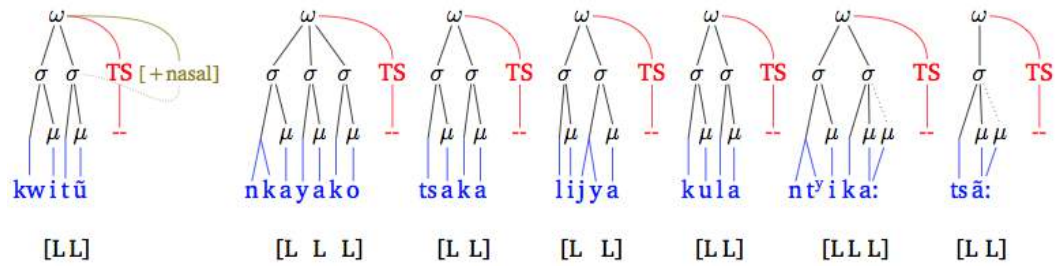


Figure 4.6: Sentence where all words are unspecified for tone

The pitch track with the corresponding autosegmental representation in figure 4.7 illustrates the persistence (with a slight decline) of high pitch [H] from the last mora of word *kwíná* 'snake' (/M-H/) into all subsequent words made of tonally unlinked moras until the end of the utterance.

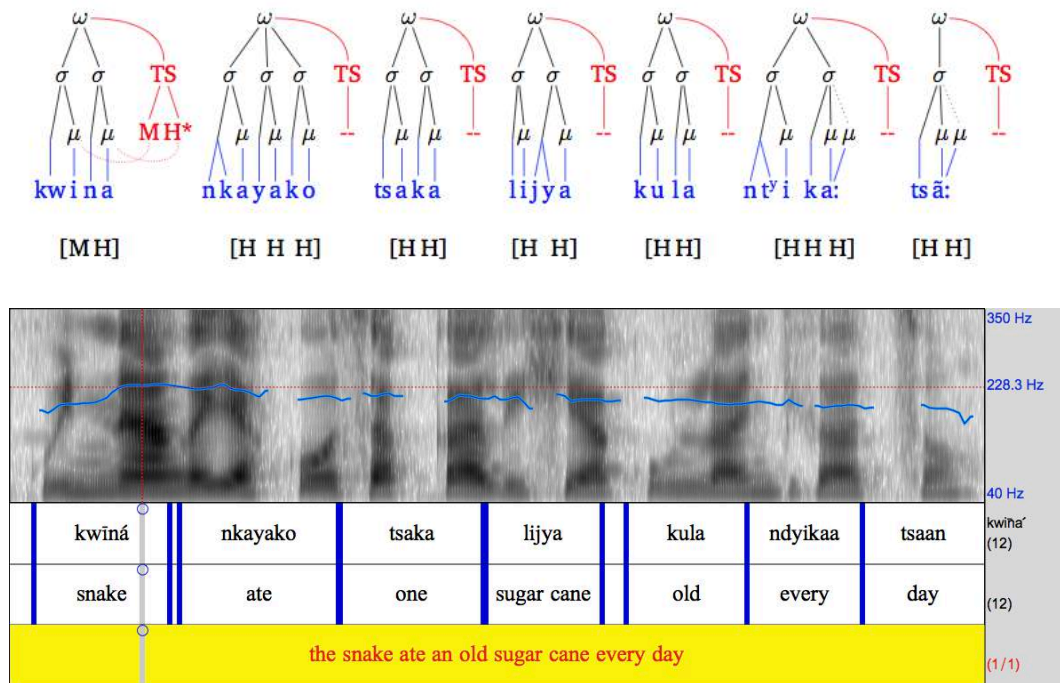


Figure 4.7: Persistence of high pitch [H] (from /M-H/) into subsequent tonally unspecified moras

The pitch track with the corresponding autosegmental representation in figure 4.8 demonstrates the persistence from the final high pitch [H] from /LH/ tone that is linked to the last mora of word *lusĩ* 'butterfly' (/X-LH/) into all subsequent words made of tonally unlinked moras just as it occurred for the word *kwíná* 'snake' (/M-H/) in figure 4.7.

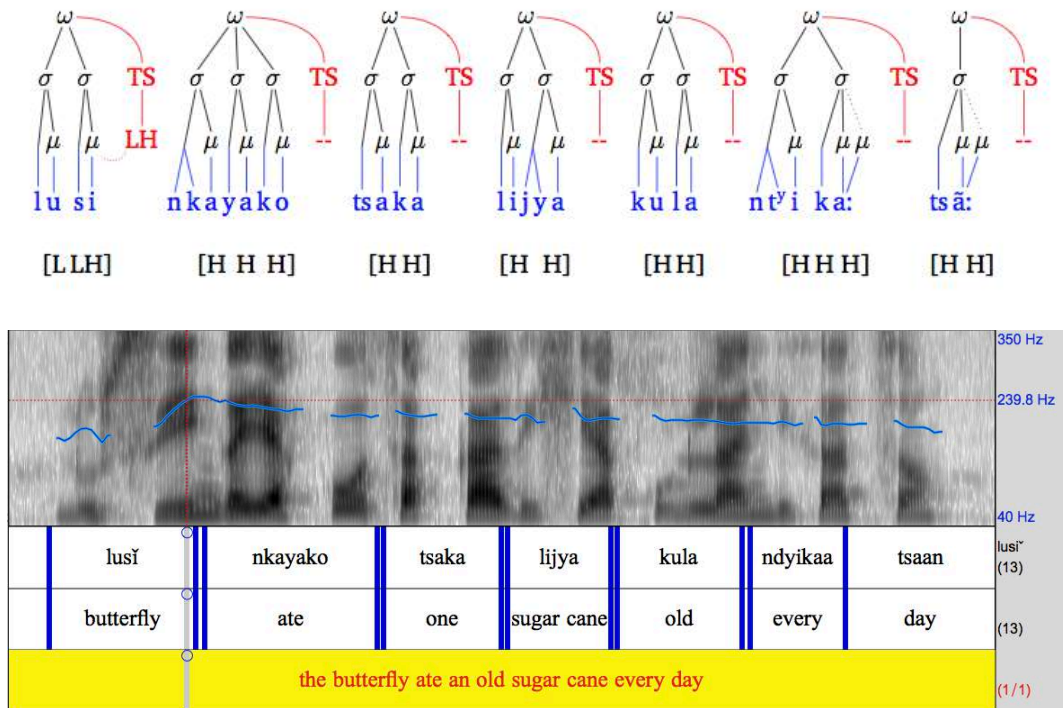


Figure 4.8: Persistence of the final high pitch [H] (from /LH/) into subsequent unspecified moras

The pitch track with the corresponding autosegmental representation in figure 4.9 exemplifies the persistence of the final super high [S] pitch from the last mora of the word *yùsín* 'turtle' (/L-LS/) into all subsequent words consisting of tonally unlinked moras similarly to the examples presented for the words *kwíná* 'snake' (/M-H/) and *lusĩ* 'butterfly' (/X-LH/). The [S] pitch declines earlier and a bit more than [H] through the sentence.

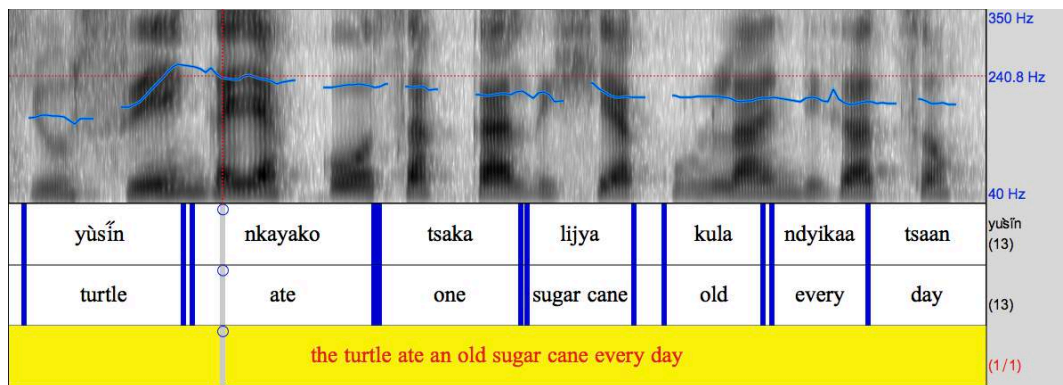
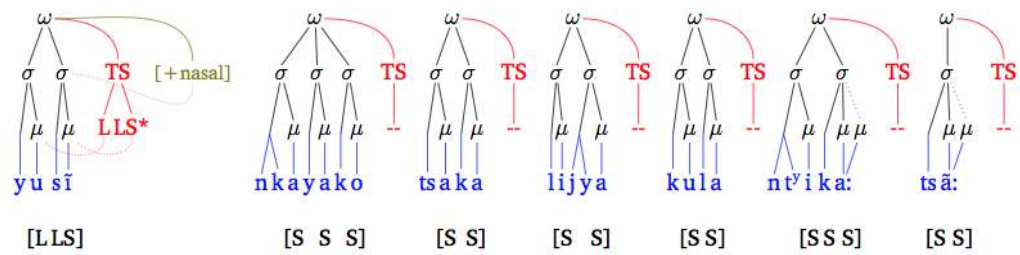


Figure 4.9: Persistence of super high pitch [S] (from /L-LS/) into subsequent tonally unspecified moras

The pitch track in figure 4.10 presents a sentence starting with the demonstrative (DEM) *kān?* 'that one' (/M/) followed by the same words unspecified for tone. We can observe that after the initial /M/ tone, the pitch goes back down to its default low level in all subsequent tonally unlinked moras. This shows that /M/ does not spread into tonally unspecified moras.

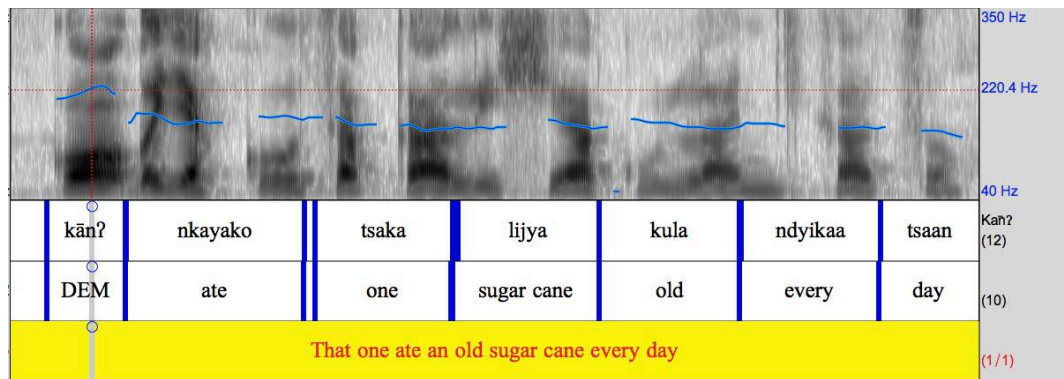


Figure 4.10: [M] pitch (from /M/) does not persist in subsequent tonally unspecified moras

The pitch track in figure 4.11 shows another example of no effect in all subsequent tonally unspecified moras. We can observe that after the final low pitch [L] from (/M-L/) of word *lāxò* 'vulture' all unspecified moras surface with the default [L] pitch.

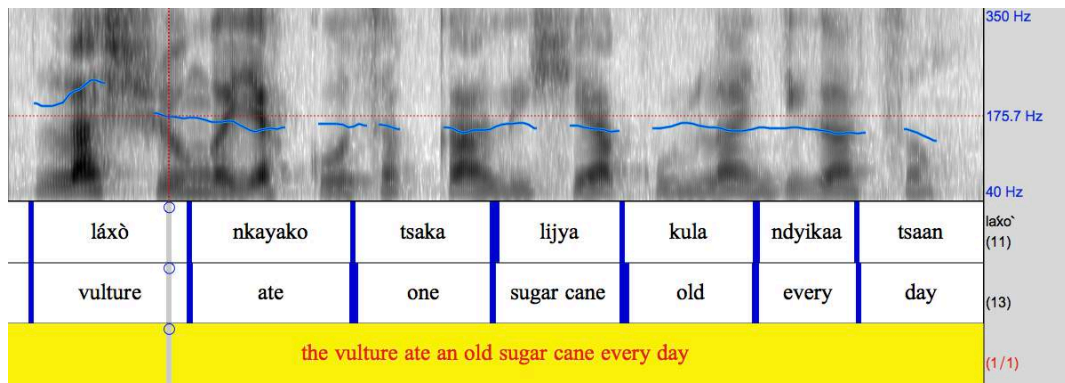


Figure 4.11: [L] pitch (from /M-L/) has no effect on subsequent tonally unspecified moras

The pitch track with the corresponding autosegmental representation in figure 4.12 illustrates the spreading of the high pitch [H] (from /M-H/) from the final mora of word *kwīná* 'snake' into all subsequent words made of tonally unlinked moras until a tone-linked mora is encountered in the word *ʔūwā* 'annona'⁸ (/M-M/). The latter is realized as [M-M], and all subsequent tonally unspecified moras are realized with the default [L] pitch since /M/ (from /M-M/) does not spread. This shows that spreading only occurs in tonally unlinked moras and that spreading gets interrupted by a tone-linked mora.

⁸*Annona* is a generic name and here the exact translation for this word is 'custard apple'.

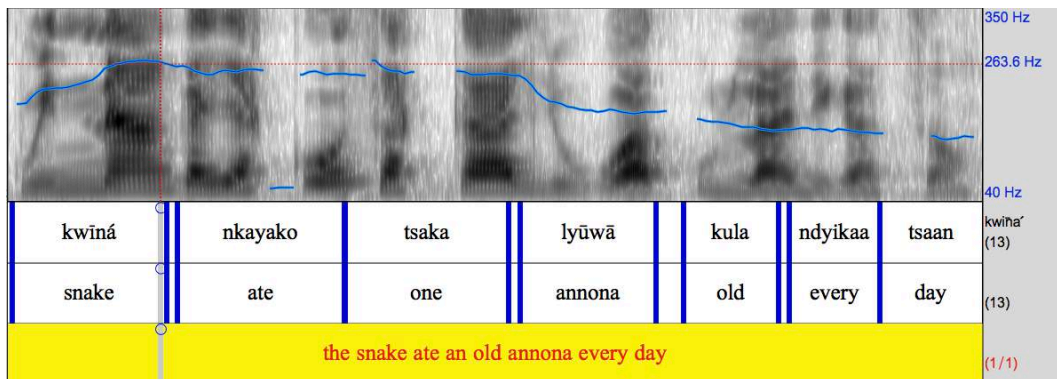
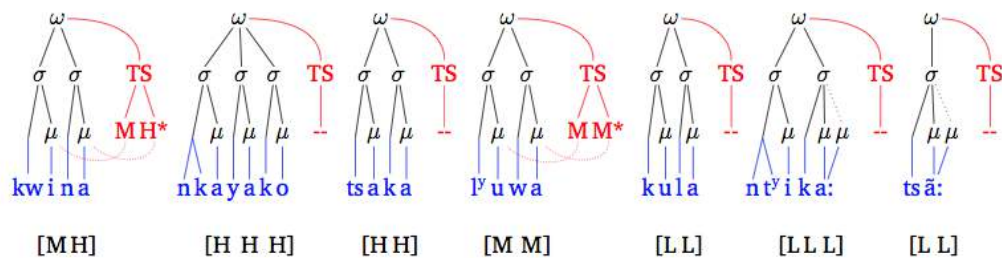


Figure 4.12: Persistence of [H] pitch (from /M-H/) in subsequent unspecified moras until it reaches the TS /M-M/ in lyūwā, which is realized on each mora with [M] pitch.

Now that spreading has been demonstrated in various environments, the rule can be stated as follow:

The final pitch level of tones /H/, /LH/ and /LS/ persists through subsequent tonally unlinked moras until encountering a tone-linked mora or reaching the end of the utterance.

Figure 4.13: Spreading rule

4.5.2 Linking and realization of floating tones in subsequent tonally unspecified moras

Among the five tones present in the inventory, three of them can be realized as floating tones: /L/, /H/ and /LS/. These tones are unlinked but still they are part of certain TS's tonal representation.

This section demonstrates what happens when a floating /L/, /H/ and /LS/ is directly followed by tonally unlinked moras in subsequent words.

It is important to point out that the data just presented in §4.5.1 and the data shown in this section show that Spreading and floating tone behavior are different processes. Spreading involves the persistence of a pitch target from preceding word into subsequent tonally unspecified moras until the end of a utterance. The floating tone behavior involves the actual linking of a previously unlinked tone to a tonally unspecified mora in a subsequent word only (i.e the domain of realization of a floating tone is the subsequent word and no further). The environments for Spreading (and blocking of Spreading) and for floating tone realization are phonological, they both obey phonological rules, but their entity and their respective do-

main are different. As a result, Spreading is analyzed as a phonetic process (as in Pierrehumbert and Beckman (1988)), whereas floating tone behavior is considered phonological.

Figure 4.14 shows the representation of floating tones in the autosegmental analysis. The final mora of the word *xunī?* is linked to a /M/ tone but the word also presents a /H/ floating tone (which is unlinked). It shows that the TS consisting of /M (H)/ is hosted by the ω , but that only the /M/ links to the final mora and the /H/ floating tone is left unlinked.

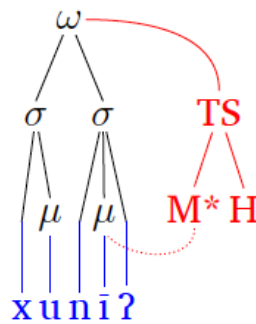


Figure 4.14: Autosegmental representation of the word *xunī?* 'dog'

In the practical orthography, the floating tones are marked on the right edge of words with diacritics (/L/: *word`*; /H/: *word'*; /LS/: *word~*). In tonal representations, the floating tones are marked in between parentheses such as: /M (H)/.

We now turn to observing floating tone behavior in pitch tracks illustrating their realization in tonally unspecified moras using the same sentence frame as in the previous section.

The pitch track with its corresponding autosegmental representation in figure 4.15 demonstrates how the floating /LS/ of word *natèn* 'people' (/X-L (LS)/) links to the rightmost tonally unlinked mora in subsequent word *nkayako* (/X-X-X/) 'he/she ate'. Then, it also shows how all subsequent tonally unlinked moras (after *nkayako*) undergo spreading from the newly-linked /LS/ that had originated as a floating tone.

Finally, one can observe that the antepenultimate and the penultimate tonally unlinked moras in *nkayako* surface with a mid level pitch that suggests a mid tone.

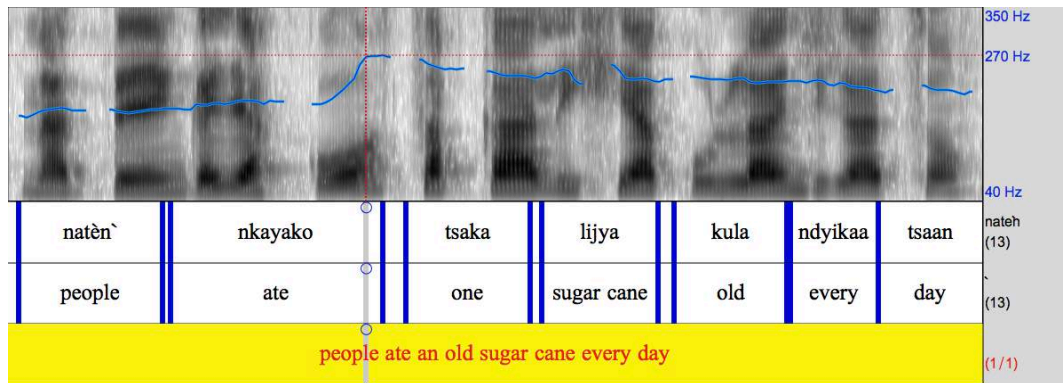
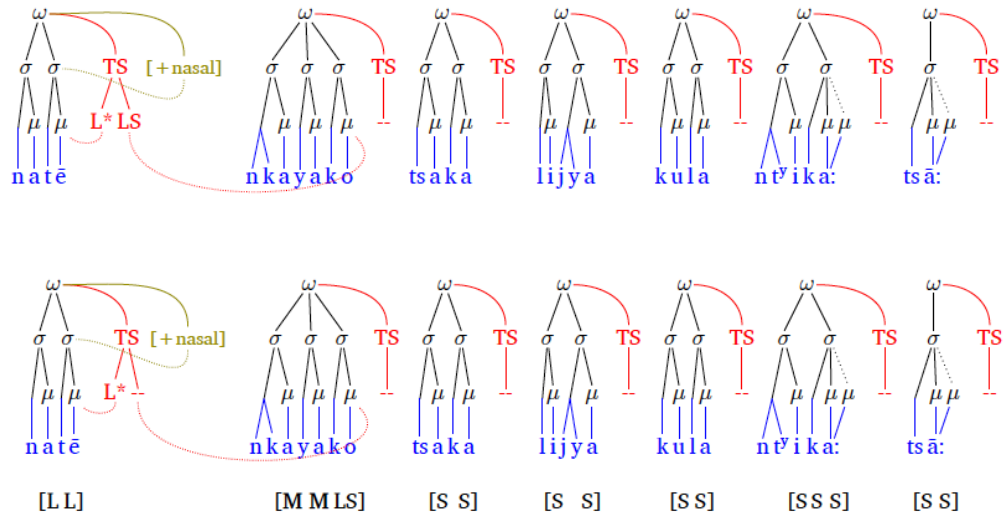


Figure 4.15: Floating /LS/ in subsequent tonally unspecified moras

The pitch track in figure 4.16 shows how the floating /H/ of word *kinʷi* 'bird' (/M(H)/) links to the rightmost mora in word *nkayako* (/X-X-X/) 'he/she ate', and how all subsequent unlinked moras in following words undergo spreading and surface with a [H] pitch. As we observed in the previous pitch track, the antepenultimate and penultimate mora in *nkayako* surface with a [M] pitch level suggesting a mid tone /M/.

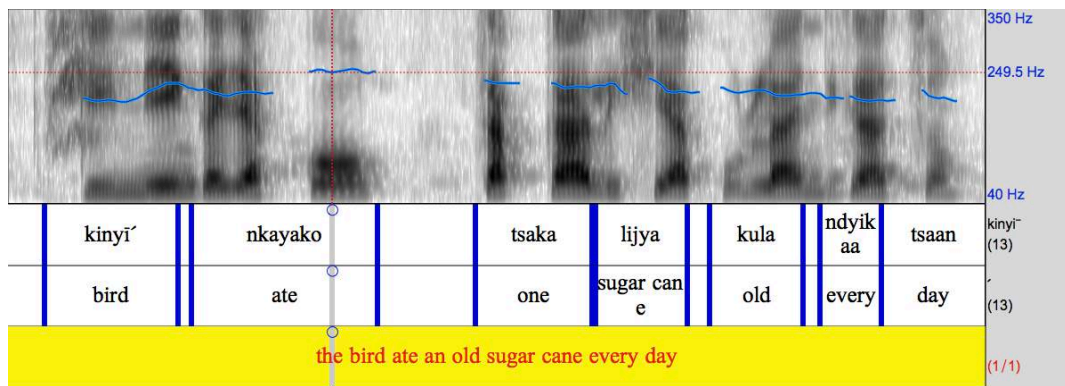
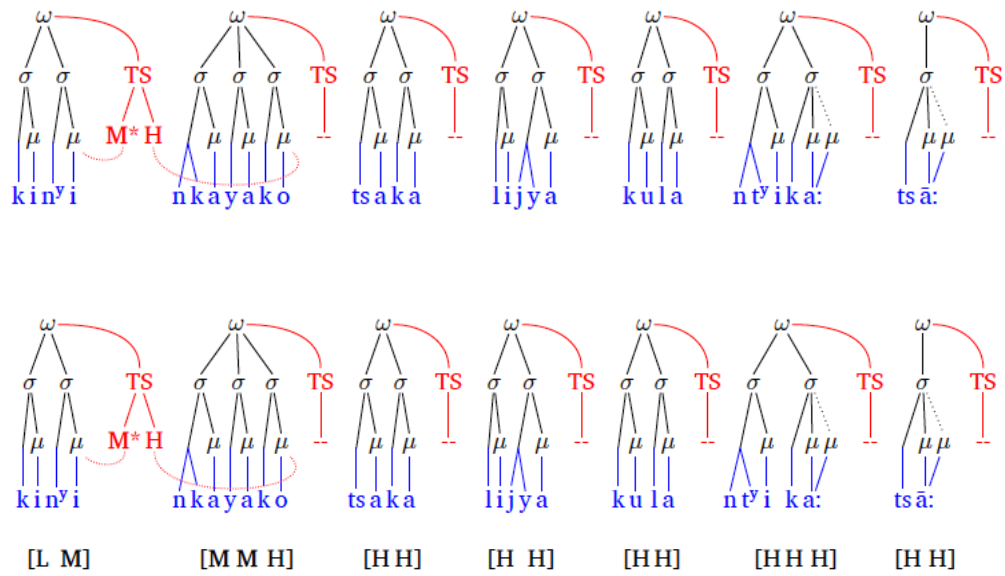


Figure 4.16: Floating /H/ in subsequent tonally unspecified moras

The pitch track with its corresponding autosegmental representation in figure 4.17 shows how the floating /L/ of word ?à` 'no' (/L (L)/) links to the rightmost mora in word *nkayako* (/X-X-X/) 'he/she ate it'. Again, the antepenultimate and penultimate mora in *nkayako* surface with a [M] pitch level suggesting a mid tone /M/⁹.

⁹Although the penultimate mora seem to be raised a bit higher than the antepenultimate mora, it is not as high as high tones in penultimate position.

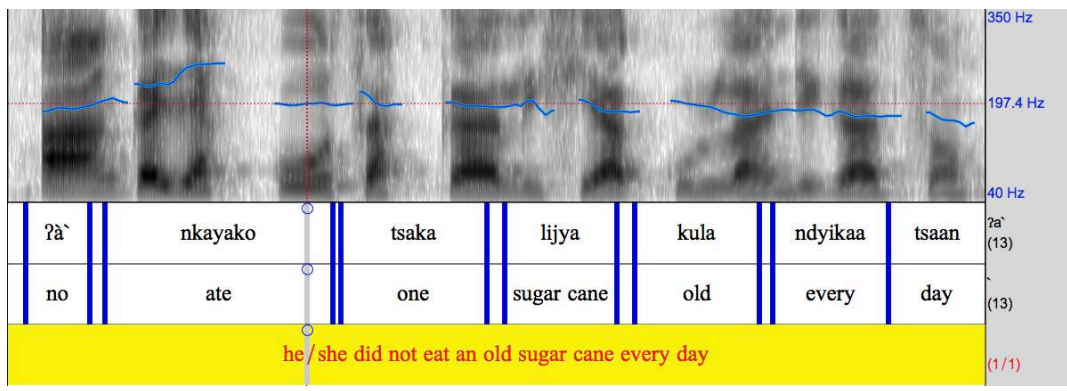
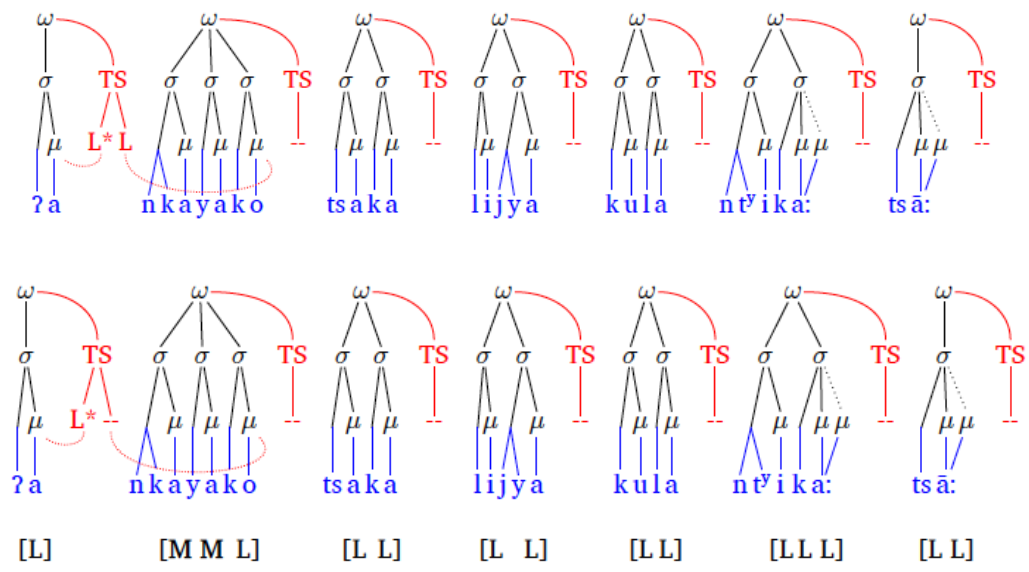


Figure 4.17: Floating /L/ in subsequent tonally unspecified moras

Now that we have observed the realization of the three floating tones in the sentence frame consisting of words unspecified for tone, a preliminary¹⁰ version of the rule for the linking of the floating tones can be formulated as follow:

In a sequence of words where W1 hosts a floating tone and W2 is unspecified for tone, the floating tone links to the rightmost mora in W2. All moras to the left of the (newly linked) floating tone in W2 are assigned a /M/ tone.

Figure 4.18: Preliminary Floating Tone Linking rule 1

The data presented in this section showed that floating tone behavior involves the actual linking of a previously unlinked tone to a tonally unspecified mora in a subsequent word only (i.e the domain of realization of a floating tone is the subsequent word and no further). However, as show in §4.5.1 a tone may phonetically spread onto adjacent tonally unspecified moras, creating a slight contour (a slight downdrift of the F_0). In this case, the structural change makes reference to phonetic parameters (i.e. the pitch level) requiring it to be maintained with a slight declination. As a result, Spreading is analyzed as phonetic process (as in Pierrehumbert and Beckman (1988)), whereas floating tone behavior is considered phonological.

¹⁰It is preliminary because it does not account for when there are tones linked to W2. This phenomenon is treated in §4.11.2

4.5.3 Phonetic data illustrating the Spreading and Floating Tone Linking rules

This section presents data from a phonetic study conducted in the field by the author with Anthony Woodbury. It discusses averaged pitches for the word *kula* 'old' (unspecified for tone: /X-X/) placed after words ending in the five possible tones a mora can bear (plus an example of word where moras are unspecified for tone so showing a total of six possibilities), as well as after each of the three floating tones. Words whose final mora ends with each of the six possibilities are placed within a frame consisting of words unspecified for tone: *tsaka* TARGET WORD *kula*: one TARGET WORD old, meaning 'one old TARGET WORD'. The actual TARGET WORDS used for the experiment are the following:

- /X/: *kwana* 'mirror', *yaka* 'tree', *kee* 'stone', *ntaa* 'bean', *ne?* 'person'
- /L/: *xūnē?èn* (/M-M-L/) 'scorpion', *stānù* (/M-M-L/) 'grapefruit', *tōyōò* (/M-M-L/) 'hole', *jn'ākè* (/M-M-L/) 'your head'
- /M/: *kwītō* (/M-M/) 'hen', *jn'ākē* (/M-M/) 'his/her head', *kōō* (/M-M/) 'mist', *lāā* (/M-M/) 'church'
- /H/: *kwíná* (/M-H/) 'snake', *jn'ātén* (/M-H/) 'mosquito', *xāá* (/M-H/) 'daylight', *nkāán* (/M-H/) 'coconut'
- /LH/: *yanǎn* (/LH/) 'corn cob', *kalǎ* (/LH/) 'dream', *lutǐ* (/LH/) 'rope'
- /LS/: *pǐ* (/L-LS/) 'poult', *pǐ* (/L-LS/) 'fair', *yùsǐn* (/L-LS/) 'turtle', *mixt'ún* (/L-LS/) 'cat', *kyàǎ* (/L-LS/) 'tomorrow', *kwisàǎ* (/L-LS/) 'weevil'

Words ending in the three possible floating tones (unlinked tones):

- /L/: *sí'ùn* (/M-LS-L (L)/) 'dove', *nkwíxì* (/M-LS-L (L)/) 'tomato'
- /H/: *kwanā'* (/X-M (H)/) 'thief', *kitā'* (/X-M (H)/) 'flour, dust', *kweēn'* (/X-M (H)/) 'bat', *keē'* (/X-M (H)/) 'flower'
- /LS/: *mul'ā''* (/L-M (LS)/) 'mule', *mansanā''* (/L-M (LS)/) 'apple', *tasā''* (/L-M (LS)/) 'cup', *tilā''* (/L (LS)/) 'night', *ntsuwaà'ʔ'* (/L (LS)/) 'Piper Auri-tum', *natèn''* (/L (LS)/) 'person', *ntulaā''* (/L (LS)/) 'peach', *jaʔwǎ''* (/L (LS)/) 'banana', *nkùn''* (/L (LS)/) 'tortoise'

Figure 4.19 presents averaged pitch tracks for the word *kula* 'old' after the five tonal possibilities (plus the example of unspecified mora) (/X/, /L/, /M/, /H/, /LH/, /LS/) and illustrates the Spreading rule stated in figure 4.13 on page 163. One can observe that when *kula* is placed after /H/, /LH/ and /LS/, it undergoes spreading whereas when it is placed after /X/, /L/ or /M/ it surfaces in its default low pitch.

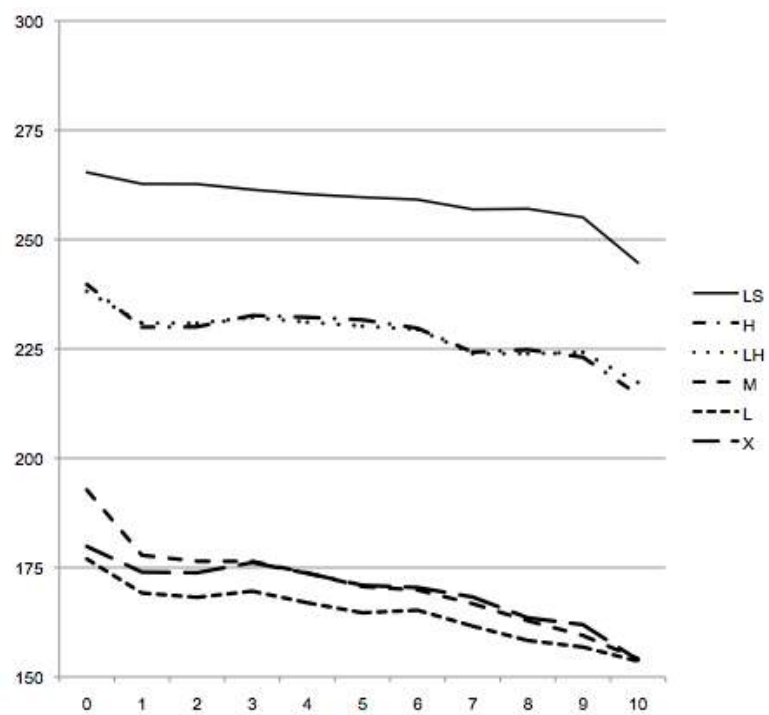


Figure 4.19: Averaged pitch for *kula* (/X-X/) AFTER each tone

Figure 4.20 presents averaged pitch tracks for the word *kula* 'old' after the three floating tones /L/, /H/ and /LS/. The pitch tracks illustrate the Floating Tone Linking rule stated in figure 4.18 on page 171, i.e. how the floating tones link to the final mora of the word *kula* and how a /M/ tone inserts to the left of newly linked tone in all three cases¹¹. After floating tone linkage, the word *kula* (/X-X/) surfaces as /M-LS/ (after floating tone /LS/), as /M-H/ (after floating tone /H/), and as /M-L/ (after floating tone /L/).

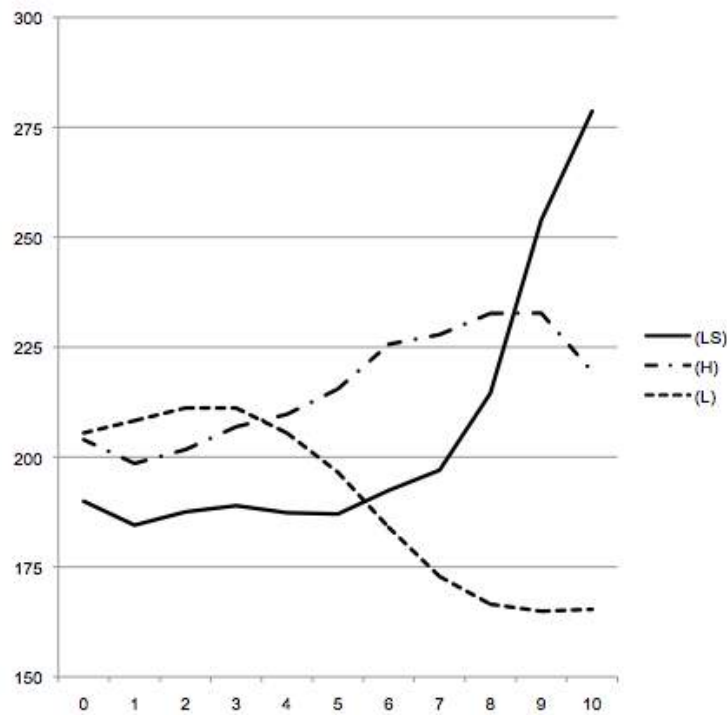


Figure 4.20: Averaged pitch for *kula* (/X-X/) AFTER each floating tone

¹¹One can observe that the /M/ surfaces a little lower when followed by /LS/.

This section described two major processes in connected speech: the behavior of tonally unspecified moras when directly preceded by a /H/, /LH/ or /LS/ mora-linked tone, as well as their behavior when preceded by each of the three floating tones (/L/, /H/ and /LS/). We observe that when a tonally unspecified mora is preceded by a mora-linked /H/, /LH/ or /LS/ tone, the pitch level of the mora-linked tone ([H] for /H/ and /LH/ and [S] for /LS/) is maintained in all subsequent tonally unlinked moras until a TS is encountered.

Furthermore, we observed that floating /L/, /H/ and /LS/ link to the rightmost mora of subsequent tonally unspecified words, and that the pitch of /H/ and /LS/ is maintained in all subsequent tonal unlinked mora until a TS is encountered. However, in this case, all tonally unlinked moras before the newly linked floating tone get assigned a /M/ tone.

This floating tone analysis will need to be refined since it only accounts for cases when the subsequent word is tonally unspecified. Section 4.11.2 revisits this floating tone analysis taking into account cases when W2 is linked to a TS.

4.6 The Lexical Tone Classes

As mentioned earlier in §4.1, the ZAC five tones are arranged in Tone Classes each defined by one of the fifteen existing TS's. A TS may consist of up to three linked tones, and may also be followed by an unlinked tone (a floating tone). TS's pertain to words and have different surface realizations depending on the number of moras in the word. Table 4.3 (already introduced in §4.1 as table 4.2) present the fifteen Tone Classes in the language. Some TS's include floating tones (marked in between parentheses). Note that Tone Class 1 is actually unspecified for tone as the TS shows no mora-linked tonal elements (/ /).

Class	Word	Gloss	TS
1	nkajin ^y an	<i>I asked for it</i>	/ /
2	ntikalǎ	<i>cloud</i>	/L (LS)/
3	ntusanè	<i>he/she sprays it</i>	/L (L)/
4	nkayakwēn'	<i>he/she vomited it</i>	/M (H)/
5	nkajil ^y ān	<i>I farted</i>	/M/
6	nkajil ^y ā	<i>you farted</i>	/L-M/
7	mintilē	<i>napkin</i>	/L-M (LS)/
8	nkalukwǎ	<i>he/she swept it</i>	/LH/
9	ntijin ^y ǎn	<i>he/she asks for it</i>	/L-LS/
10	nkayūjwī	<i>he/she died</i>	/M-M/
11	nkajin ^y án	<i>he/she asked for it</i>	/M-H/
12	ntāsālàn	<i>I am opening it</i>	/M-M-L/
13	ntāsǎnè	<i>he/she is spray- -ing it</i>	/M-LS-L (L)/
14	ntājín ^y ān	<i>he/she is asking for it</i>	/M-H-M/
15	ntòlòò	<i>you remove it it</i>	/L-M-L/

Table 4.3: The ZAC Tone Classes

The following sections present the occurrence of the TS's according to prosodic shapes, starting with the most common shape i.e. dimoraic disyllables, followed by the dimoraic monosyllables which are then compared with the most restricted word shape, i.e monomoraic words. Examples of the TS's in trimoraic words are presented last as this word shape is generally restricted to inflected verb forms or to Spanish borrowings.

First, the pitch sequences¹² are introduced on the basis of their realization on words pronounced in isolation, and then each sequence is placed within a frame allowing for the unveiling of its underlying tonal components.

4.6.1 Tone Classes in dimoraic disyllables

4.6.1.1 Tone Classes in isolation

Example (1) shows that ZAC has eight TS's audible in isolation in dimoraic disyllables. The first column 'Class' gives the Class number corresponding to a particular TS, and the third column gives the phonetic realization in isolation for each TS.

¹²The term 'pitch' refers to phonetic values and the terms 'tone' and 'TS' are reserved for underlying tonal representations.

(1) **Tone Sequences in isolation**

Class	TS	Phonetic realization	Form	Gloss
1	/X-X/	[L-L]	kwana	<i>mirror</i>
4	/X-M/	[L-M]	kwanã́	<i>thief</i>
8	/X-LH/	[L-LH]	yanǎn	<i>corncob</i>
9	/L-LS/	[L-LS]	yùsín	<i>sea turtle</i>
10	/M-M/	[M-M]	kwitō	<i>hen</i>
11	/M-H/	[M-H]	kwíná	<i>snake</i>
12	/M-L/	[M-L]	jn ^y ákè	<i>your head</i>
13	/LS-L/	[LS-L]	nkwíxǐ	<i>tomato</i>

The underlying tonal element(s) of each TS will reveal themselves through a test based on the Spreading rule discussed and illustrated in §4.5.1, and stated in figure 4.13 on page 163.

Furthermore, in example (1), in order to avoid information overload, the tonal representations are not complete yet and do not include the floating tones since they are not relevant yet. Nevertheless, the forms show the marking of floating tones with diacritics on the right edge of the words.

The tonal representation of some Classes will be revised when trimoraic words are considered. For convenience, and in order for the reader to easily understand the underlying tonal representation for each example, the /X/ in the TS notation is used as a place holder for tonally unspecified moras.

One can also observe the linking mode of the tonal element(s) for the various TS's. In the autosegmental representation presented in figure 4.3 we saw how the TS links to moras in the prominent syllable (final) in a one-to-one fashion starting from the starred (*) tonal element from right-to-left. Outside of autosegmental representations, the linking mode does not need

to be marked on tonal representations as it is the right most tonal element in the TS that links to the rightmost mora in the prominent syllable (final) in a one-to-one fashion. When we get to discuss TS's including floating tones, this statement gets revised slightly.

4.6.1.2 Tone Classes preceded by a word ending in /LS/

In example (2) below, each TS presented in example (1) is placed in a frame where the preceding word ends with a /LS/ tone (*titʰùkwá*). This test unveils the underlying tonal elements of the postponed TS.

Placing a word whose final mora is super high (/LS/), directly preceding words belonging to Tone Class 1 (/X-X/: unspecified for tone) found in example (1), results in a [S-S] surface tonal pattern. This phenomenon results from the Spreading rule stated in figure 4.13 on page 163.

Among other words that present a [L-L] phonetic realization in isolation, some words are found to occur with a different tonal pattern when placed after a word ending in /LS/. In example (2), the word *natèn* 'people' shows a surface phonetic realization as [L-L] in isolation (just like the word belonging to Tone Class 1 *kwana* (unspecified for tone)), but when *natèn* is placed after a word ending in /LS/, its surface phonetic realization is [S-L], as opposed to [S-S] for *kwana*. In both cases, [S] results from the spreading of the super high pitch from the last mora of 'twelve' *titʰùkwá*. This shows that despite the fact that those two words have the same phonetic realization in isolation ([L-L]), they actually belong to two different Tone Classes.

kwana belongs to Tone Class 1, and *natèn* belongs to Tone Class 2. *natèn* is underlyingly /X-L/ whereas *kwana* is underlyingly /X-X/.

Placing a word whose final mora is super high (/LS/), directly preceding words belonging to Tone Class 4 (phonetically [L-M] in isolation) *kwana* 'thief' found in example (1), results in a [S-M] surface tonal pattern. This phenomenon results from the Spreading rule stated in figure 4.13 on page 163.

Among other words that present a [L-M] phonetic realization in isolation, some words are found to occur with a different tonal pattern when placed after a word ending in /LS/. In example (2), the word *kwana* 'thief' shows a surface phonetic realization as [L-M] in isolation, but when another word with the same surface phonetic realization as [L-M] in isolation (*mul*) is placed after a word ending in /LS/, its surface phonetic realization is [L-M] when placed after a word ending with /LS/ as opposed to [S-M] for *kwana* where [S] results from the spreading of the super high pitch from the last mora of 'twelve' *tì*. This shows that despite the fact that those two words have the same phonetic realization in isolation ([L-M]), they actually belong to two different Tone Classes. *kwana* belongs to Tone Class 4, and *mul* belongs to Tone Class 7. *mul* is underlyingly /L-M/ whereas *kwana* is underlyingly /X-M/ as shown in example (2).

Furthermore, placing a word whose final mora is super high (/LS/), directly preceding words belonging to Tone Class 8 *yan* 'corn cob' (phonetically [L-LH] in isolation) found in example (1), results in a [S-LH] surface

tonal pattern as shown in example (2). This phenomenon results from the Spreading rule stated in figure 4.13 on page 163. The Spreading test reveals that *yanǎn* 'corn cob' (which surfaces as [L-LH] in isolation) turns out to be /X-LH/ underlyingly.

The sandhi changes are highlighted in bold face in example (2) below.

The fact that in example (2), the phonetic realization after /LS/ of examples for Tone Classes 9, 10, 11, 12, and 13 matches their respective underlying tonal representation proves that those tones are actually mora-linked tones. Indeed, the example for Tone Class 9 *yùsǐn* which surfaces in isolation as [L-LS] is underlyingly /L-LS/ and not /X-LS/. If it were the case that the first mora were /X/ instead of /L/, the spreading test would have caused that tonally unspecified mora to surface as [S]. For Tone Classes, 10, 11, 12, and 13, the Spreading test does not affect the subsequent mora-linked tones, and their respective phonetic realization matches their underlying tonal representation.

The fact that mora-linked tones block Spreading was demonstrated in §4.5.1.

(2) Tone Sequences preceded by /LS/				
Class	Phrase	Gloss	TS	Phonetic realization after /LS/
1	titʸùkwǎ kwana	twelve mirrors	/X-L-LS/ /X-X/	[L-L-LS] [S-S]
2	titʸùkwǎ natèñ	twelve people	/X-L-LS/ /X-L/	[L-L-LS] [S-L]
4	titʸùkwǎ kwanǎ	twelve thieves	/X-L-LS/ /X-M/	[L-L-LS] [S-M]
7	titʸùkwǎ mùlʸǎ	twelve mules	/X-L-LS/ /L-M/	[L-L-LS] [L-M]
8	titʸùkwǎ yanǎn	twelve corncobs	/X-L-LS/ /X-LH/	[L-L-LS] [S-LH]
9	titʸùkwǎ yùsín	twelve sea turtles	/X-L-LS/ /L-LS/	[L-L-LS] [L-LS]
10	titʸùkwǎ kwītō	twelve hens	/X-L-LS/ /M-M/	[L-L-LS] [M-M]
11	titʸùkwǎ kwīná	twelve snakes	/X-L-LS/ /M-H/	[L-L-LS] [M-H]
12	titʸùkwǎ jnʸākè	twelve of your heads	/X-L-LS/ /M-L/	[L-L-LS] [M-L]
13	titʸùkwǎ nkwíxĩ	twelve tomatoes	/X-L-LS/ /LS-L/	[L-L-LS] [LS-L]

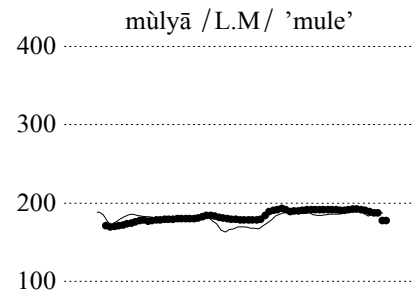
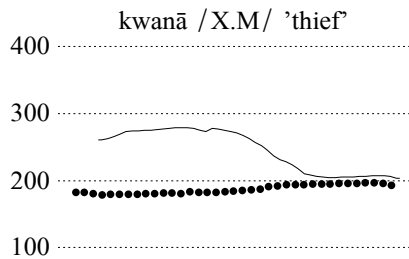
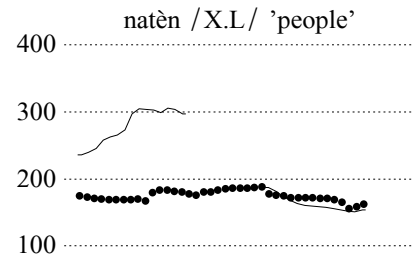
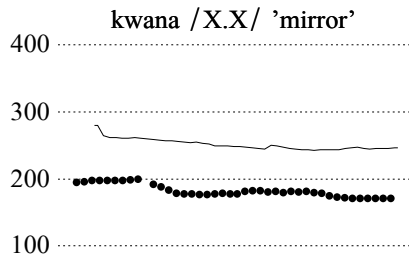
This Spreading test into the left edge of words presenting the same phonetic realization in isolation as each of the eight pitch sequences presented in example (1) allowed for the positing of ten different Tone Classes. Among those ten Tone Classes, only eight are discernible in isolation.

The figures below present pitch tracks for all the Tone Classes presented in example (2).

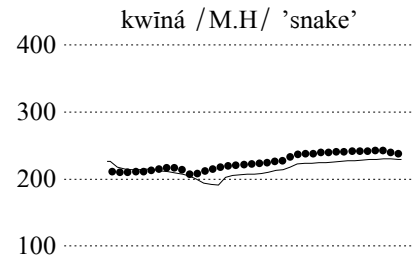
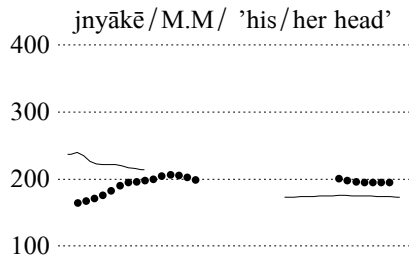
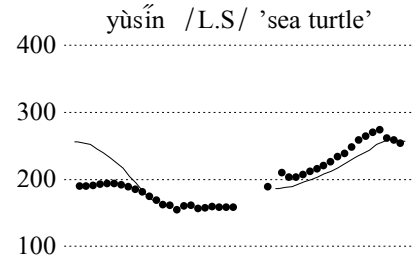
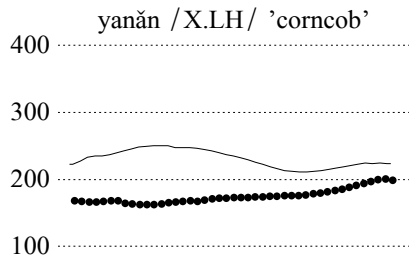
In each graph, the speckled line illustrates the F0 tracking of the word undisturbed, i.e. in its default phonetic realization as encountered when in isolation or when preceded by a word whose tone does not spread or float. The sentence frame for the undisturbed forms is the following: *tsaka* (/X-X/) *NOUN kula* (/X-X/) 'one NOUN old'.

The fine line shows the word's pitch track when preceded by a word ending with [S]. The sentence frame for the disturbed forms is the following: *titʸùkwǎ* (/X-L-LS/) *NOUN kula* (/X-X/) 'twelve NOUN old'.

The pitch tracks clearly show that only unlinked moras (/X/) get raised by the spreading of the [S] pitch¹³.



¹³The fine line showing the f_0 tracking for the word 'sea turtle' *yùsín* when preceded by a word ending with [S] appears to present some phonetic effect at the beginning of the word. However, the tone is still interpreted as a /L/ as it comes together with the /L/ of the unperturbed track.



4.6.1.3 Tone Classes followed by /X-X/

In this section, a similar type of test gets applied to each of the ten Tone Classes encountered so far, but in this case, the test reveals the effect of each Tone Class on tonally unlinked moras in subsequent words (as shown in figures 4.19 and 4.20 on page 175). The words *kula* 'old' and *kwila* 'fish' are not specified for tone, so their underlying tonal representation is /X-X/, and their default phonetic realization is [L-L]. Again, in the examples below,

when a Tone Class affects subsequent unlinked moras, the sandhi changes are marked in bold face. Now that the floating tones are relevant, they are included in the representations of TS's in example (3).

(3)	Tone Classes followed by /X-X/				
Class	Phrase	Gloss	TS	Phonetic real.	
1	kwana kula	<i>old mirror</i>	/X-X/ /X-X/	[L-L][L-L]	
2	natèn' kula	<i>old people</i>	/X-L (LS)/ /X-X/	[L-L] [M-LS]	
3	kakwèn' kwila	<i>he/she will vomit</i> <i>fish</i>	/X-L (L)/ /X-X/	[L-L] [M-L]	
4	kwanā' kula	<i>old thief</i>	/X-M (H)/ /X-X/	[L-M] [M-H]	
5	nkanān kwila	<i>I looked for</i> <i>fish</i>	/X-M/ /X-X/	[L-M][L-L]	
6	kàkwēn kwila	<i>you will vomit</i> <i>fish</i>	/L-M/ /X-X/	[L-M][L-L]	
7	mùly'ǎ kula	<i>old mule</i>	/L-M (LS)/ /X-X/	[L-M] [M-LS]	
8	yanān kula	<i>old corncob</i>	/X-LH/ /X-X/	[L-LH] [H-H]	
9	yùsín kula	<i>old sea turtle</i>	/L-LS/ /X-X/	[L-LS] [S-S]	
10	kwītō kula	<i>old hen</i>	/M-M/ /X-X/	[M-M][L-L]	
11	kwīnā kula	<i>old snake</i>	/M-H/ /X-X/	[M-H] [H-H]	
12	jny'ākè kula	<i>old head of yours</i>	/M-L/ /X-X/	[M-L] [L-L]	
13	nkwíxì kula	<i>old tomato</i>	/LS-L (L)/ /X-X/	[LS-L] [M-L]	

Placing an /X-X/ (Tone Class 1) word directly following each of the ten Tone Classes presented in example (2) revealed the presence of unlinked tones (or floating tones) after some TS's. As was discussed in §4.5.2 there are three floating tones, /L/, /H/, and /LS/; but they are present only after certain TS's. The data presented in example (3) just above reveals which TS's are followed by a /L/, a /H/ or a /LS/ floating tone, and which ones present no floating tone at all.

This test shows that Tone Class 2 (*natèn'* /X-L (LS)/) includes the floating tone /LS/ as the subsequent word *kula* (/X-X/ unspecified for tone)

surfaces phonetically as [M-LS] instead of as [L-L] (its undisturbed default phonetic realization).

It also shows that among the words with a phonetic realization as [L-L] in isolation (like Tone Class 1 and 2), an additional Tone Class has to be posited (Tone Class 3). The word *kakwèn* 'he/she will vomit it' sounds in isolation like the words belonging to Tone Classes 1 and 2 ([L-L]), but when followed by the word *kwila* (/X-X/), its /L/ floating tone gets revealed, and *kwila* surfaces as [M-L].

This test shows that Tone Class 4 (*kwanā* 'thief' /X-M (H)/) includes the floating tone /H/ as the subsequent word *kula* (/X-X/ unspecified for tone) surfaces phonetically as [M-H] instead of as [L-L] (its undisturbed default phonetic realization).

It also shows that among the words with a phonetic realization as [L-M] in isolation (like Tone Class 4 (/X-M (H)/ and Tone Class 7 (/L-M (LS)/), two additional Tone Classes have to be posited (Tone Class 5, and Tone Class 6).

The word *nkanān* 'I looked for it' sounds in isolation like the words belonging to Tone Class 4 (*kwanā* 'thief') and Tone Class 7 (*mul'ā* 'mule'): [L-M]. However, when *nkanān* is followed by the word *kwila* (/X-X/), *kwila* surfaces as [L-L] (its default phonetic realization) proving that the word *nkanān* belongs to a Tone Class which does not include a floating tone (contrary to Tone Class 4 and Tone Class 7). This new Tone Class is Class 5 and *nkanān*'s tonal representation is /X-M/.

Furthermore, the word *kàkwēn* 'you will vomit it' sounds in isolation like the words belonging to Tone Class 4 (*kwanā́* 'thief'), Tone Class 7 (*mul'ā́* 'mule'), and Tone Class 5 (*nkanān* 'I looked for it'): [L-M]. However, when *kàkwēn* is followed by the word *kwila* (/X-X/), *kwila* surfaces as [L-L] (its default phonetic realization) proving that the word *kàkwēn* also belongs to a Tone Class which does not include a floating tone. However, because the penultimate mora of *kàkwēn* is actually linked to a /L/ tone, another new Tone Class has to be posited: Class 6 where *kàkwēn*'s tonal representation is /L-M/.

Tone Classes 8 (/X-LH/), 9 (/L-LS/), and 11 (/M-H/) all end with a final [H] or [S] whose pitch is maintained in subsequent unlinked moras due to the effect of the Spreading rule. So the word *kwila* surfaces with as [M-H] after words belonging to Tone Classes 8 and 11, and as [M-LS] after Tone Class 9.

Class 10 (/M-M/) ends in a /M/ tone which does not spread into subsequent tonally unlinked moras, and is not followed by any floating tone. As a result, the word *kwila* surfaces as [L-L] (its default phonetic realization) after a word belonging to Tone Class 10.

Class 12 (/M-L/) ends in a /L/ tone which does not spread into subsequent tonally unlinked moras, and is not followed by any floating tone. So the word *kwila* surfaces with as [L-L] after a word belonging to Tone Classes 12.

Finally, Class 13 (/LS-L/) ends in a /L/ tone which does not spread into subsequent unlinked moras but which is followed by a /L/ floating tone. So the word *kwila* surfaces with as [M-L] instead of [L-L] after a word belonging to Tone Class 13.

In summary, this test which consisted in placing a word unspecified for tone after each of the ten Tone Classes presented in example (2) revealed that some TS's are followed by a floating tone which affect all subsequent tonally unspecified moras.

This test frame 'twelve NOUN old' test frame allowed for the distinction of thirteen TS's (3 more than with the 'twelve NOUN' test frame in §4.6.1.2), defining in turn thirteen Tone Classes. Both this 'twelve NOUN old' test frame and the 'twelve NOUN' test frame are crucial, since in an isolation context, only eight distinct TS's are discernible.

The goal of this section was to distinguish the various Tone Classes and the TS's that mark them. What happens to W2 in every single possible W1W2 sequence is dealt with at a later stage in §4.11.

4.6.2 Tone Classes in dimoraic monosyllables

In the previous section the realization of the Tone Classes in disyllabic dimoraic words was demonstrated, and we will now explore how those TS's are realized in dimoraic monosyllables. Example (4) shows that out of thirteen Tone Classes encountered in dimoraic disyllables, only nine occur in dimoraic monosyllables.

Again, one can observe the linking mode of the tonal element(s) for the various TS's: the rightmost tonal element (after the floating tone marked in between parentheses) in the TS links to the rightmost mora in the word from right to left in a one-to-one fashion. When there are more tones than moras to be linked to a word, all left over tones are unrealized.

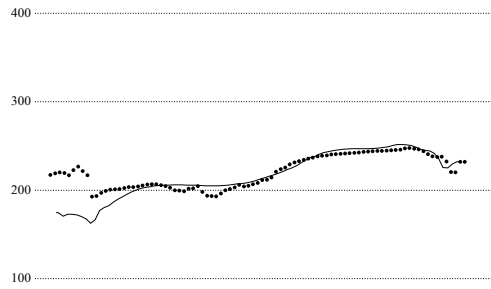
(4) **Tone Classes in dimoraic monosyllables**

Class	Word	Gloss	TS	Phonetic real. after /X/	Phonetic real. after /LS/
1	ntaa	<i>bean</i>	/X/	[L-L]	[S-S]
2	ntswaàʔ	<i>Piper Auritum</i>	/X-L (LS)/	[L-L]	[S-L]
3	koð	<i>he/she will grind it</i>	/X-L (L)/	[L-L]	[S-L]
4	keě	<i>flower</i>	/X-M (H)/	[L-M]	[S-M]
5	---	---	/X-M/		
6	---	---	/L-M/		
7	---	---	/L-M (LS)/		
8	---	---	/LH/		
9	píí	<i>white, fair</i>	/L-LS/	[L-LS]	[L-LS]
10	kūūn	<i>sweet potato</i>	/M-M/	[M-M]	[M-M]
11	nkāán	<i>coconut</i>	/M-H/	[M-H]	[M-H]
12	nʸèè	<i>you will confess</i>	/M-L/	[M-L]	[M-L]
13	---	---	/LS-L (L)/		

The three following pitch tracks present an overlay of disyllabic dimoraic words (fine line) and monosyllabic dimoraic words (speckled line) belonging to the same Tone Class in order to demonstrate that they occur with the same TS:

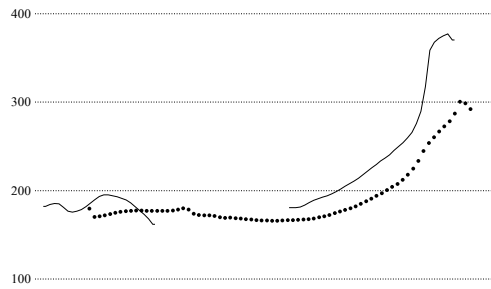
Class 11 (/M-H/): kwīná 'snake' versus nkāán 'coconut':

kwīná (/M-H/) versus nkāán (/M-H/)



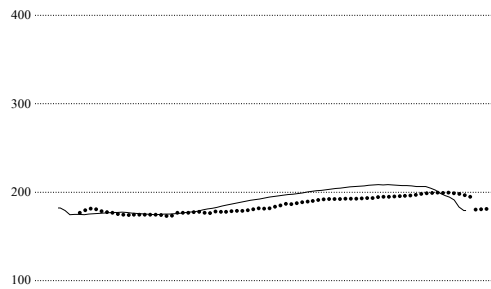
Class 9 (/L-LS/): yūsín 'turtle' versus kyàǎ 'tomorrow':

yūsín (/L-LS/) versus kyàǎ (/L-LS/)



Class 4 (/X-M (H)/): keḗ 'flower' versus kwanā́ 'thief':

kwanā́ (/X-M/ /H/) versus keḗ (/X-M/ /H/)



words, and (2) how the predictions of a simple one-tone one-mora alignment scheme may fail to predict the results in a few cases (as in Tone Class 12). Indeed, the linking mode for the TS belonging to Tone Class 12 represents an exception to the more general rule which predicts a one-to one alignment. In this case, both tonal elements /M/ and /L/ link to the same mora. Furthermore, data shown in example (5) shows that the general mode of alignment results in the neutralization of many of the Tone Classes in isolation.

(5) **Tone Classes in monomoraic monosyllables**

Class	Word	Gloss	TS	Phonetic real. after /X/	Phonetic real. after [S]
1	ne?	<i>person</i>	/X/	[L]	[S]
2	nkùn ^ˀ	<i>tortoise</i>	/L (LS)/	[L]	[L]
3	?à	NEG	/L (L)/	[L]	[L]
4	nkwā ^ˀ	<i>he/she was</i>	/M (H)/	[M]	[M]
5	---		/M/		
6	---		/L-M/		
7	wrā ^ˀ	<i>hour</i>	/L-M (LS)/	[M]	[M]
8	nǎ	<i>thing</i>	/LH/	[LH]	[LH]
9	l'ó?	<i>little</i>	/LS/	[LS]	[LS]
10	kān?	<i>then</i>	/M-M/	[M]	[M]
11	nkwá	<i>you were</i>	/M-H/	[H]	[H]
12	xkà	<i>another</i>	/M-L/	[M-L]	[M-L]
13	---		/LS-L (L)/		

For example, Tone Classes 4 (/M (H)/), 7 (/L-M (LS)/ and 10 (/M-M/) all surface with a single [M] in monomoraic words, and similarly, Tone Classes 1 (/X/), 2 (/L (LS)/), and 3 (/L (L)/) all surface with a single [L] tone in monomoraic words. However, when placed in phrasal context (with subsequent tonally unlinked moras), the presence and the type of floating tone after Tone Class 4 and Tone Class 7 makes all three Tone Classes distinct

from each other. Similarly, Tone Classes 1, 2 and 3 are all distinct from each other based on the presence or not (and the type) of floating tone.

Tone Classes 1, 2 and 3 all have different effect in subsequent tonally unlinked moras: Tone Class 1 which does not have a floating tone does not affect subsequent tonally unlinked moras, Tone Class 2 has a /LS/ floating tone which gets realized on subsequent tonally unlinked moras, and finally Tone Class 3 has a /L/ floating tone which gets realized on subsequent tonally unlinked moras.

Similarly Tone Class 4 has a /H/ floating tone, Tone Class 7 has a /LS/ floating tone, and Tone Class 10 has no floating tone. The effect of each floating tone on subsequent tonally unlinked moras was discussed and illustrated in §4.5.2.

Nevertheless, when monomoraic words with Tone Classes 1, 2, 3, 4, 7 or 10 find themselves in a phrasal context where the subsequent mora is linked to a tone (which blocks spreading or the realization of a floating tone), in this case, the distinction between Tone Class 1, 2, 3 and between 4, 7 and 10 is neutralized because their distinctive feature (i.e the presence or not of a floating tone and if so the type of floating tone) does not get realized. This phenomenon is described and illustrated further on in detail further on in §4.11.1.

Furthermore, the simple one-tone one-mora alignment scheme discussed in §4.3 fails in monomoraic words with Tone Class 12 which is un-

derlyingly /M-L/ and should link to monomoraic stems as /L/. In fact, monomoraic words with Tone Class 12 (which are extremely rare, so far only one example) surface with both tonal elements /M-L/ on the single mora as shown in example (5). A detailed account of how alignment works in different word shapes is presented in §4.7 and also (cite R-L alignment)

Finally, example (5) shows that certain TS's are not attested for monomoraic monosyllables, leading to the conclusion that the Classes which those TS's would define do not exist for monomoraic monosyllables. Section §4.8 further on discusses the distribution of Tone Classes according to word shape.

In the section describing the ZAC tonal inventory (§4.2), figure 4.1 and figure 4.2 on page 148 illustrated the realization of each of the five tones on monomoraic words. Here, a similar graph is presented in figure 4.21 showing pitch tracks representing the different pitch contours occurring in monomoraic words. The monomoraic words were pronounced in sequence, and each of their respective pitch tracks were overlaid in order to make comparison of each tone easier. The lowest speckled line represents the word *é'a* 'cob' (/X/); the fine line just above represents the word *nkwā'* 'he/she was' (/M (H)/); the dotted line represents the word *nkwá* 'you were' (/H/); the dashed line represents the word *nǎ* 'thing' (/LH/), and finally the dashed and dotted line at the top represents the word *pí* 'poult' (/LS/).

Figure 4.22 presents an overlay of monomoraic words undisturbed (*ne?* 'person' /X/ (dashed line) and *nkùń'* 'turtle' /L (LS)/ (fine line)), with the

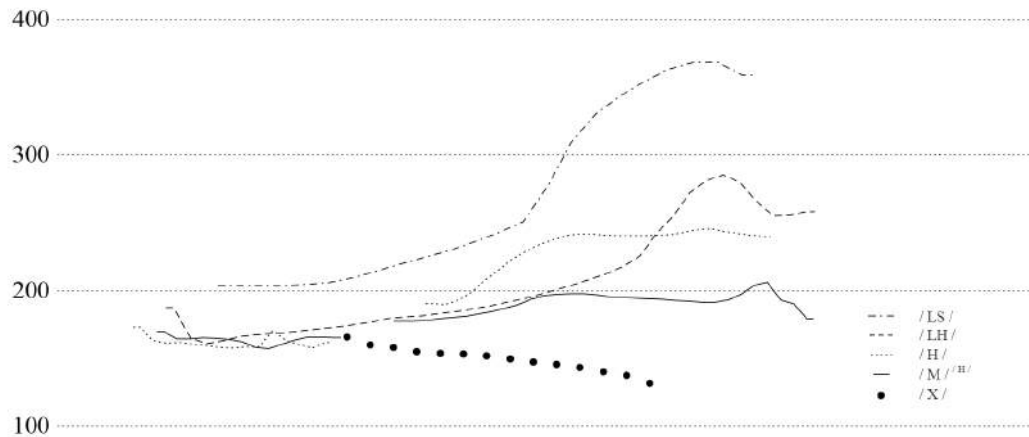


Figure 4.21: Monomoraic words pronounced in sequence and overlaid

same words when placed after a word ending in /LS/. This figure shows that the word *ne?* is underlyingly (/X/) as the final [S] pitch of preceding word is maintained in *ne?* [S] (dashed and dotted line) whereas *nkùn* 'turtle' is underlyingly /L/ since it does not get affected by the preceding [S] (speckled line):

So far the data presented has shown that tones link to the prominent mora (the final mora) in the stem, from right to left, in a one to one fashion. When there are more tones than moras to be linked to a word, all left over tones are left unrealized. Floating tones are always preserved as part of the TS but may or may not be realized, depending on whether or not the subsequent moras are linked with a tone or not. If they are, then the floating tone is left unrealized.

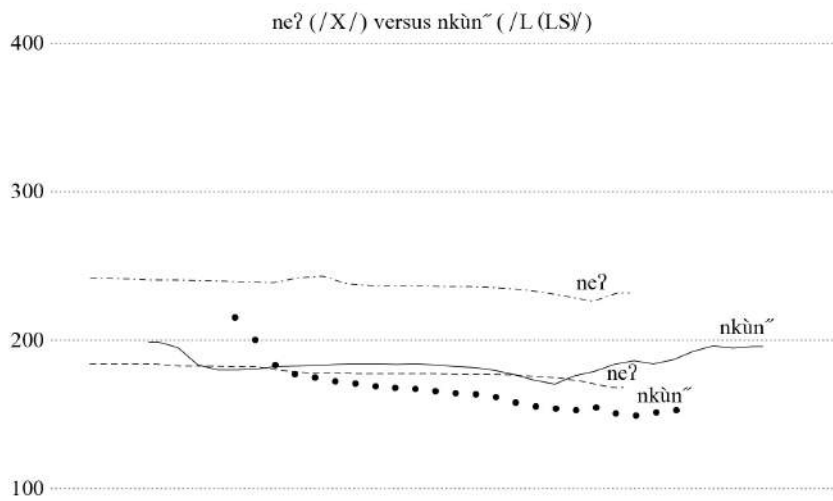


Figure 4.22: *ne?* (/X/) after /X/ and after /LS/ VERSUS *nkùn'* (/L (LS)/) after /X/ and after /LS/

4.6.4 Tone Classes in trimoraic trisyllables

This word shape is generally restricted to inflected verb forms and Spanish loans. Furthermore, example (6) includes one more Tone Class which only occurs in trimoraic trisyllabic second person singular progressive verb forms (Class 14).

In trimoraic trisyllables, the complete TSs get realized as shown in examples for Tone Class 12, 13, and 14 which all occur with a /M/ tone on the antepenultimate syllable.

In light of the data presented in example (6), we can now formulate the final linking rule:

Tones link to the prominent mora (the final mora) in the stem, from right to left, in a one to one fashion. When there are more tones than moras to be linked to a word, all left over tones are left unrealized. When there are more moras than tones, any left-over moras are unspecified for tone. Floating tones are always preserved. There can only be a maximum of 3 linked tones per word.

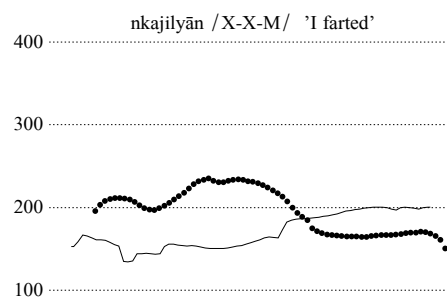
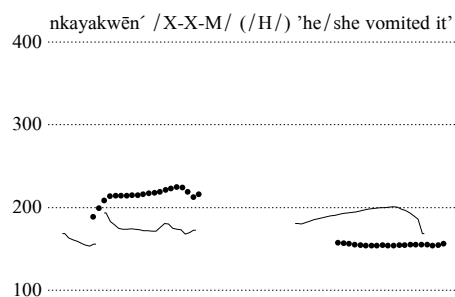
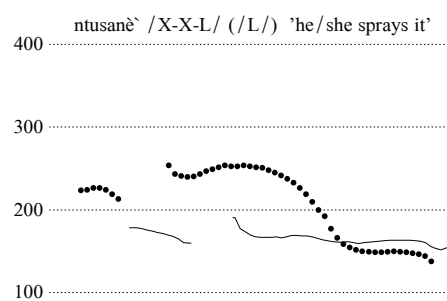
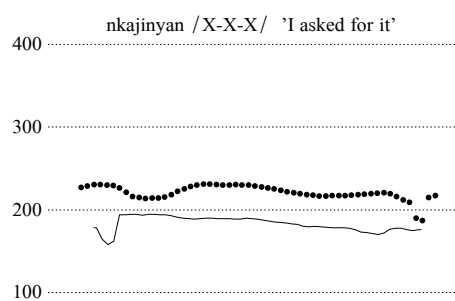
Figure 4.23: Linking rule for lexically linked tones

(6) Tone Classes in trimoraic trisyllables					
Class	Word	Gloss	TS	Phonetic real. after /X/	Phonetic real. after /LS/
1	nkajin ^y an	<i>I asked for it</i>	/X-X-X/	[L-L-L]	[S-S-S]
2	ntikalã	<i>cloud</i>	/X-X-L (LS)/	[L-L-L]	[S-S-L]
3	ntusanè	<i>he/she sprays it</i>	/X-X-L (L)/	[L-L-L]	[S-S-L]
4	nkayakwēn'	<i>he/she vomited it</i>	/X-X-M (H)/	[L-L-M]	[S-S-M]
5	nkajil ^y ān	<i>I farted</i>	/X-X-M/	[L-L-M]	[S-S-M]
6	nkajil ^y ā	<i>you farted</i>	/X-L-M/	[L-L-M]	[S-L-M]
7	mintilẽ	<i>napkin</i>	/X-L-M (LS)/	[L-L-M]	[S-L-M]
8	nkalukwǎ	<i>he/she swept it</i>	/X-X-LH/	[L-L-LH]	[S-S-LH]
9	ntijin ^y án	<i>he/she asks for it</i>	/X-L-LS/	[L-L-LS]	[S-L-LS]
10	nkayūjwī	<i>he/she died</i>	/X-M-M/	[L-M-M]	[S-M-M]
11	nkajin ^y án	<i>he/she asked for it</i>	/X-M-H/	[L-M-H]	[S-M-H]
12	ntāsālàn	<i>I am opening it</i>	/M-M-L/	[M-M-L]	[M-M-L]
13	ntāsánè	<i>he/she is spraying it</i>	/M-LS-L (L)/	[M-LS-L]	[M-LS-L]
14	ntājín ^y ān	<i>he/she is asking for it</i>	/M-H-M/	[M-H-M]	[M-H-M]

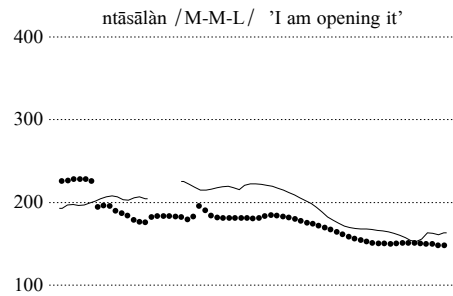
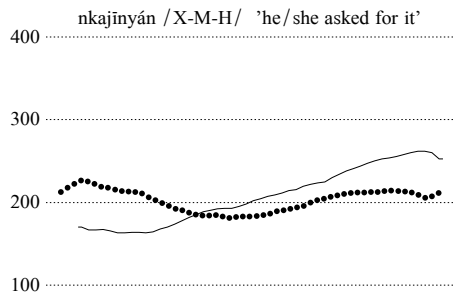
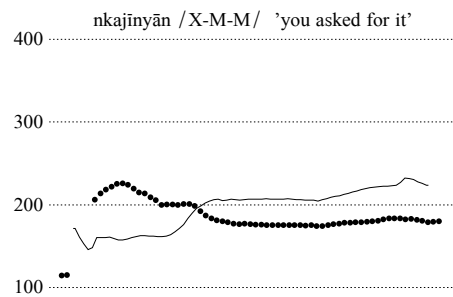
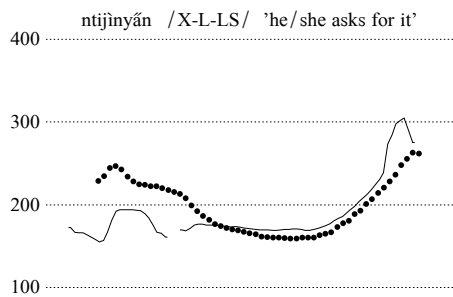
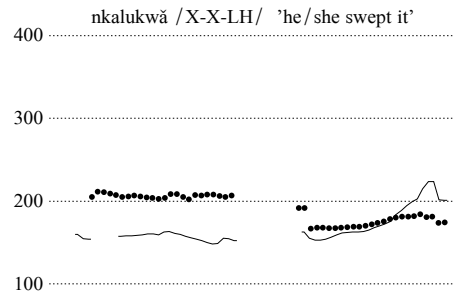
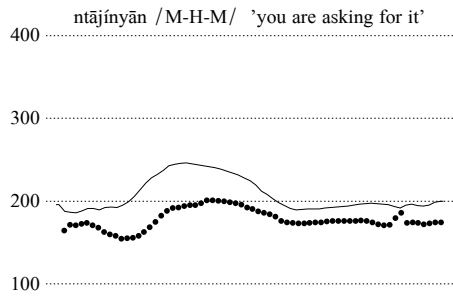
In example (6), Classes 1 through 11 all undergo spreading of [S] from preceding /LS/ tone into the antepenultimate mora which is tonally unlinked. On the other hand, words from Classes 12-14 all have a antepenultimate mora linked to a /M/ tone which blocks spreading of [S] from preceding /LS/. As it was demonstrated in a similar example with a pitch track and its corresponding autosegmental diagram in figure 4.12 on page 162, the [S] pitch of preceding /LS/ tone spreads into tonally unlinked moras until a TS is reached, at which point all subsequent tonally unlinked moras surface with their default [L] pitch.

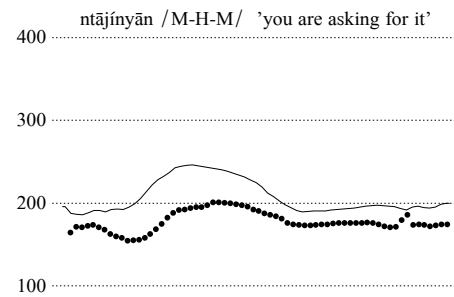
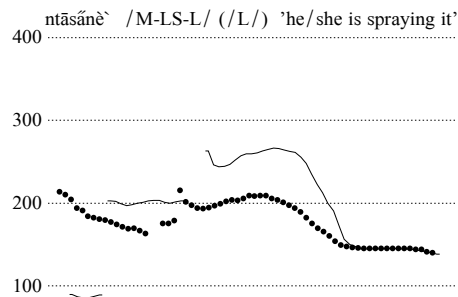
The pitch tracks below show a word undisturbed (in isolation) (fine line) superposed with the surface pattern for the same word when preceded

by a word ending in /LS/ (speckled line)¹⁴. The stimulus sentence frame for the disturbed target word is *ni syáʔ* VERB 'despite VERB' where the final mora of the expression *ni syáʔ* bears a /LS/ which affects all subsequent tonally unlinked moras. One can observe that only /X/ moras get affected by preceding /LS/.



¹⁴In some instances, such as for the examples representing TS's /M-M-L/, /M-LS-L/ or /M-H-M/, the pitch tracks don't match each other well. This is due to the phonetic pitch lowering phenomenon after [S] which affects the entire tonal domain (§4.11.3)





Furthermore, data in example (6) as well as the pitch tracks above demonstrate that in the antepenultimate syllable, only a two way contrast exists between a /M/ tone or nothing (i.e a tonally unlinked mora). The distribution of tonal elements within the word is discussed in §4.9.

4.6.5 Tone Classes in trimoraic disyllables

Example (7) shows examples of trimoraic disyllabic words for all Tone Classes. The same changes occur in the long syllables presented here as in the dimoraic monosyllables presented in example (4) on page 191. Indeed, trimoraic disyllabic words belonging to Tone Class 6 (/L-M/) surface as /L-M-L/. The latter is in fact an additional Tone Class (Class 15) which only occurs in disyllabic stems with long vowels marking a 2s subject. Again, one can observe that Classes 7 and 8 do not occur either in trimoraic disyllables.

(7) **Trimoraic disyllables**

Class	Word	Gloss	Underlying represent.	Phonetic realization after /X/	Phonetic real. after /LS/
1	nkut ^v ii	<i>it ended</i>	/X-X-X/	[L-L-L]	[S-S-S]
2	ntulaǎ	<i>peach</i>	/X-X-L (LS)/	[L-L-L]	[S-S-L]
3	ntoloð	<i>he/she removes it</i>	/X-X-L (L)/	[L-L-L]	[S-S-L]
4	nkayoó	<i>he/she ground it</i>	/X-X-M (H)/	[L-L-M]	[S-S-M]
5	nkaluūn	<i>I removed it</i>	/X-X-M/	[L-L-M]	[S-S-M]
6	---		/L-M/		
7	---		/L-M (LS)/		
8	---		/LH/		
9	ntil ^v ǎǎ	<i>he/she escapes</i>	/X-L-LS/	[L-L-LS]	[S-L-LS]
10	nkatēēn	<i>he/she trans-ported it</i>	/X-M-M/	[L-M-M]	[S-M-M]
11	nkataá	<i>he/she gave it</i>	/X-M-H/	[L-M-H]	[S-M-H]
12	ntātūùn	<i>he/she is standing</i>	/M-M-L/	[M-M-L]	[M-M-L]
13	nkānēè	<i>he/she confessed herself</i>	/M-LS-L (L)/	[M-LS-L]	[M-LS-L]
14	nkālōo	<i>he/she is removing it</i>	/M-H-M/	[M-H-M]	[M-H-M]
15	ntòlòð	<i>you remove it</i>	/L-M-L/	[L-M-L]	[L-M-L]

4.7 Formal representation of linking rule for mora-linked tones

This section explicitly abstracts the TS's for each Tone Class, and demonstrates how they link to words of various prosodic shapes. Furthermore, it shows that the sequence-defined Classes cut across all prosodic shapes, despite a few gaps that have been shown in preceding sections. The empty space in between the slashes for Tone Class 1 symbolizes the fact that this class is unspecified for tone. The latter is a change from the earlier notation where X is a place holder symbol that characterizes a tonally unspecified mora. The diacritic * shows which tonal element in the TS links

to the prominent mora in the final syllable. When the TS only includes one tonal element and a floating tone marked in between parentheses, then the notation is not used because it would be redundant.

Figure 4.23 formulates the linking rule, and figure 4.24 illustrates how the tonal elements of TS's link to the mora in different word shapes. In figure 4.24, the cells shaded in grey signal the non-occurrence of words of a certain shape with the corresponding Tone Class. Furthermore, note that as was discussed in §4.6.3 with example (5), monomoraic words occurring with Tone Class 12 represent an exception to the linking rule stated above as both tones link to a single mora.

Class	TS	Trimoraic	Dimoraic	Monomoraic
1	/ /	μ μ μ 	μ μ 	μ
2	/L (LS)/	μ μ μ L (LS)	μ μ L (LS)	μ L (LS)
3	/L (L)/	μ μ μ L (L)	μ μ L (L)	μ L (L)
4	/M (H)/	μ μ μ M (H)	μ μ M (H)	μ M (H)
5	/M/	μ μ μ M	μ μ M	μ M
6	/L-M*/	μ μ μ L M	μ μ L M	μ L M
7	/L-M* (LS)/	μ μ μ L M (LS)	μ μ L M (LS)	μ L M (LS)
8	/LH/	μ μ μ LH	μ μ LH	μ LH
9	/L-LS*/	μ μ μ L LS	μ μ L LS	μ LS
10	/M-M*/	μ μ μ M M	μ μ M M	μ M M
11	/M-H*/	μ μ μ M H	μ μ M H	μ M H
12	/M-M-L*/	μ μ μ M M L	μ μ M M L	μ Λ M M L
13	/M-LS-L* (L)/	μ μ μ M L S L (L)	μ μ M L S L (L)	μ M L S L (L)
14	/M-H-M*/	μ μ μ M H M	μ μ M H M	μ M H M
15	/L-M-L*/	μ μ μ L M L	μ μ L M L	μ L M L

Figure 4.24: Linking rule for each Tone Class according to word shape

4.8 Distribution of Tone Classes according to word shape

This section describes the distributions of the different prosodic shapes per Tone Class. It shows how independent the Classes are in relation to the shapes. Indeed, as the Linking rule shows, the TS of (nearly) any Class can fit any prosodic shape.

Table 4.4 presents the phonological gaps per Tone Class. The numbers represent percentages and data includes inflected verb forms, nouns, adjectives, adverbs etc. Row 1 of the table should be read as follow: 9 percent of the lexicon is a dimoraic disyllabic lexeme with Tone Class 1, 5 percent of the lexicon is a trimoraic trisyllabic lexeme with Tone Class 1 etc.

Class	TS	$\mu.\mu$	$\mu.\mu.\mu$	$\mu.\mu\mu$	$\mu\mu$	μ
1	/ /	9	5	.7	.6	.3
2	/L (LS)/	.3	.2	0	.2	.2
3	/L (L)/	5	3	.5	.9	0
4	/M (H)/	3	.6	.6	.2	.03
5	/M/	.1	.2	.6	.1	0
6	/L-M/	5	4	0	0	0
7	/L-M (LS)/	1	.4	.03	0	.03
8	/LH/	3	1	0	0	.01
9	/L-LS/	6	8	1	.6	.6
10	/M-M/	5	4	.5	.8	.1
11	/M-H/	4	.3	1	.7	.1
12	/M-M-L/	2	2	1.5	1.1	.03
13	/M-LS-L (L)/	.2	1	.2	0	0
14	/M-H-M/	.03	1	0	0	0
15	/L-M-L/	0	0	.7	0	0

Table 4.4: Distribution of Tone Classes according to word shape

One can observe from data in table 4.4 that there is no monomoraic word associated with Tone Classes 3, 5, 6, 13,14 and 15. These phonological gaps are motivated by the lexicon as these Tone Classes are restricted to morphologically complex forms in the lexicon, none of which have this shape. The latter is discussed in detail in §4.10.

Tone Class 6 (/L-M/) and Tone Class 14 (/M-H-M/) only occur in stems with short vowels.

Tone Class 15 (/L-M-L/) only occurs in stems with long vowels (trimoraic disyllabic).

Figure 4.25 below shows averaged normalized pitch tracks for the final dimoraic syllable in prosodic words of the shapes $\mu.\mu\mu$ and $\mu\mu\mu$. It contrasts Tone Classes 12 (/M-M-L/), 13 (/M-LS-L (L)/), 14 (/M-H-M/) and 15 (/L-M-L/) in order to illustrate how some of them actually merge, and how some surface with a slightly different tonal pattern.

Because Tone Class 14 (/M-H-M/) does not occur on long stems, the stimulus for this Class is a long stem which is part of Tone Class 14 conjugation class, i.e, a stem which is expected to occur with Tone Class 14 according to its aspectual tonal ablaut pattern (see chapter 5 for a detailed account of conjugation Classes)

Since this graph only takes into consideration the final dimoraic syllable, it compares how the two final tonal elements of each TS surfaces phonetically. So for Class 12 it shows /M-L/ only, for Class 13, it shows

/LS-L/ only, for Class 14 (/H-M/) only, and finally for Class 15 (/M-L/) only.

The graph shows that Tone Class 13 (/M-LS-L (L)/) and Tone Class 15 (/L-M-L/) are definitely distinct classes¹⁵, and that Tone Class 12 and 14 merge.

So long stems expected to occur with Tone Class 14 actually occur with Tone Class 12 instead.

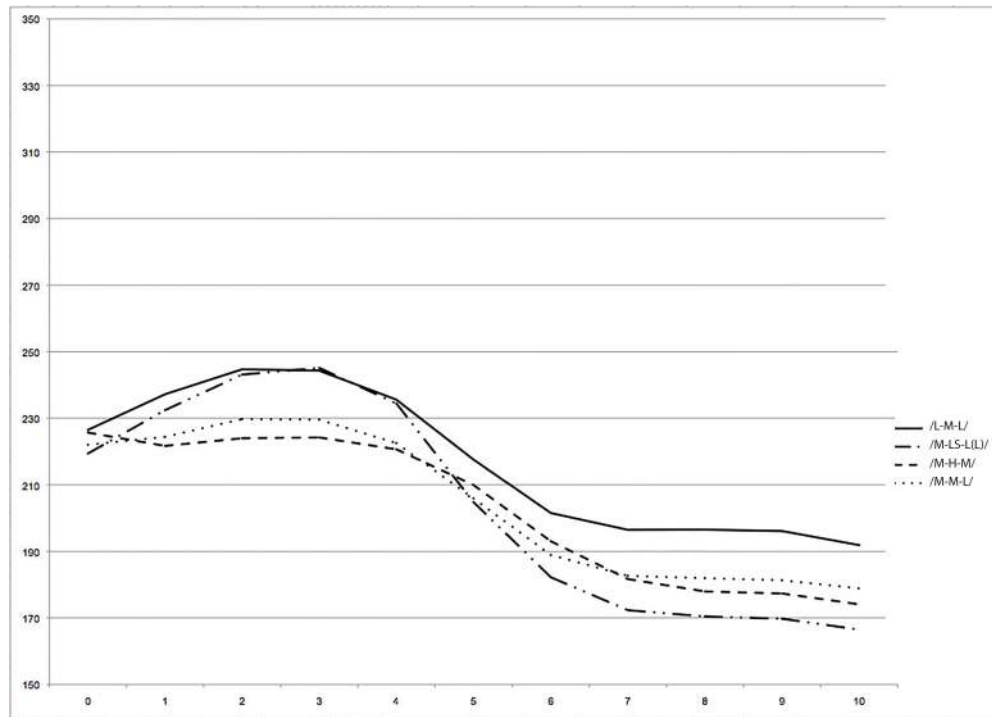


Figure 4.25: Averaged pitch tracks for falling melodies in long stems

¹⁵The penultimate mora /LS/ on word for Tone Class 13 (/M-LS-L (L)/) is not as high as usual, it is usually much higher than 250 Hz.

4.9 Distribution of tone within the word

Just as is the case for segments, the final mora is the position within the word where most tonal contrast occurs. Some restrictions exist regarding the occurrence of certain tones within the word. The antepenultimate syllable is the position where most restrictions occur. Indeed, in that position there is only a contrast between /M/, /L/ or nothing (/ /: mora unspecified for tone). The /LS/ tone may surface in the antepenultimate syllable of a verb form (on the aspect prefix) only and only if the verb stem bears a /L-LS/ tone. So, the occurrence of a /LS/ tone in the antepenultimate syllable results from a highly restricted phonological rule:

M—> LS / ___ L-LS

Furthermore, as shown in table 4.5, /L/ and /M/ are the only tonal elements allowed (underlyingly) in all positions of the word. Another interesting fact about the distribution of tone is that the contour /LH/ only occurs in final monomoraic syllables.

Table 4.5 summarizes the distribution of all tones within the word:

Tone	Antepenult μ	Penult μ	Ultimate μ
/L/	✓	✓	✓
/M/	✓	✓	✓
/H/	X	✓	✓
/LS/	X	✓	✓
/LH/	X	X	✓

Table 4.5: Distribution of tones in simplex words

Typologically, it is unusual to have such a large inventory of tones

(five) and so few tonal sequences. Indeed, the only allowed combination of tonal elements occur in fifteen tonal sequences only. The main argument in support of such a large tonal inventory is that the tones actually show no alternation in sandhi context. A /H/ tone always stays a /H/ tone, a /LS/ is always an /LS/ tone etc. However, the /L/ tone is a little bit trickier because as it is demonstrated in section 4.11.2.3 later on, they are mutable when hit by a floating tone.

4.10 Tonal Sequences as Lexical Tone Classes

The TS's are composed of a combination of tones or tonal elements and are associated with words. As illustrated in the sections to follow, not all combinations of tones occur as a TS. As was discussed in the preceding section, some restrictions exist in the combinatoric possibilities, as for example, only /L/ and /M/ tones occur in the antepenultimate position; /LH/ tone occurs in the final mora only; and only /L/, /H/, and /LS/ tones occur as floating tones.

This section discusses all of the fifteen Lexical Tone Classes indicating their prevalence in different areas of the lexicon. The Classes highlighted in dark grey are 'major Classes', they include major open-ended Classes of stems while 'the minor Classes' (white background) have important restrictions as some can be the result of historical tonal combinations or fulfill specific grammatical functions in the language.

Major Classes occur in most or all areas in lexicon, and will be fairly well-populated such as Classes 1, 2, 3, 4, 8, 9, 10, 11. Some Classes are borderline major Classes because they are very restricted to one specific area in lexicon but have many lexemes associated with them such as Class 7 (Spanish loans are numerous in the lexicon). On the other hand, Class 12 is a borderline major Class for opposite reasons as it covers a wider range of functions in the lexicon, but lexemes associated with Class 12 are rather scarce in the lexicon.

Class	Ts	Native N	Spn N	Adj/Adv	3S COMPL V	3S PROG V	3S POT V	2s N/V/Adj	1s N/V/Adj
1	/ /	112/375	0/60	43/137	30/231	0/218	38/229	0/617	146/618
2	/L (LS)/	34/375	8/60	0/137	0/231	0/218	0/229	0/617	0/618
3	/L (L)/	0/375	0	22/137	8/231	0/218	99/229	0/617	1/618
4	/M (H)/	45/375	0	8/137	24/231	24/218	7/229	0/617	10/618
5	/M/	0	0	0/137	0/231	0/218	0/229	21/617	128/618
6	/L-M/	0	0	0/137	0/231	0/218	0/229	223/617	0/618
7	/L-M (LS)/	0	0/60	0/137	0/231	0/218	0/229	0/617	0/618
8	/LH/	35/375	9/60	14/137	39/231	16/218	2/229	0/617	11/618
9	/L-LS/	25/375	0	9/137	2/231	1/218	67/229	0/617	226/618
10	/M-M/	58/375	0	25/137	34/231	5/218	7/229	120/617	21/618
11	/M-H/	49/375	0	12/137	72/231	86/218	5/229	116/617	36/618
12	/M-M-L/	15/375	0	3/137	3/231	51/218	1/229	80/617	39/618
13	/M-LS-L (L)/	2/375	0	1/137	17/231	29/218	3/229	0/617	0/618
14	/M-H-M/	0	0	0/137	0/231	0/218	0/229	57/617	0/618
15	/L-M-L/	0	0	0	0	0	0	21/617	0

Table 4.6: Prevalence of Tonal Sequences in the lexicon. (Modified from (Villard & Woodbury, 2012))

Class 1 which is unspecified for tone occurs on about 10 percent of lexemes in the lexicon. It also occurs in the numerical system but only on the numbers from 1 to 10.

Class 2 and 3 have different floating tones for different parts of speech. Class 2 only includes nouns (and a couple of numbers: *ntiʔnʔònr̃* 'fifteen' and *nkaʔyòr̃* 'five' (when added to a base number) whereas Class 3 includes lexemes belonging to verb, adverb, and adjective classes including the number twenty *kalà̀*.

Class 5 and class 6 are unique to 1sg and 2sg inflected N/Adj/V stems respectively.

Class 7 marks the majority of Spanish loan nouns and is exclusively restricted to this word class.

Class 9, which is a major Tone Class, does not present any particular restrictions as far as word class is concerned; it may occur on nouns, on inflected verb forms as well as on adjectives. One interesting fact to note, is that adjectives describing small things or nouns referring to small animals or babies bear this Tone Class. For example, *lʔóʔ* 'little', *lʔèéʔ* 'baby', *kùwíʔ* 'baby' (endearing), *mpíʔ* 'dram of liquor', *lʔíʔ* 'parakeet', and *chèʔé* 'cockerel' and *cheʔē* 'cock' which form a doublet. Campbell and Woodbury (2010) speculates that this phenomenon is a sound symbolic effect resulting from Tone Class 1 words (unspecified for tone) shifting to the Tone Class with the cute sounding rise i.e. Tone Class 9.

Class 12 is the result of historic tone combinations involving a mid tone progressive prefix /M/ (possibly with a some type of high floating tone) and a /X/ stem (Campbell & Woodbury, 2010) . Only a few nouns occur with this tone and some examples are *ntsātìn* 'plum' and *tā̀n* 'people from the valley of Oaxaca'. Many progressive verb forms occur with this Tone Class when the stem unspecified for tone is combined with the progressive prefix bearing a /M/ tone. For example, *nka-sikwan* 'he/she plucked it' (/X-X-X/) becomes *ntā̀-̀sikwà̀n* 'he/she is plucking it' (/M-M-L/).

Class 13 is the result of historic tone combinations involving the progressive prefix /M/ (possibly with some type of high floating tone) being combined to a stem with a /L (L)/ tone (Tone Class 3). This Tone Class also extends to some completive verb forms where it mainly occurs with transitive stems that are underlyingly Tone Class 3. As illustrated in §4.8, this Tone Class tends to occur on trimoraic stems¹⁶ as in *nkwiákwèn`* 'he/she responded' and *ntiákwèn`* 'he/she is responding'. This class may also occur in very few dimoraic lexemes, as in *nkwiáxi`* 'tomato' and *síé`òn`* 'dove'.

Class 14 is solely restricted to 2sg progressive verb forms occurring with a stem of Class 11 tone (/M-H/) in their corresponding 3rd person completive form. It only occurs on trimoraic stems.

Class 15 is about as restricted in its distribution as Class 14 as it only

¹⁶Inflected verb forms tend to be trimoraic because they are normally-dimoraic stems bearing a monomoraic/monosyllabic prefix. Refer to Chapter 5 §5.3.1.1 for a discussion about prefixes. In most cases the progressive forms are trimoraic whereas the completive forms and especially the potential forms may be dimoraic.

occurs on 2sg verb forms whose stems are either dimoraic monosyllabic or trimoraic disyllabic.

4.11 Tone realization at the sentence level revisited

At the beginning of this chapter, section §4.5 discusses tone realization at the sentence level describing three major processes: the behavior of moras unspecified for tone, the persistence or spreading of /H/, /LH/ and /LS/ tones into moras unspecified for tone, and finally the behavior of three of the five tones as lexically unlinked or floating tones, and their effect on tonally unlinked moras in subsequent words. By presenting the realization of the tones in connected speech, §4.5 exposed the main post-lexical tonal rules of the language (i.e. the behavior of tonally unlinked moras, the Spreading rule (figure 4.13), and a preliminary floating tone linking rule (figure 4.18). However, what was lacking from that description were two important phenomena: 1) a more detailed description of spreading when W2 is linked with tone, and 2) an account of floating tone behavior in W2 linked with tone. This section offers a complete description and illustration of these two phenomena.

4.11.1 Description of Spreading revisited

Section 4.5.1 earlier illustrated the spreading of /H/, /LH/ and /LS/ tones into subsequent tonally unspecified moras. It also briefly discussed with just one example how Spreading gets interrupted when a tonally linked

mora is encountered. This section has the sole purpose of providing more examples of this phenomenon where W2 is tonally linked to different tone Classes in order to illustrate the Spreading rule stated in figure 4.13 on page 163.

The pitch tracks in figure 4.26 and figure 4.27 show the same phenomenon as figure 4.12 on page 162 (i.e Spreading interrupted by a tonally linked mora), but for Spreading of the high pitch [H] (from /LH/) *lusĩ* 'butterfly' and Spreading of the super high pitch [S] (from /L-LS/) *yũsĩn* 'turtle' into tonally unspecified moras until a tone-linked mora is encountered in the word *lyũwā* 'annona' (/M-M/). The /M/ tone does not spread in subsequent unlinked moras, so as a result all subsequent words to *lyũwā* 'annona' (/M-M/) surface with their default low pitch.

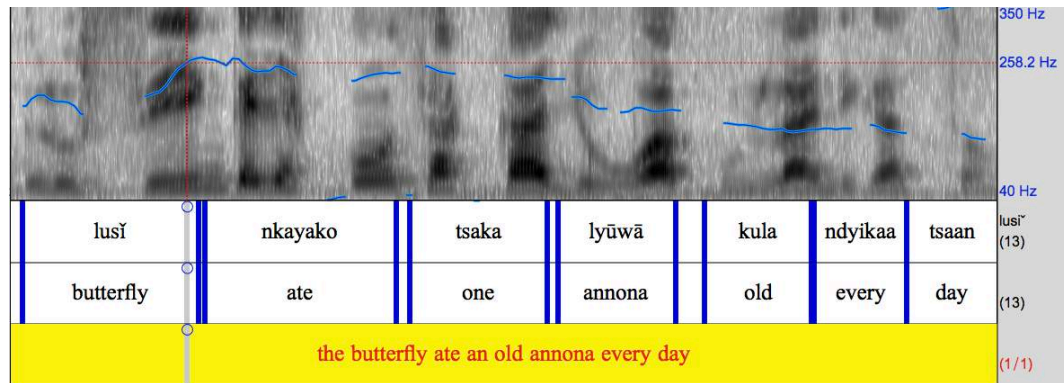


Figure 4.26: Persistence of [H] pitch (from /LH/) in subsequent unspecified moras until /M/ (from /M-M/)

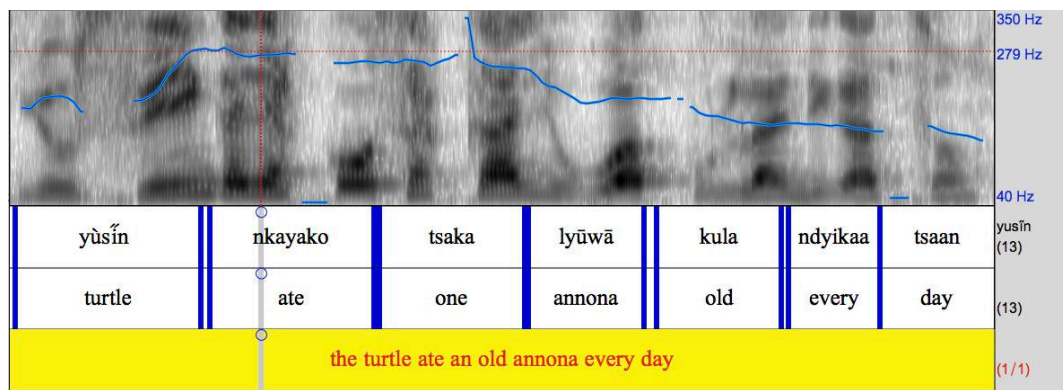


Figure 4.27: Persistence of [S] pitch (from /L-LS/) in subsequent unspecified moras until /M/ (from /M-M/)

The pitch track in figure 4.28 shows the spreading of final [H] pitch of word *kwīná* 'snake' (/M-H/) into all subsequent words made of tonally unlinked moras until a tone-linked mora is encountered in the word *jaʔwǎ* 'banana' (/X-L (LS)/). The word *kula* 'old' (/X-X/) hosts the preceding word's floating tone /LS/, and gets realized as [M-LS], because of the /M/ tone insertion rule (as stated in figure 4.18 on page 171). All following words made of tonally unlinked moras undergo spreading of the final [S] pitch from floating tone /LS/.

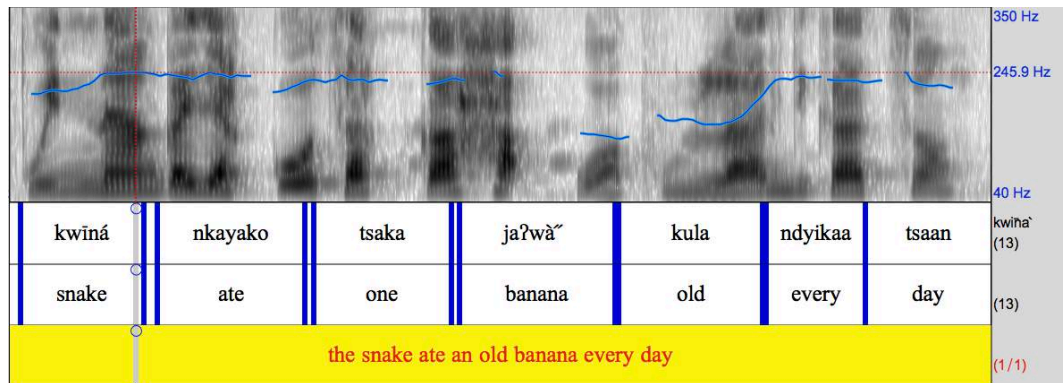


Figure 4.28: Persistence of [H] pitch (from /M-H/) in subsequent tonally unspecified moras until /L/ (from /X-L (LS)/)

The pitch track in figure 4.29 illustrates the spreading of final [H] pitch of word *lusĩ* 'butterfly' (/X-LH/) into all subsequent words made of tonally unlinked moras until a tone-linked mora is encountered in the word *jaʔwǎ* 'banana' (/X-L (LS)/). The word *kula* 'old' (/X-X/) hosts the preceding word's floating tone /LS/, and gets realized as [M-LS], because of the /M/ tone insertion rule. All following words made of tonally unlinked moras

undergo spreading of the final [S] pitch from floating tone /LS/.

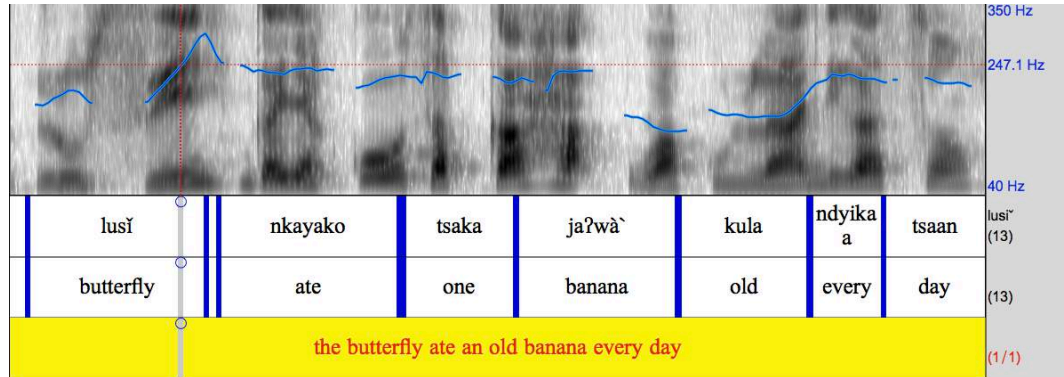


Figure 4.29: Persistence of [H] pitch (from /X-LH/) in subsequent tonally unspecified moras until /L/ (from /X-L (LS)/)

The pitch track in figure 4.30 shows the spreading of final [S] pitch of word *yùsĩn* 'turtle' (/L-LS/) into all subsequent words made of unlinked moras until a linked mora is encountered in the word *jaʔwà`* 'banana' (/X-L (LS)/). The word *kula* 'old' (/X-X/) hosts the preceding word floating tone /LS/, and gets realized as [M-LS], because of the /M/ tone insertion rule. All following words made of unlinked moras undergo spreading of the final [S] pitch from floating tone /LS/.

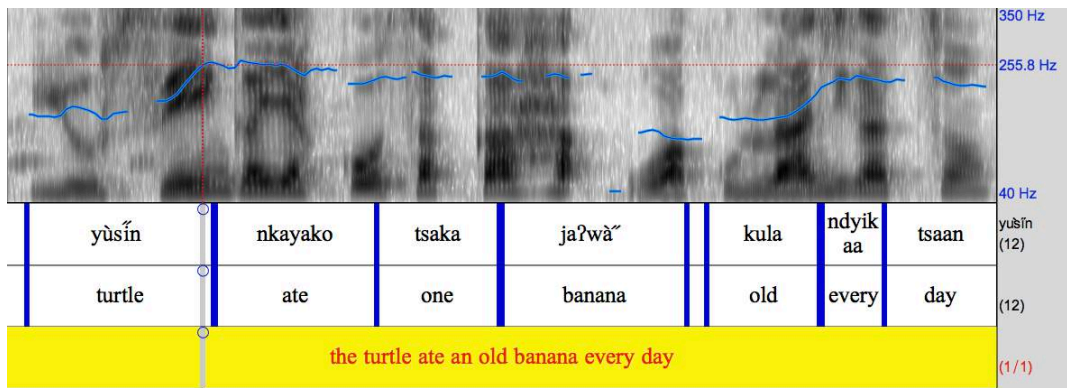


Figure 4.30: Persistence of [S] pitch (from /L-LS/) in subsequent tonally unspecified moras until /L/ (from /X-L (LS)/)

4.11.2 Description of floating tone realization revisited

Section §4.5 earlier discussed the behavior of the three floating tones on tonally unlinked moras in subsequent words. This section's main goal is to provide a complete description and illustration of the behavior of all floating tones in phrasal context with W2 of all Tone Classes (as opposed to only showing tonally unspecified W2). It also presents a final floating tone linking rule building up on previously stated 'preliminary floating tone rules' offered in figure 4.18 on page 171 and in figure 4.31 on page 232.

Just for convenience, the 'Preliminary Floating Tone Rule 1' is reiterated below:

In a sequence of words where W1 hosts a floating tone and W2 is unspecified for tone, the floating tone links to the rightmost mora in W2. All moras to the left of the (newly linked) floating tone in W2 are assigned a /M/ tone.

4.11.2.1 Floating /LS/ followed by all Tone Classes

Example 8 below, presents the word *tiʔǎ* 'early'¹⁷ (/L (LS)/) followed by different verb forms each bearing a different Tone Class. The dashes --- signal the lack of an example to illustrate the sandhi pattern in question.

¹⁷*tiʔǎ* is translated in Spanish as 'early' but it is not an adverb in Chatino, it is a noun which literally means 'in the night' referring to early morning when it is still dark.

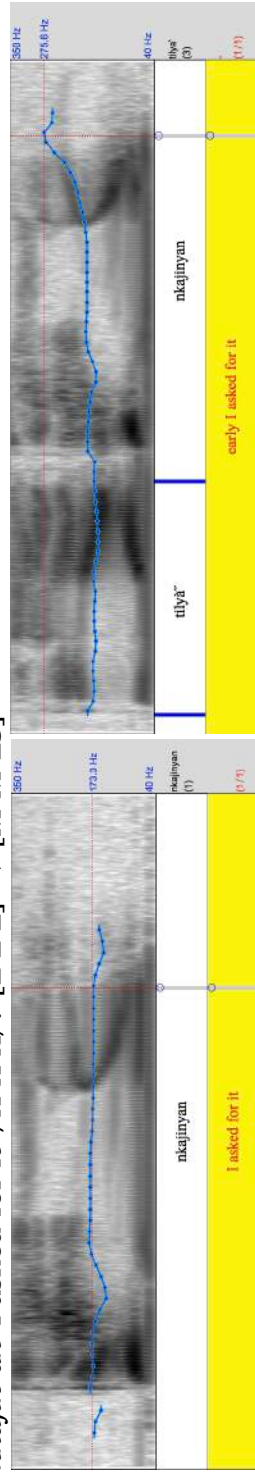
(8) Realization of floating tone /LS/ in all Tone Classes

Class	Word	Gloss	Tonal rep. of W2	Phonetic realization of W2
1	til ^y ǎ́ nkajin ^y an	early I asked for it	/X/	[M-M-LS]
2	---	---	/L (LS)/	---
3	til ^y ǎ́ ntusanè	early he/she sprays it	/L (L)/	[M-LS-L]
4	til ^y ǎ́ nkayakwēn'	early he/she vomited it	/M (H)/	[M-LS-M]
5	til ^y ǎ́ nkajil ^y ān	early I farted	/M/	[M-LS-M]
6	til ^y ǎ́ nkasālō	early you threw it away	/L-M/	[LS-L-M]
6	---	---	/L-M (LS)/	---
7	---	---	/L-M (LS)/	---
8	til ^y ǎ́ nkalukwǎ	early he/she swept it	/LH/	[M-LS-LH]
9	til ^y ǎ́ ntusàlǎ́	early he/she opens it	/L-LS/	[LS-L-LS]
10	til ^y ǎ́ nkajinyān	early you asked for it	/M-M/	[LS-M-M]
11	til ^y ǎ́ nkajinyán	early he/she asked for it	/M-H/	[LS-M-H]
12	til ^y ǎ́ ntājinyàn	early I am asking for it	/M-M-L/	[M-M-L]
13	til ^y ǎ́ ntāsálò	early he/she is throwing it away	/M-LS-L (L)/	[M-LS-L]
14	til ^y ǎ́ ntāsálā	early you are opening it	/M-H-M/	[M-H-M]
15	til ^y ǎ́ kòlòò	early you will remove it	/L-M-L/	[L-M-L]

The following pitch tracks illustrate and explain the data presented in example (8).

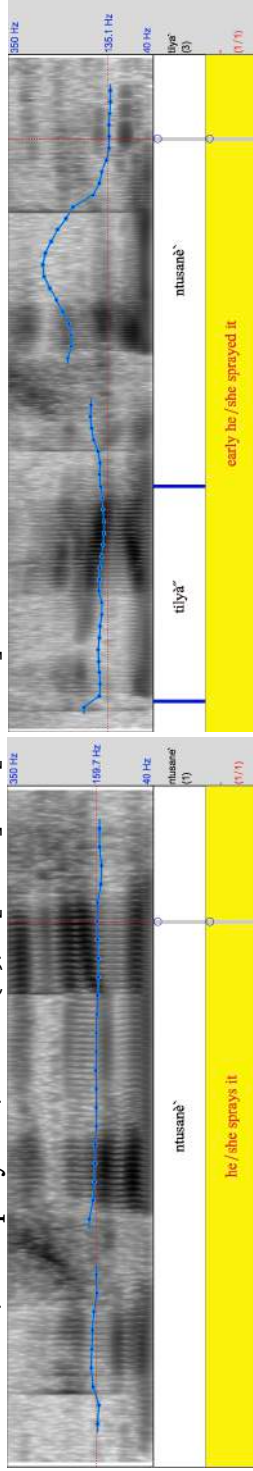
The pitch track below shows how the floating /LS/ from *tɪɸ̃ä* (/L (LS)/) gets realized on the rightmost mora of subsequent word *nkajinʸan* (/X-X-X/), and it also demonstrates how all the moras to the left of the newly linked tone /LS/ are assigned a /M/ tone:

nkajinʸan 'I asked for it' /X-X-X/: [L-L-L] → [M-M-LS]



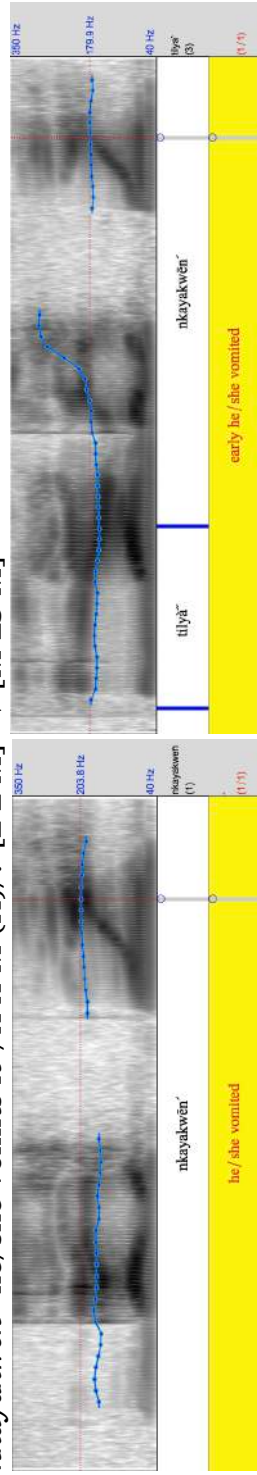
The next one shows how the floating /LS/ from *tɪɸá* gets realized on the rightmost unlinked mora (penultimate mora) of subsequent word *ntusanè* (/L (L)/, and it also demonstrates how the mora to the left of the newly linked tone /LS/ (the antepenultimate mora of *ntusanè*) gets assigned a /M/ tone:

ntusanè 'he/she sprays it' /X-X-L (L)/: [L-L-L] → [M-LS-L]

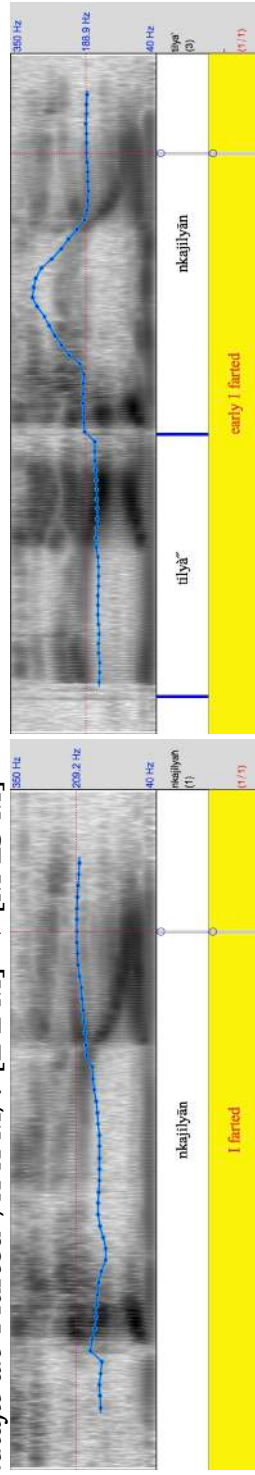


The next two present the same phenomena described in the preceding pitch track but instead involving a linked /M/ tone in W2 :

nkayakwēn 'he/she vomits it' /X-X-M (H)/: [L-L-M] → [M-LS-M]

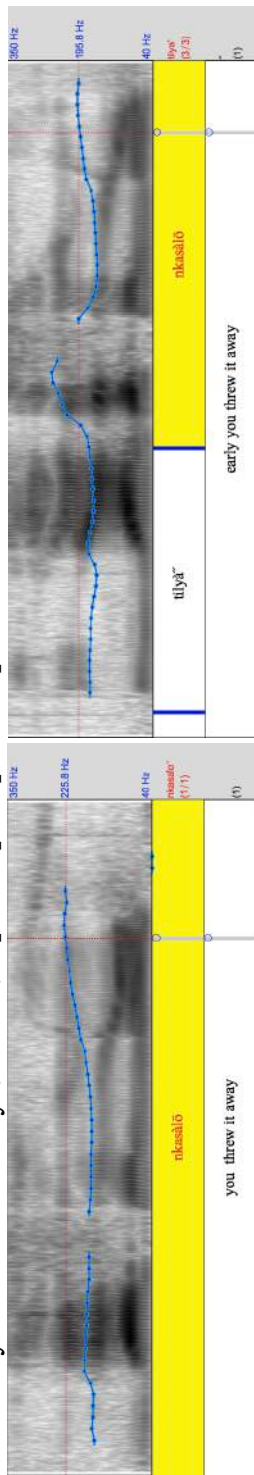


nkajijl'ān 'I farted' /X-X-M/: [L-L-M] → [M-LS-M]



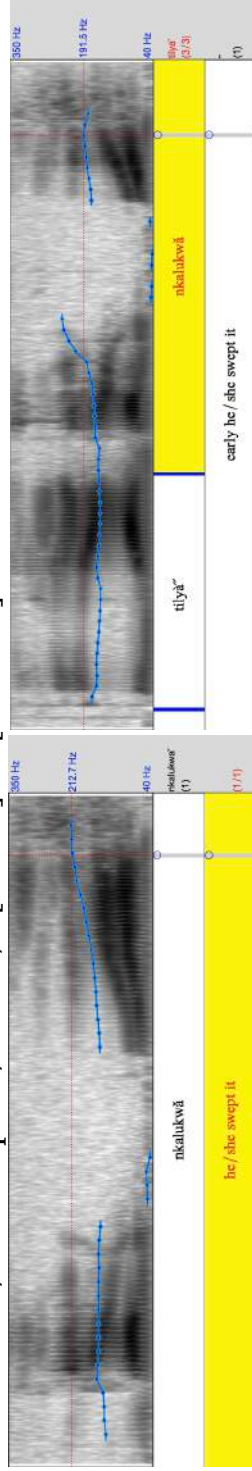
This next pitch track shows how the floating /LS/ from *tɪl'ã* gets realized on the rightmost unlinked mora (the antepenultimate mora as both the penultimate and the final mora are linked to a /L/ and a /M/ tone respectively) of subsequent word *nkasâlô*. After the linkage of the floating tone to the only available tonally unlinked mora in antepenultimate mora of word *nkasâlô*, the /M/ tone insertion does not occur.

nkasâlô 'you threw it away' /X-L-M/: [L-L-M] → [LS-L-M]

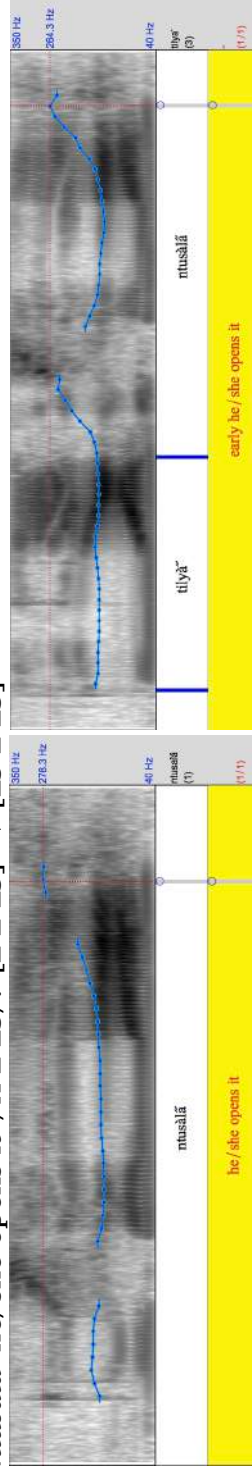


All of the following pitch tracks show more examples of the linking of the floating tone /LS/ to words bearing different Tone Classes.

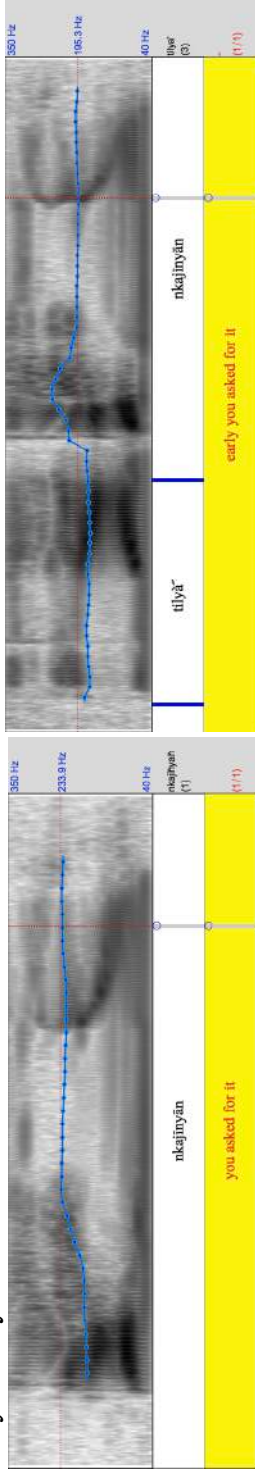
nkalukwǎ 'he/she sweeps it' /X-X-LH/: [L-L-LH] → [M-LS-LH]



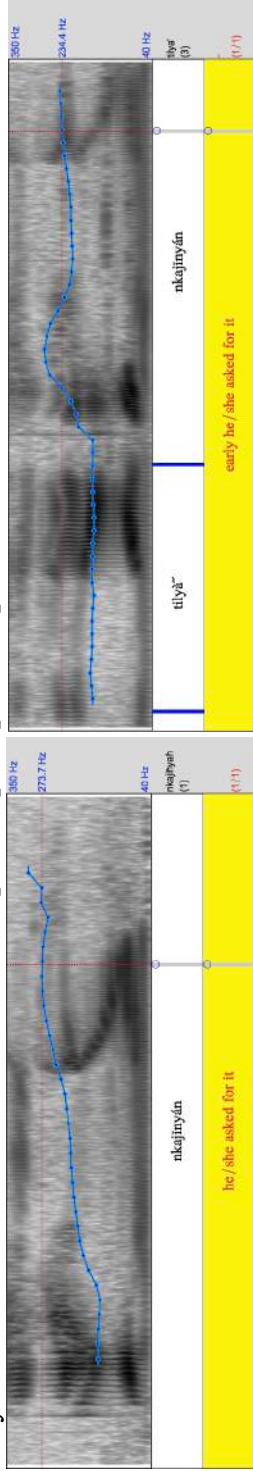
ntusálǎ 'he/she opens it' /X-L-LS/: [L-L-LS] → [LS-L-LS]



nkajin'ân 'you asked for it' /X-M-M/: [L-M-M] → [LS-M-M]

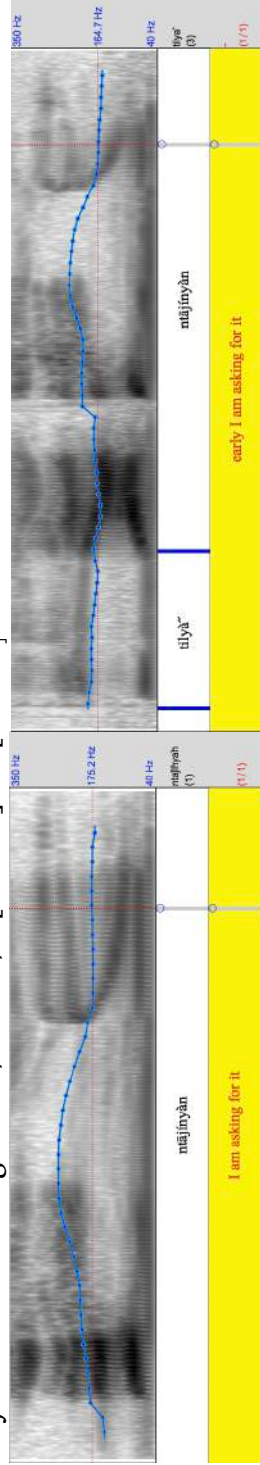


nkajin'ân 'he/she asked for it' /X-M-H/: [L-M-H] → [LS-M-H]

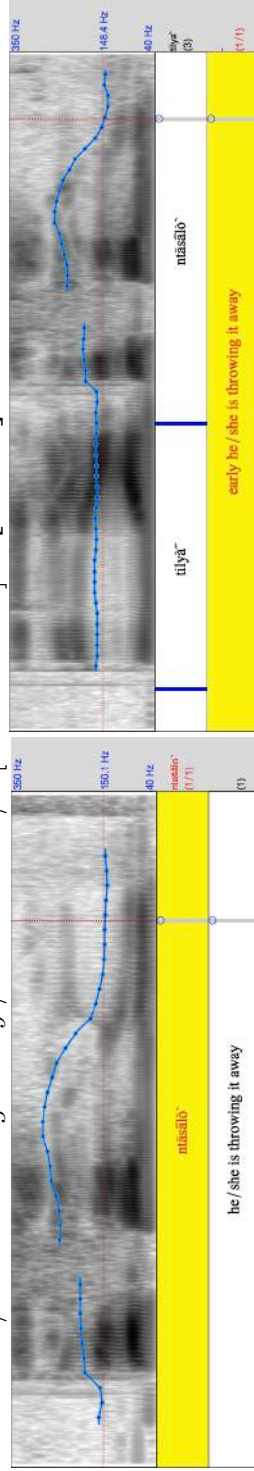


The pitch tracks below show how the floating tone /LS/ does not get realized as all the moras in subsequent words are already linked to a tone:

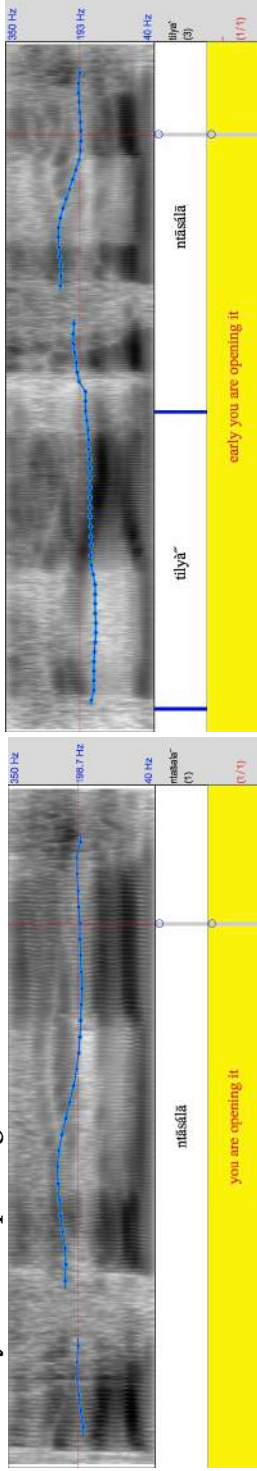
ntājir'ân 'I am asking for it' /M-M-L/: [M-M-L] → [M-M-L]



ntāsālò'he/she is throwing it away' /M - LS - L/ : [M - LS - L] → [M-LS-L]



nīāsālā 'you are opening it' /M-H-M/: [M-H-M] → [M-H-M]



The data presented in this section showed that when W2 is linked to a tone, the floating tone from W1 links to the rightmost available (tonally unlinked) mora in W2. Furthermore, it also demonstrated how the mora to the left of the newly linked tone gets assigned a /M/ tone. However, in the case where W2 has no available moras left after the linkage of the floating tone, the /M/ tone insertion does not occur. Finally, in the case where all moras in W2 are already linked to a tone, the floating tone from W1 does not get realized at all.

In light of the data just presented the 'Preliminary Floating Tone Rule 1' may now be revised from:

In a sequence of words where W1 hosts a floating tone and W2 is unspecified for tone, the floating tone links to the rightmost mora in W2. All moras to the left of the (newly linked) floating tone in W2 are assigned a /M/ tone.

To the following statement:

*In a sequence of words where W1 hosts a floating tone, **the floating tone links to the rightmost tonally unlinked mora in W2 (if any available)**. All moras **(if any available)** to the left of the newly linked floating tone in W2 are assigned a /M/ tone.*

Figure 4.31: Preliminary Floating Tone rule 2

4.11.2.2 Floating /H/ followed by all Tone Classes

Example (9) below, presents the word *kwā'* 'already' (Tone Class 4: /M (H)/) followed by different verb forms bearing all tonal sequences

present in the language. The dashes --- signal the lack of an example to illustrate the sandhi pattern in question.

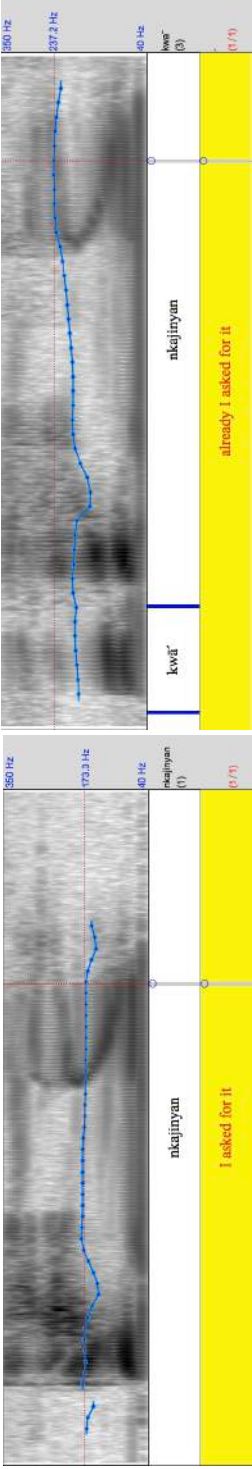
(9) Realization of floating tone /H/ in all Tone Classes

Class	Word	Gloss	Underlying rep. of W2	Phonetic realization of W2
1	kwā́ nkajinyan	<i>already I asked for it</i>	/X/	[M-M-H]
2	---	---	/L (LS)/	---
3	kwā́ ntusanè	<i>already he/she sprays it</i>	/L (L)/	[M-H-L]
4	kwā́ nkayakwḗn	<i>already he/she vomited it</i>	/M (H)/	[M-H-M]
5	kwā́ nkajilyān	<i>already I farted</i>	/M/	[M-H-M]
6	kwā́ nkasàlò	<i>already you threw it away</i>	/L-M/	[H-L-M]
7	---	---	/L-M (LS)/	---
8	kwā́ nkalukwă	<i>already he/she swept it</i>	/LH/	[M-H-LH]
9	kwā́ ntusàlǎ	<i>already he/she opens it</i>	/L-LS/	[H-L-LS]
10	kwā́ nkajinyān	<i>already you asked for it</i>	/M-M/	[H-M-M]
11	kwā́ nkajin ^v án	<i>already he/she asked for it for it</i>	/M-H/	[H-M-H]
12	kwā́ ntājinyàn	<i>already I am opening it</i>	/M-M-L/	[M-M-L]
13	kwā́ ntāsǎlò	<i>already he/she is throwing it away</i>	/M-LS-L (L)/	[M-LS-L]
14	kwā́ ntāsálā	<i>already you are opening it</i>	/M-H-M/	[M-H-M]
15	kwā́ kòlòò	<i>already you will remove it</i>	/L-M-L/	[L-M-L]

All of the following pitch tracks illustrate and explain the data presented in example (9). The pitch tracks demonstrate the 'Preliminary Floating Tone Linking Rule 2' stated on page 232:

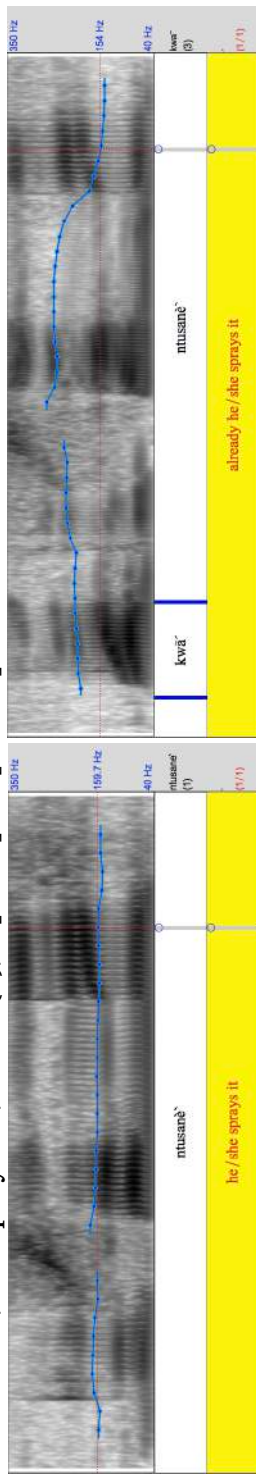
The pitch track below shows how the floating /H/ from *kwā'* (/M (H)/) gets realized on the rightmost mora of subsequent word *nkajin'an* (/X-X-X/), and it also demonstrates how all the moras to the left of the newly linked tone /H/ are assigned a /M/ tone:

nkajin'an 'I asked for it' /X-X-X/: [L-L-L] → [M-M-H]



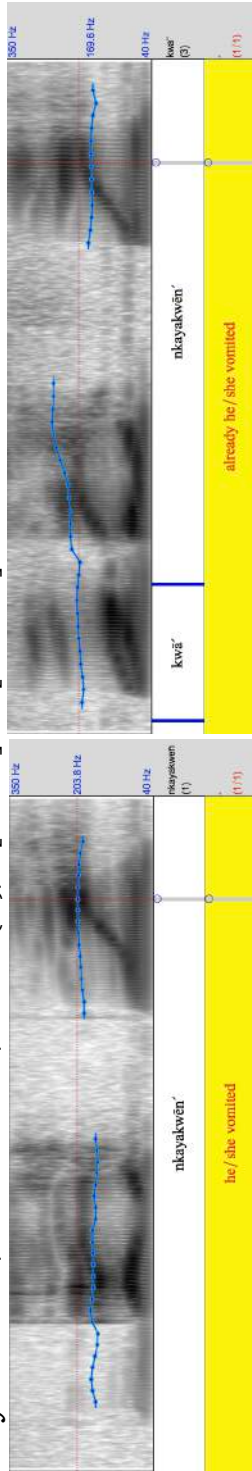
The next one shows how the floating /H/ from *kwā́* (/M (H)/) gets realized on the rightmost unlinked mora (penultimate mora) of subsequent word *ntusanè`* (/L (L)/), and it also demonstrates how the mora to the left of the newly linked tone /H/ (the antepenultimate mora of *ntusanè`*) gets assigned a /M/ tone:

ntusanè` 'he/she sprays it' /X-X-L (L)/: [L-L-L] → [M-H-L]

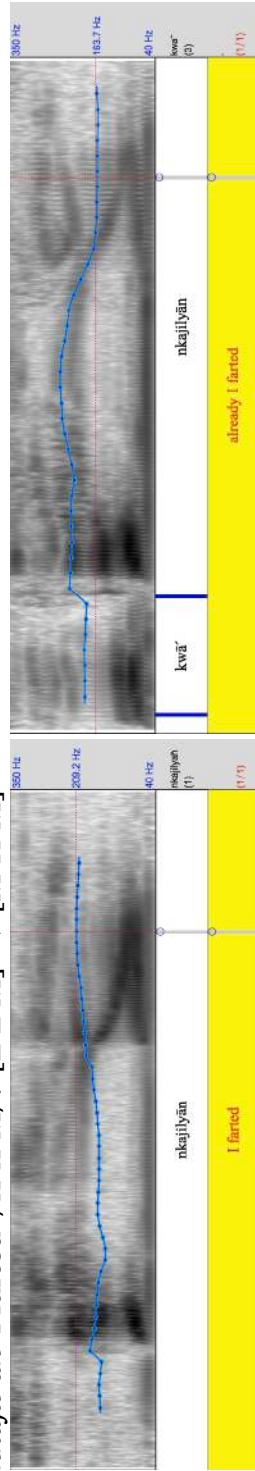


The next two pitch tracks present the same phenomena described in the preceding pitch track but instead involving a linked /M/ tone in W2 :

nkayakwēn 'he/she vomits it' /X-X-M (H)/: [L-L-M] → [M-H-M]

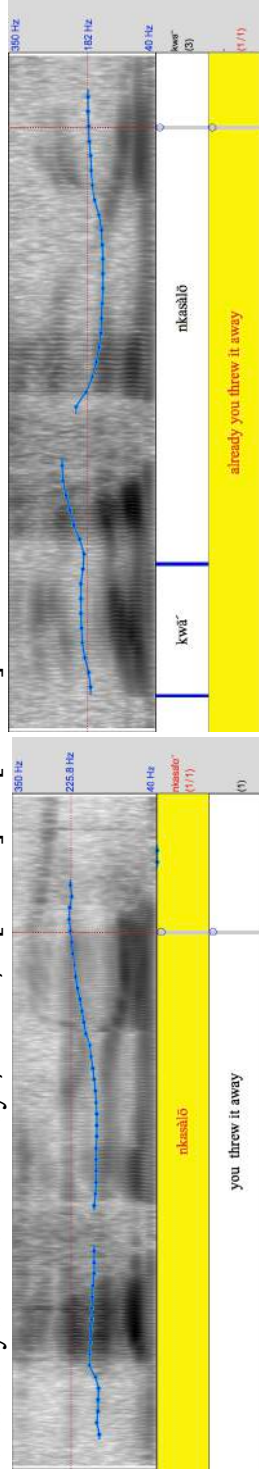


nkajil'ān 'I farted' /X-X-M/: [L-L-M] → [M-H-M]



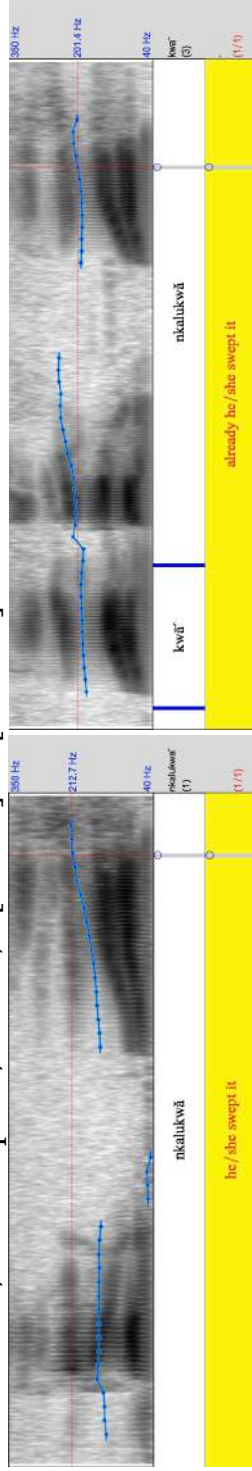
This next pitch track shows how the floating /H/ from *kwā* (/M (H)/) gets realized on the right-most unlinked mora (the antepenultimate mora as both the penultimate and the final mora are linked to a /L/ and a /M/ tone respectively) of subsequent word *nkasàlò*. After the linkage of the floating tone to the only available tonally unlinked mora in antepenultimate mora of word *nkasàlò*, the /M/ tone insertion does not occur:

nkasàlò 'you threw it away' /X-L-M/: [L-L-M] → [H-L-M]



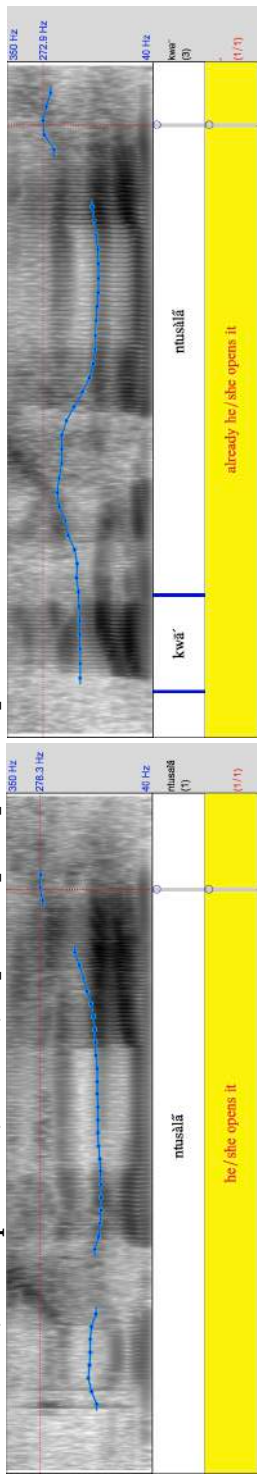
This next pitch track shows how the floating /H/ from *kwā* (/M (H)/) gets realized on the rightmost unlinked mora (the penultimate mora as the final mora is linked to a /LH/) of subsequent word *nkalukwǎ*. After the linkage of the floating tone to the rightmost available tonally unlinked mora in penultimate mora of word *nkalukwǎ*, the mora to the left of the newly linked tone /H/ gets assigned a /M/ tone:

nkalukwǎ 'he/she sweeps it' /X-X-LH/: [L-L-LH] → [M-H-LH]



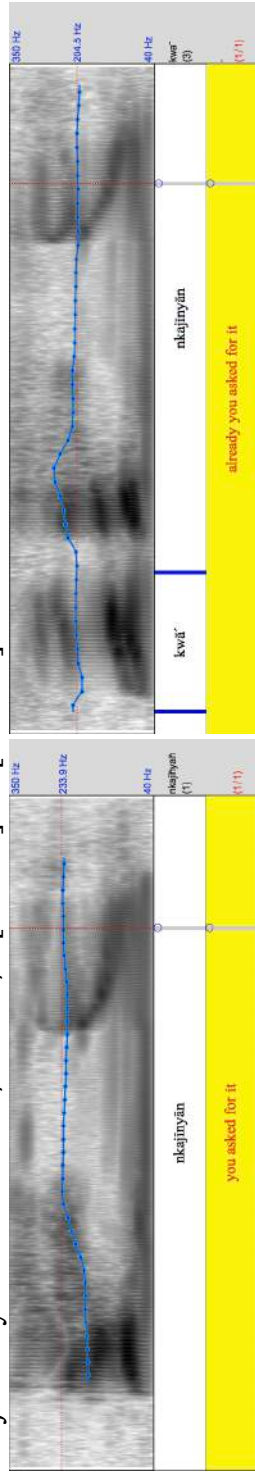
This next pitch track shows how the floating /H/ from *kwã* (/M (H)/) gets realized on the right-most unlinked mora (the antepenultimate mora as both the penultimate and the final mora are linked to a /L/ and a /LS/ tone respectively) of subsequent word *ntusàlǎ́*. After the linkage of the floating tone to the only available tonally unlinked mora in antepenultimate mora of word *ntusàlǎ́*, the /M/ tone insertion does not occur:

ntusàlǎ́ 'he/she opens it' /X-L-LS/: [L-L-LS] → [H-L-LS]



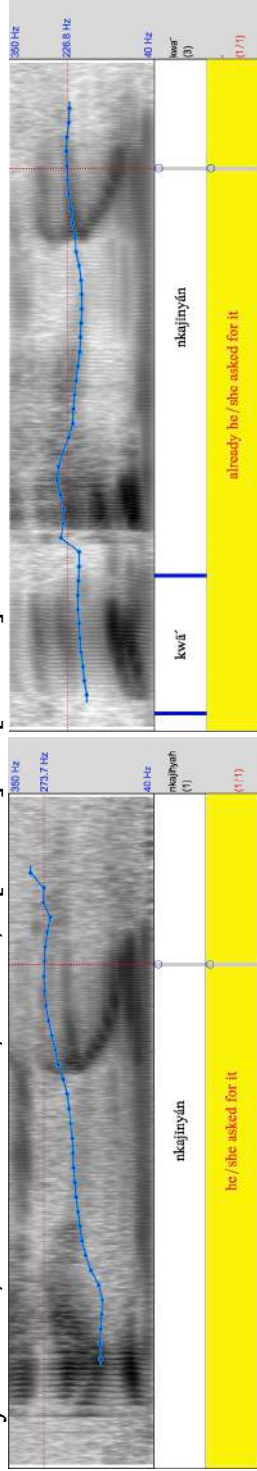
This next pitch track shows how the floating /H/ from *kwā* (/M (H)/) gets realized on the right-most unlinked mora (the antepenultimate mora as both the penultimate and the final mora are linked to a /M/ and a /M/ tone respectively) of subsequent word *nkajin'ān*. After the linkage of the floating tone to the only available tonally unlinked mora in antepenultimate mora of word *nkajin'ān*, the /M/ tone insertion does not occur:

nkajin'ān 'you asked for it' /X-M-M/: [L-M-M] → [H-M-M]



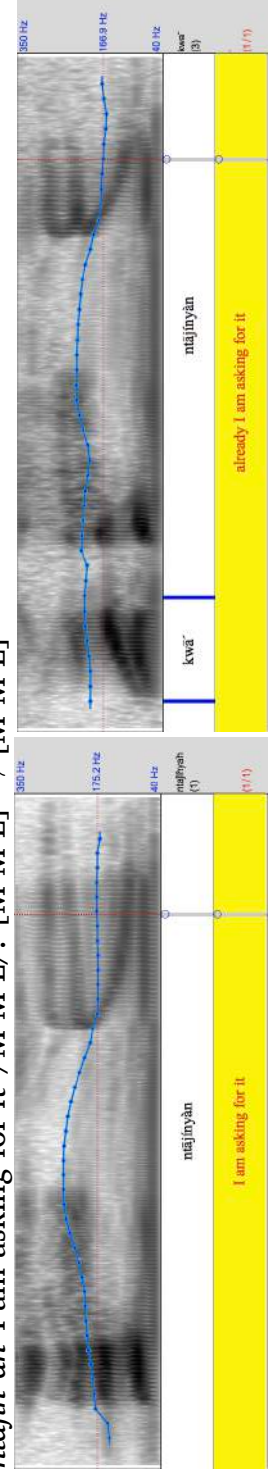
This next pitch track shows how the floating /H/ from *kwá* (/M (H)/) gets realized on the right-most unlinked mora (the antepenultimate mora as both the penultimate and the final mora are linked to a /M/ and a /H/ tone respectively) of subsequent word *nkajín'án*. After the linkage of the floating tone to the only available tonally unlinked mora in antepenultimate mora of word *nkajín'án*, the /M/ tone insertion does not occur:

nkajín'án 'he/she asked for it' /X-M-H/: [L-M-H] → [H-M-H]

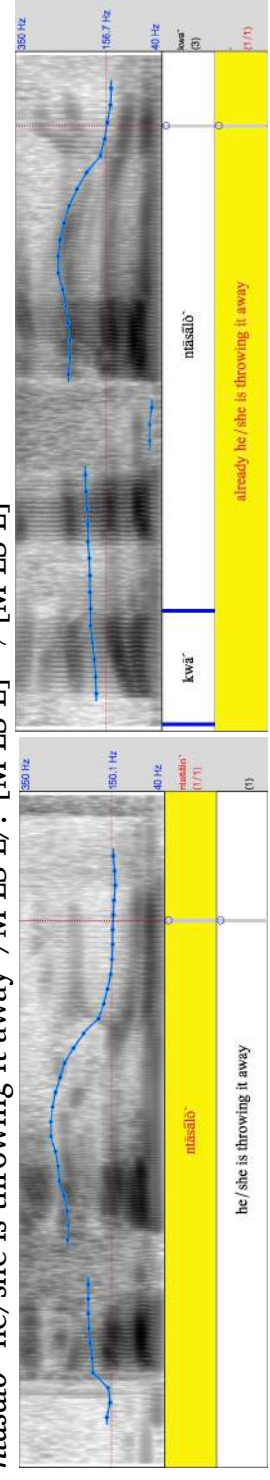


The pitch tracks below show how the floating tone /H/ does not get realized as all the moras in subsequent words are already linked to a tone:

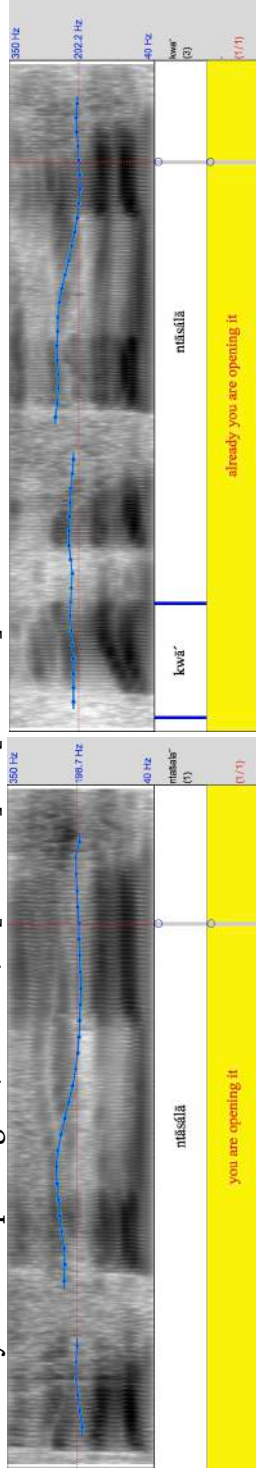
nājīn'àn 'I am asking for it' /M-M-L/: [M-M-L] → [M-M-L]



nāsālò 'he/she is throwing it away' /M-LS-L/: [M-LS-L] → [M-LS-L]

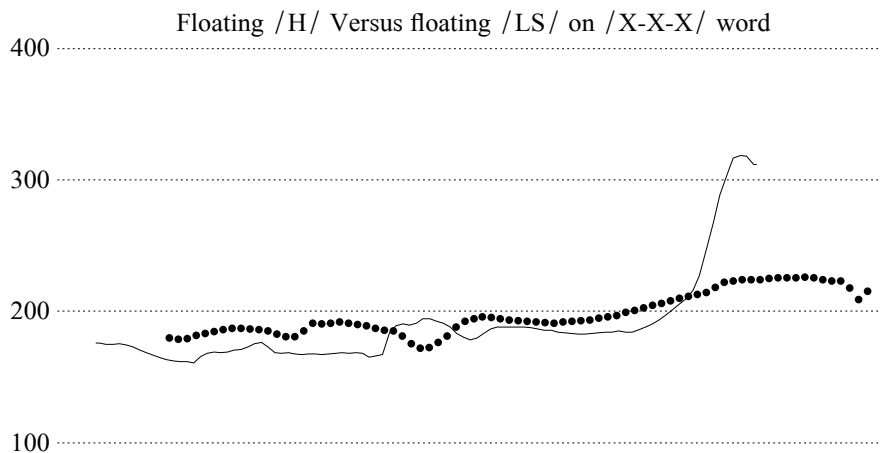


ntāsālā 'you are opening it' /M-H-M/: [M-H-M] → [M-H-M]



The data in this section shows that the Preliminary Floating Tone rule 2 stated in 4.31 applies to all examples presenting a floating /H/. As a result, in light of floating /H/, the rule does not need to be revised.

To conclude these two sections about the description of the high floating tones realization, the figure below presents an overlay of both floating /H/ and floating /LS/ realized on a /X-X-X/ word: *kwā' nkajin'an* 'I already asked for it' (/M (H)/ /X-X-X/) versus *til'ǎ' nkajin'an* (/L (LS)/ /X-X-X/) 'early I asked for it'. We can clearly see that both floating tones get realized on the right most mora of the word *nkajin'an* and that all the tonally unlinked moras to the left of the newly linked tone are assigned a /M/ tone.



4.11.2.3 Floating /L/ followed by all Tone Classes

This section presents the behavior of floating /L/, we will see that it behaves differently from the two other floating tones /H/ and /LS/. As a result, in light of the data presented here, the 'Preliminary Floating Tone Linking Rule 2' will need to be revised.

Example (10) below, presents the words *ʔà* 'not' or *kalà* 'twenty' (/L (L)/) followed by different verb forms (or by a noun in the case of *kalà*) each bearing a different Tone Class. In example (10), the column representing the phonetic realization of the target words show new sandhi patterns which have not been discussed before and which will be the basis for the revision of the 'Preliminary Floating Tone linking rule 2' . The dashes --- signal the lack of an example to illustrate the sandhi pattern in question.

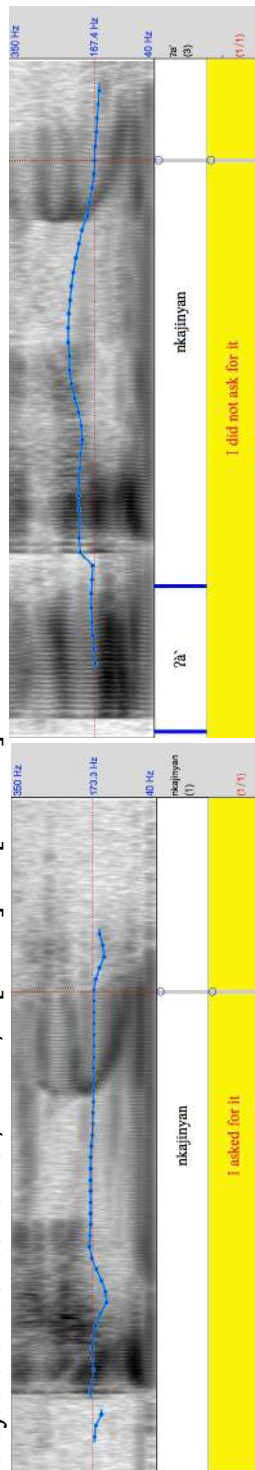
(10) **Realization of floating tone /L/ in all Tone Classes**

Class	Word	Gloss	Tonal rep. of W2	Phonetic realization of W2
1	ʔà nkajinyan	<i>I did not ask for it</i>	/X/	[M-M-L]
2	---	---	/L (LS)/	---
3	ʔà ntusanè	<i>he/she sprays it</i>	/L (L)/	[M-M-M]
4	ʔà nkayakwēn'	<i>he/she did not vomit it</i>	/M (H)/	[M-M-M]
5	ʔà nkajilyān	<i>I did not fart</i>	/M/	[M-M-M]
6	ʔà nkasàlō	<i>you did not throw it away</i>	/L-M/	[M-M-M]
7	kalà` mansàná`	<i>twenty apples</i>	/L-M (LS)/	[M-L-M]
8	ʔà nkalukwǎ	<i>he/she did not sweep it</i>	/LH/	[M-M-LH]
9	ʔà ntusàlá	<i>he/she does not open it</i>	/L-LS/	[M-L-LS]
10	ʔà nkajīnyān	<i>you did not ask for it</i>	/M-M/	[M-M-M]
11	ʔà nkajīn ^y án	<i>he/she did not ask for it</i>	/M-H/	[M-M-H]
12	ʔà ntājinyàn	<i>I am not asking for it</i>	/M-M-L/	[M-M-L]
13	ʔà ntāsáìlō	<i>he/she is throwing it away</i>	/M-LS-L (L)/	[M-LS-L]
14	ʔà ntāsálā	<i>you are not opening it</i>	/M-H-M/	[M-H-M]
15	ʔà` kòlōd	<i>you will not remove it</i>	/L-M-L/	[L-M-L]

All of the following pitch tracks illustrate and explain the data presented in example (10).

The pitch track below shows the expected sandhi pattern as stated in the Preliminary Floating Tone Linking Rule 2'. It illustrates how the floating /L/ from ?à (/L (L)/) links to the rightmost mora on subsequent tonally unlinked word, and how all the unlinked moras to the left of the newly linked /L/ tone are assigned a /M/ tone:

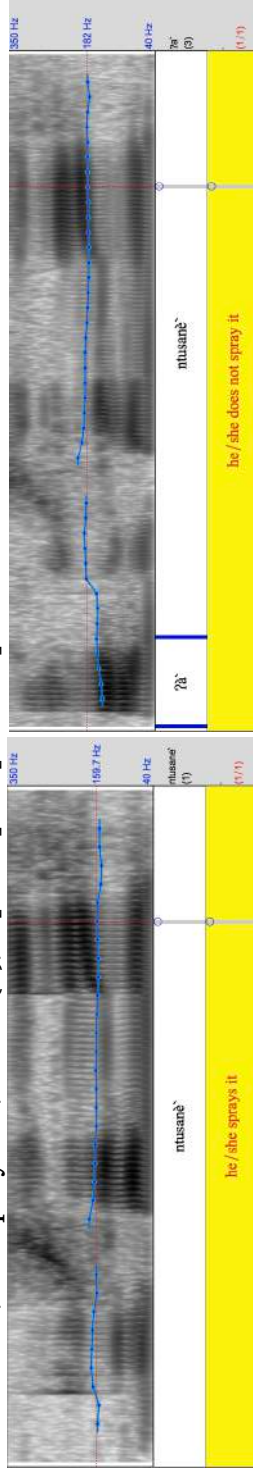
nkajin'an 'I asked for it' /X-X-X/: [L-L-L] → [M-M-L]



The following four pitch tracks present a floating tone behavior that has not been discussed yet. It seems that the floating /L/ tone from ?à (L) does not get realized at all.

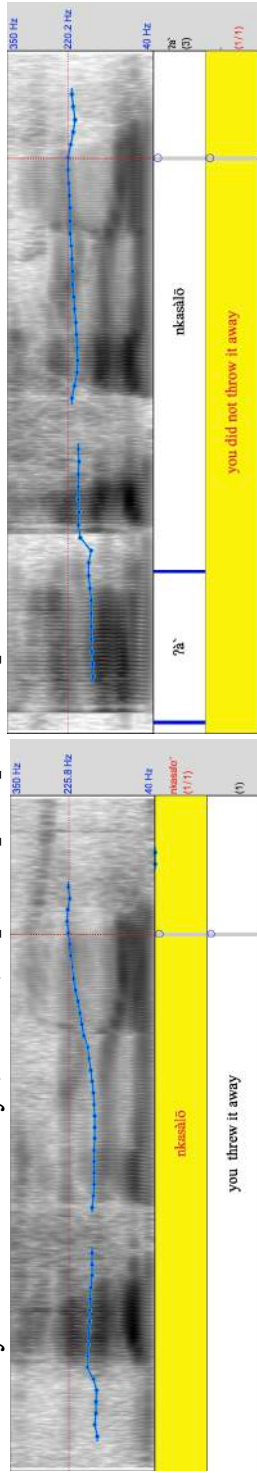
In the case of *ntusanè* 'he/she sprays it' /X-X-L (L)/, the final linked /L/ tone of *ntusanè* gets replaced by a /M/ tone resulting in a [M-M-M] surface pattern instead of [M-L-L] if the 'preliminary floating tone rule 2' were applied:

ntusanè 'he/she sprays it' /X-X-L (L)/: [L-L-L] → [M-M-M]



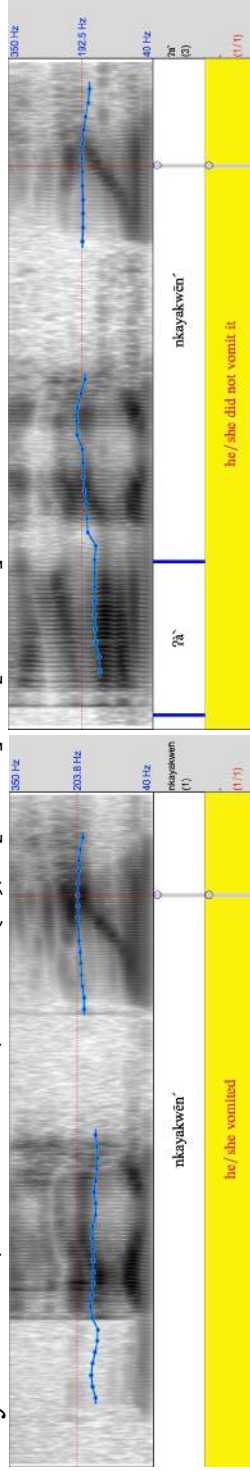
In the example just below, the floating /L/ from ?à` (/L (L)/) does not get realized either, and the linked /L/ tone in the penultimate syllable in *nkasàlò* (/X-L-M/) gets replaced by a /M/ tone. The tonally unlinked mora to the left of the newly linked /M/ tone gets assigned a /M/, just as it is the case for *ntusanè* 'he/she sprays it' /X-X-L (L)/ above. The surface realization pattern for *nkasàlò* is [M-M-M] instead of the expected [L-L-M]:

nkasàlò 'you threw it away' /X-L-M/: [L-L-M] → [M-M-M]

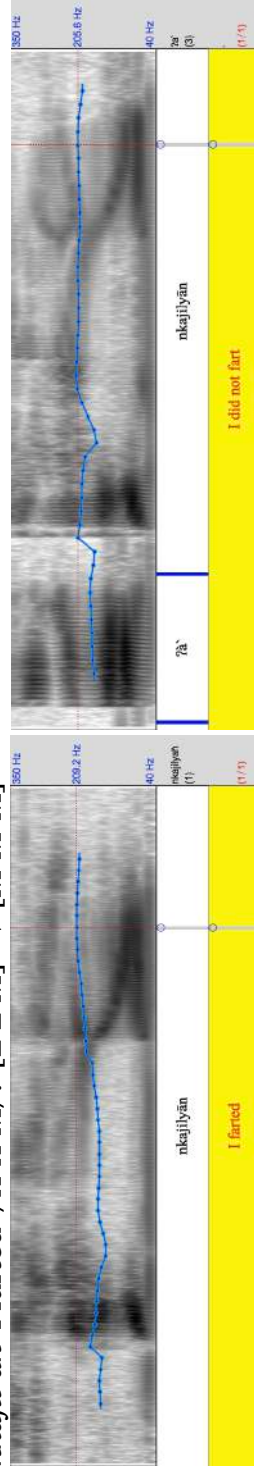


In the next two examples, the floating /L/ from ʔä (/L (L)/) does not get realized either as both tonally unlinked moras in *nkayakwēn'* (/X-X-M/) and in *nkajjɪʔän* (/X-X-M/) are assigned a /M/ tone, resulting in a [M-M-M] surface pattern in both cases:

nkayakwēn' 'he/she vomits it' /X-X-M (H)/: [L-L-M] → [M-M-M]

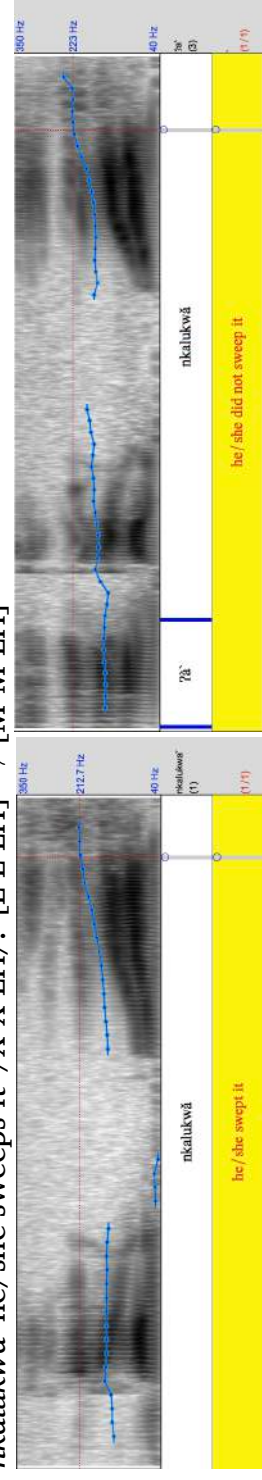


nkajjɪʔän 'I farted' /X-X-M/: [L-L-M] → [M-M-M]

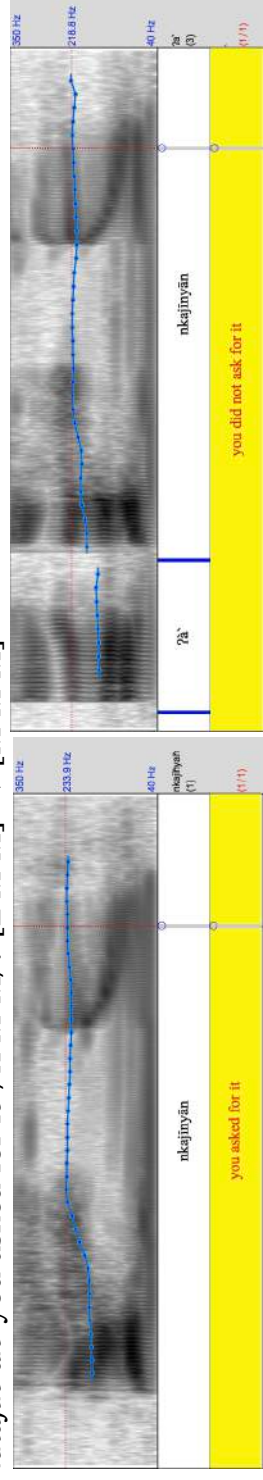


In the next three examples below, the floating /L/ tone from ʔà (/L (L)/) does not get realized either as all tonally unlinked moras in subsequent words are assigned a /M/ tone:

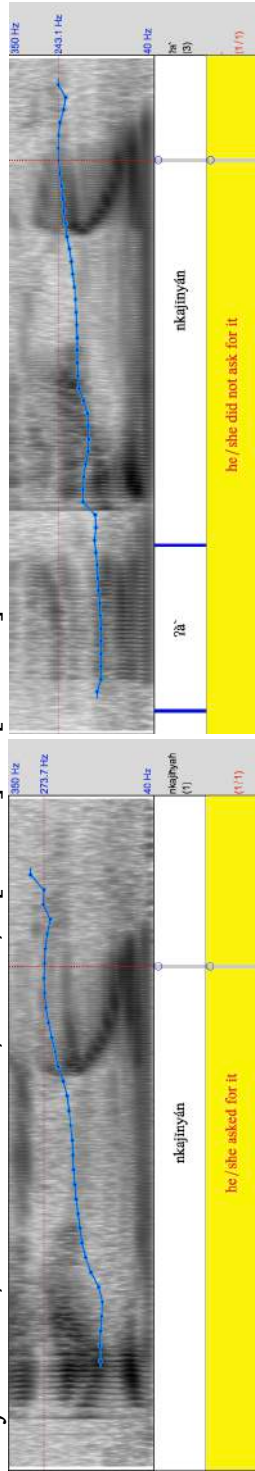
nkalukwǎ 'he/she sweeps it' /X-X-LH/: [L-L-LH] → [M-M-LH]



nkajinʔān 'you asked for it' /X-M-M/: [L-M-M] → [M-M-M]

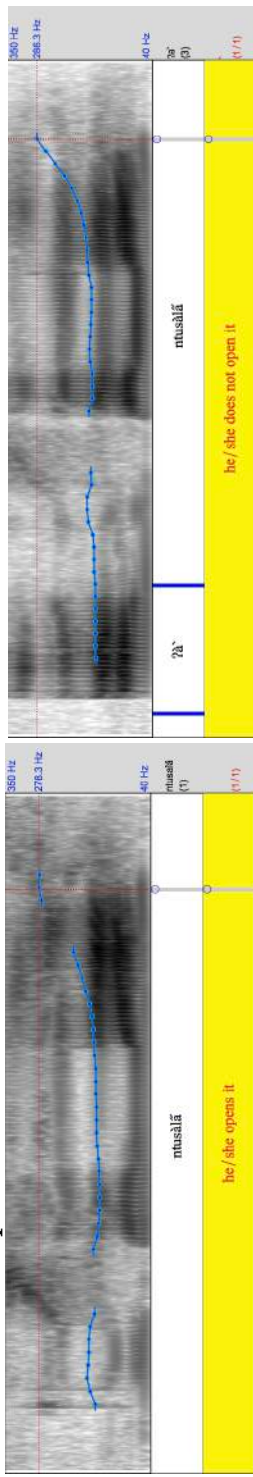


nkajin'án 'he/she asked for it' /X-M-H/: [L-M-H] → [M-M-H]



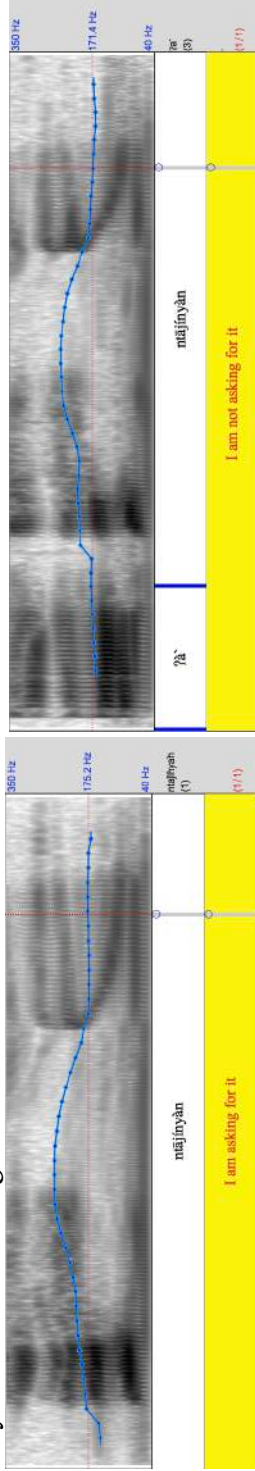
In the example below, the floating /L/ tone from ?à (/L (L)/) does not get realized either and the mora-linked /L/ tone on the penultimate mora of word *ntusàlǎ* /X-L-LS/ stays a /L/ (instead of being replaced by a /M/ as we have seen on other previous examples). Then, the tonally unlinked mora in the antepenultimate syllable is assigned a /M/ tone:

ntusàlǎ 'he/she opens it' /X-L-LS/: [L-L-LS] → [M-L-LS]

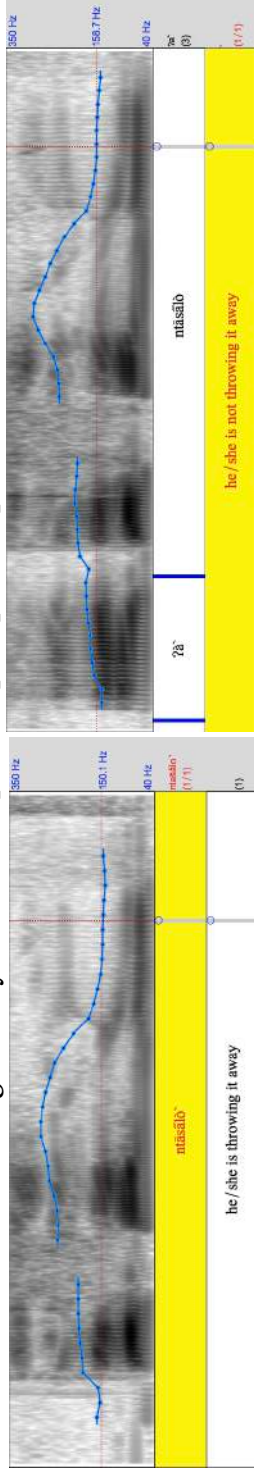


The three pitch tracks below illustrate the expected sandhi patterns according to the 'Preliminary Floating Tone Linking rule 2' as the floating tone does not get realized at all since all the subsequent moras are already linked to a tone:

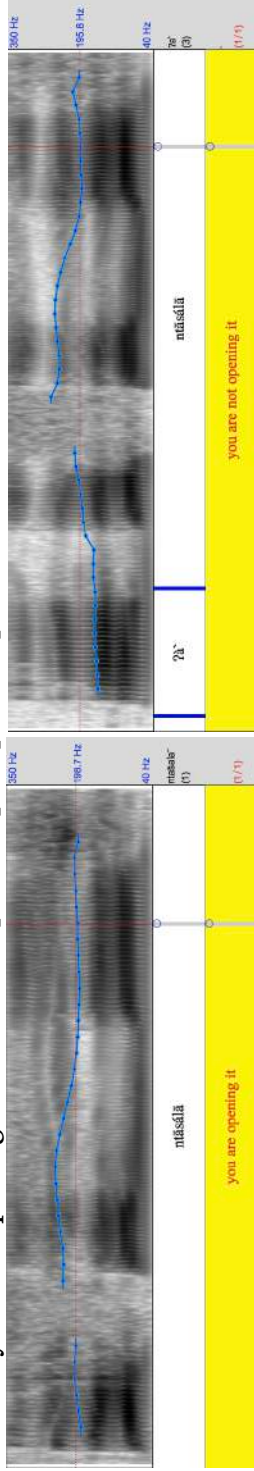
ntājīn'ân 'I am asking for it' /M-M-L/: [M-M-L] → [M-M-L]



ntāsālō 'he/she is throwing it away' /M-LS-L/: [M-LS-L] → [M-LS-L]



ntāsālā 'you are opening it' /M-H-M/: [M-H-M] → [M-H-M]



The data presented in this section showed that the floating /L/ has a completely different behavior than the two other floating tones (/H/ and /LS/) when realized in W2 which have at least one tonally unlinked mora. We saw earlier in section 4.5.2 on page 163 that when W2 are tonally unspecified, the expected pattern arises, i.e. the floating /L/ links to the rightmost mora in the subsequent word, and all the moras to the left of the newly linked tone are assigned a /M/ tone.

We also observed in this section that when W2 have no tonally unlinked moras available, as expected, the floating /L/ does not get realized at all. In order to account for the behavior of the /L/ floating tone in W2 which has at least one tonally unlinked mora, the final floating tone linking rule ought to be stated in separate rules. One rule should be posited to account for the fairly straightforward behavior of floating /H/ and floating /LS/ which is basically the same as 'the Preliminary Floating Tone Linking rule 2', and other separate rules to account for the various sandhi patterns of floating /L/ in different Tone Classes¹⁸. The final version of the Floating Tone Linking rules is formulated in figures 4.32 and 4.33 below:

¹⁸The General Rule for floating /L/ is the same as the Rule for floating /H/ and /LS/

In a sequence of words where W1 hosts a /H/ or a /LS/ floating tone, the floating tone links to the rightmost tonally unlinked mora in W2 (if any available). All moras (if any available) to the left of the newly linked floating tone in W2 are assigned a /M/ tone.

Figure 4.32: Final Floating Tone Linking rule for /H/ and /LS/

General Rule: *In a sequence of words where W1 hosts a /L/ floating tone and W2 belongs to Tone Class 1 (unspecified for tone), the floating tone links to the rightmost mora in W2. All moras to the left of the newly linked floating tone in W2 are assigned a /M/ tone.*

Subrule A: *In a sequence of words where W1 hosts a /L/ floating tone and W2 occurs with Tone Class 2 (/L (LS)/, 3 (/L (L)/, 6 (/L-M/) or 15 (/L-M-L/), the mora-linked /L/ tone gets replaced by a /M/ tone, and all moras (if any available) to the left of the newly linked /M/ tone in W2 are assigned a /M/ tone.*

Subrule B: *In a sequence of words where W1 hosts a /L/ floating tone and W2 occurs with Tone Class 4 (/M (H)/, 5 (/M/), 10 (/M-M/) or 11 (/M-H/), the floating /L/ does not get realized at all, and all tonally unlinked moras to the left of the leftmost mora-linked tone are assigned a /M/ tone.*

Subrule C: *In a sequence of words where W1 hosts a /L/ floating tone and W2 occurs with Tone Class 9 (/L-LS/), the floating tone links to the rightmost tonally unlinked mora in W2 (if any available). All moras (if any available) to the left of the newly linked floating tone in W2 are assigned a /M/ tone.*

Subrule D: *In a sequence of words where W1 hosts a /L/ floating tone and W2 is dimoraic and occurs with Class 7 (/L-M (LS)/, the mora-linked /L/ tone gets replaced by a /M/ tone. If W2 is a trimoraic Tone Class 7, then the surface pattern is the same as Subrule C ([M-L-M]).*

Figure 4.33: Final Floating Tone Linking rules for /L/

4.11.2.4 Formal representation of Linking Rules for floating tones

Figure 4.34 shows a formal representation of the Linking Rule for floating /LS/, and demonstrates all the various linking modes according to word shape. One important fact to notice is that for monomoraic W2 occurring with Tone Class 2 and 3, the floating /LS/ actually links to the final mora which is then linked to two tonal elements. There are very few instances of this phenomenon: these two cases just mentioned here, and also the case of monomoraic Tone Class 12 word, where both tonal elements /M/ and /L/ of the TS /M-M-L/ link to the final mora as shown in the figure 4.34 below.

In figure 4.34, the cells shaded in grey signal the non-occurrence of words of a certain shape with the corresponding Tone Class.

W1	W2				
Floating tone rep.	Class	Tone rep.	Trimoraic	Dimoraic	Monomoraic
/LS/	1	/ /	μ μ μ M M L S	μ μ M L S	μ L S
	2	/L (LS)/	μ μ μ M L S L (LS)	μ μ L S L (LS)	μ Λ L S L (LS)
	3	/L (L)/	μ μ μ M L S L (L)	μ μ L S L (L)	μ Λ L S L (L)
	4	/M (H)/	μ μ μ M L S M (H)	μ μ L S M (H)	μ M (H)
	5	/M/	μ μ μ M L S M	μ μ L S M	μ M
	6	/L-M/	μ μ μ L S L M	μ μ L M	μ L M
	8	/LH/	μ μ μ M L S L H	μ μ L S L H	μ L H
	9	/L-LS/	μ μ μ L S L L S	μ μ L L S	μ L L S
	10	/M-M/	μ μ μ L S M M	μ μ M M	μ M M
	11	/M-H/	μ μ μ L S M H	μ μ M H	μ M H
	12	/M-M-L/	μ μ μ M M L	μ μ M M L	μ Λ M M L
	13	/M-LS-L (L)/	μ μ μ M L S L (L)	μ μ M L S L (L)	μ M L S L (L)
	14	/M-H-M/	μ μ μ M H M	μ μ M H M	μ M H M
	15	/L-M-L/	μ μ μ L M L	μ μ L M L	μ L M L

Figure 4.34: Floating /LS/ linking mode

Figure 4.35 shows a formal representation of the Linking Rule for floating /H/, and demonstrates all the various linking modes according to word shape.

In figure 4.35, the cells shaded in grey signal the non-occurrence of words of a certain shape with the corresponding Tone Class.

W1	W2				
Floating tone rep.	Class	Tone rep.	Trimoraic	Dimoraic	Monomoraic
/H/	1	/ /	μ μ μ M M H	μ μ M H	μ H
	2	/L (LS)/	μ μ μ M H L (LS)	μ μ H L (LS)	μ L (LS)
	3	/L (L)/	μ μ μ M H L (L)	μ μ H L (L)	μ L (L)
	4	/M (H)/	μ μ μ M H M (H)	μ μ H M (H)	μ M (H)
	5	/M/	μ μ μ M H M	μ μ H M	μ M
	6	/L-M/	μ μ μ H L M	μ μ L M	μ L M
	7	/L-M (LS)/	μ μ μ H L M (LS)	μ μ L M (LS)	μ L M (LS)
	8	/LH/	μ μ μ M H L H	μ μ L S L H	μ L H
	9	/L-LS/	μ μ μ H L L S	μ μ L L S	μ L L S
	10	/M-M/	μ μ μ H M M	μ μ M M	μ M M
	11	/M-H/	μ μ μ H M H	μ μ M H	μ M H
	12	/M-M-L/	μ μ μ M M L	μ μ M M L	μ Λ M M L
	13	/M-LS-L (L)/	μ μ μ M L S L (L)	μ μ M L S L (L)	μ M L S L (L)
	14	/M-H-M/	μ μ μ M H M	μ μ M H M	μ M H M
	15	/L-M-L/	μ μ μ L M L	μ μ L M L	μ L M L

Figure 4.35: Floating /H/ linking mode

Figure 4.36 shows a formal representation of the Linking Rules for floating /L/, and demonstrates all the various linking modes according to word shape. One can observe the linking mode for monomoraic Tone Class 1, where both tonal elements /M/ and /L/ link to the final mora. Also, as it was mentioned earlier in this section, when preceded by a word with a /L/ floating tone, a trimoraic word occurring with Tone Class 7, Subrule C applies resulting in a [M-L-M] surface pattern. However, it is worth noting that the mid tone in the antepenultimate syllable is slightly higher than a regular /M/ tone, but not high enough to be a /H/.

W1	W2				
Floating tone rep.	Class	Tone rep.	Trimoraic	Dimoraic	Monomoraic
/L/	1	/ /	μ μ μ M M L	μ μ M L	μ Λ M L
	2	/L (LS)/	μ μ μ M M M (LS)	μ μ M M (LS)	μ M (LS)
	3	/L (L)/	μ μ μ M M M (L)	μ μ M M (L)	μ M (L)
	4	/M (H)/	μ μ μ M M M (H)	μ μ M M (H)	μ M (H)
	5	/M/	μ μ μ M M M	μ μ M M	μ M
	6	/L-M/	μ μ μ M M M	μ μ M M	μ L M
	7	/L-M (LS)/	μ μ μ M L M (LS)	μ μ M M (LS)	μ L M (LS)
	8	/LH/	μ μ μ M M L H	μ μ M L H	μ L H
	9	/L-LS/	μ μ μ M L L S	μ μ L L S	μ L L S
	10	/M-M/	μ μ μ M M M	μ μ M M	μ M M
	11	/M-H/	μ μ μ M M H	μ μ M H	μ M H
	12	/M-M-L/	μ μ μ M M L	μ μ M M L	μ Λ M M L
	13	/M-LS-L (L)/	μ μ μ M L S L (L)	μ μ M L S L (L)	μ M L S L (L)
	14	/M-H-M/	μ μ μ M H M	μ μ M H M	μ M H M
	15	/L-M-L/	μ μ μ M M M	μ μ L M L	μ L M L

Figure 4.36: Floating /L/ linking mode

4.11.3 Phonetic pitch lowering

As far as surface tone realization is concerned, there still exists one phenomenon which ought to be discussed before wrapping up the description of the tonal system: phonetic pitch lowering.

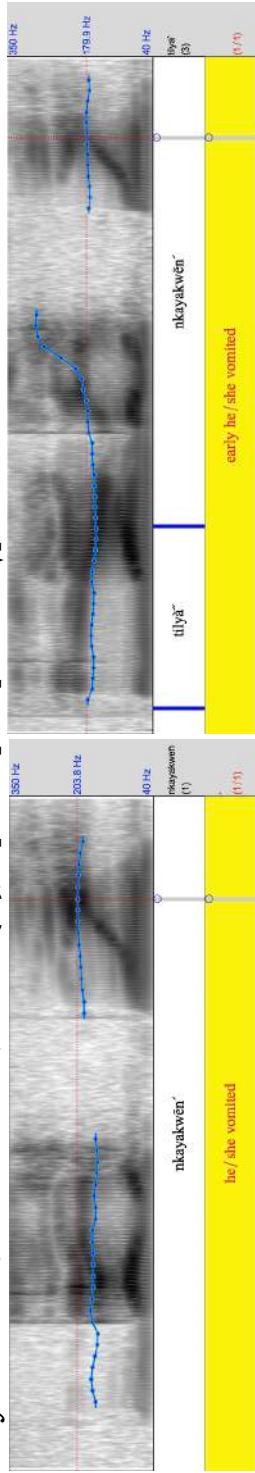
In ZAC, the pitch of each mora associated with a tone directly following a [H] or a [S] gets slightly lowered. This phenomenon affects the tonal domain (which in ZAC is the Word as discussed in chapter 1 §1.6) rather than single tonal element. For example, in the case of a sequence of words where W1 is linked to a /L-LS/ tone, and W2 is linked to a /M-M/ tone, the pitch of the tonal domain after /LS/ gets lowered and surfaces phonetically as [M↓-M↓]. It is important to note that the reference point for the second down arrow in this notation system is the normal /M/ pitch (i.e. not lowered) as phonetic pitch lowering in ZAC does not result in a staircase effect.

This phenomenon does not result in a change in tone category. A lowered /M/ does not become a /L/, and a /H/ does not become a /M/ etc. The pitch levels of the moras in the affected tonal domain just get slightly lowered in that particular environment. The range observed is about 20-40Hz. Also, the lowering effect tends to be more accentuated by preceding /LS/ than by preceding /H/, but this is not always the case. Even if this phenomenon does not affect the tonemic system, it is a phonetic effect that is clearly audible to the (linguist's) trained ear as well as to the language learner's.

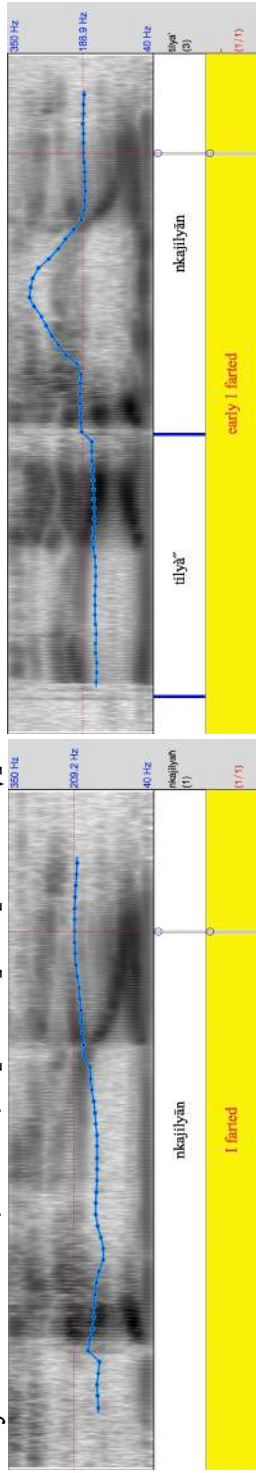
This phenomenon is illustrated by the pitch tracks presented below.

The two pitch tracks below present examples of phonetic pitch lowering of a mora-linked /M/ after a /LS/ tone. If we observe the pitch level of the /M/ tone on the final mora for both examples in isolation, and compare it to the pitch level of that same final mora /M/ in the same word when preceded by a /LS/ tone, one can note a slight difference in pitch levels. The pitch of the mora-linked /M/ tone is lower when preceded by a /LS/ tone than when encountered in isolation.

nkayakwēn 'he/she vomits it' /X-X-M (H)/: [L-L-M] → [M-LS-M↓]

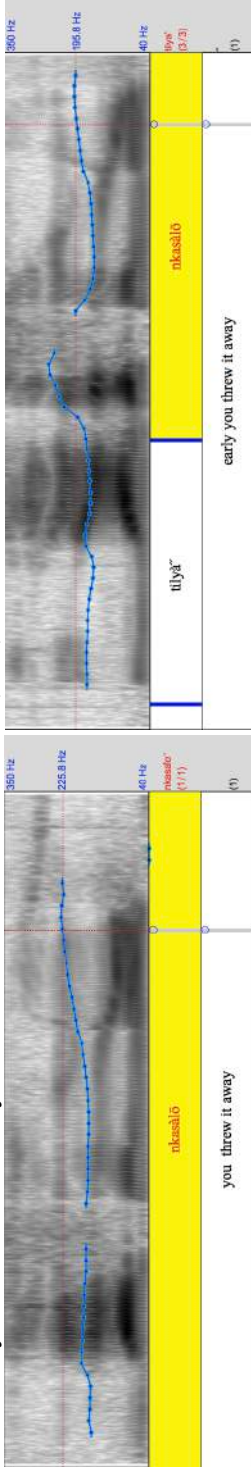


nkajijān 'I farted' /X-X-M/: [L-L-M] → [M-LS-M↓]

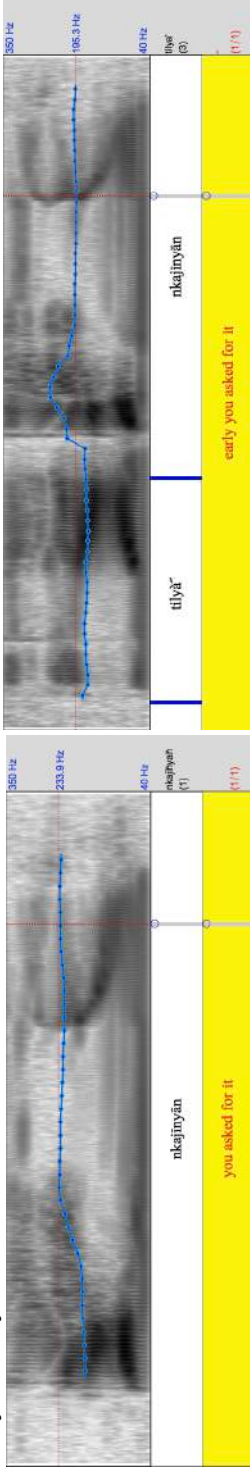


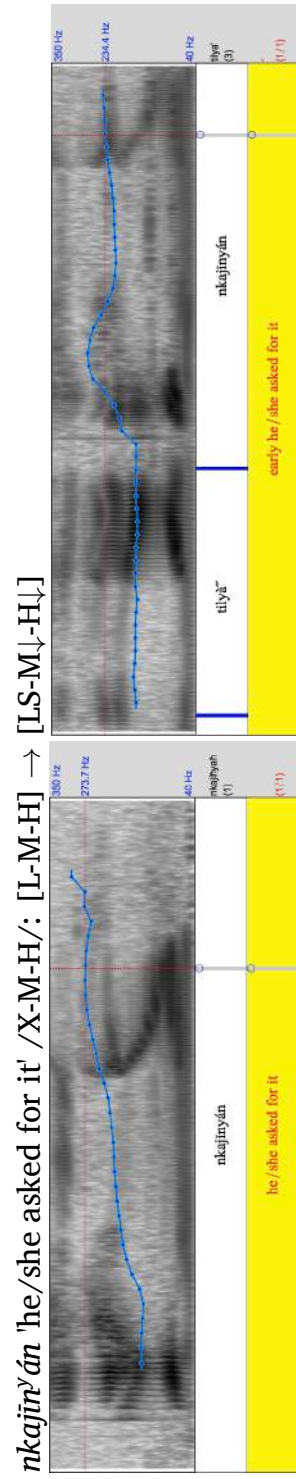
These next pitch tracks show how phonetic pitch lowering affects the entire tonal domain. The target words presented are linked to a tonal sequence including two tonal elements. When the words are preceded by an /LS/ tone, the entire tonal domain including the tonal sequence gets lowered.

nkasàlò 'you threw it away' /X-L-M/: [L-L-M] → [LS-L↓-M↓]



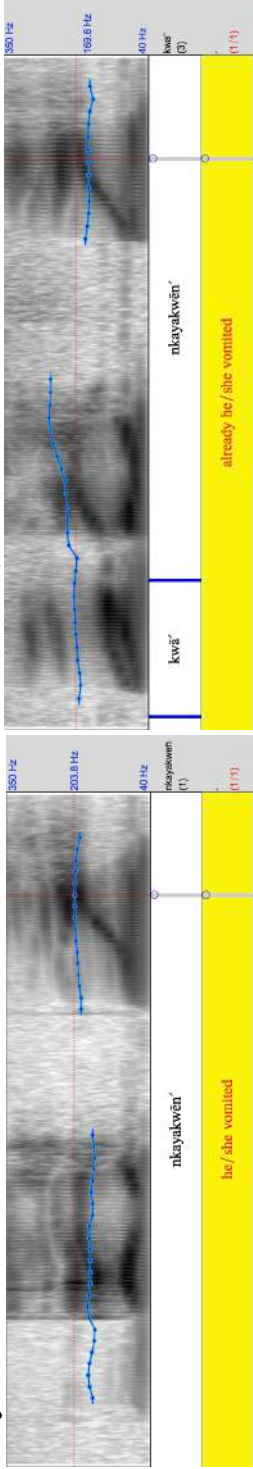
nkajin'ân 'you asked for it' /X-M-M/: [L-M-M] → [LS-M↓-M↓]



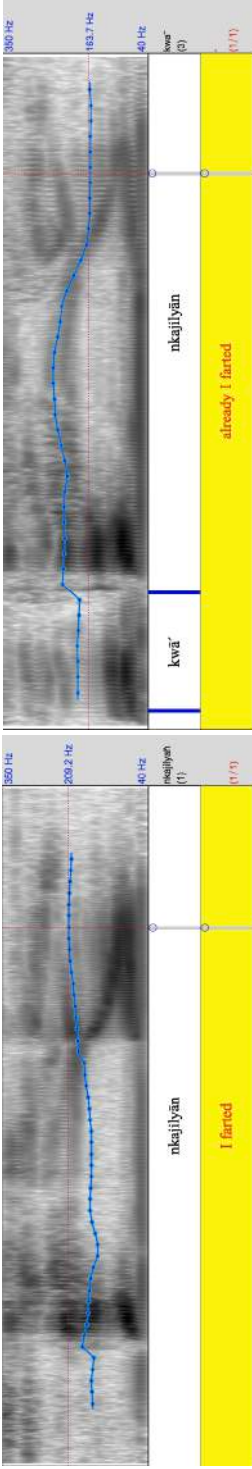


The pitch tracks below show the phenomenon of phonetic pitch lowering when the preceding tone is a /H/ tone instead of an /LS/ tone as presented in preceding examples. A preceding /H/ tone has the same lowering effect on subsequent tonal domains.

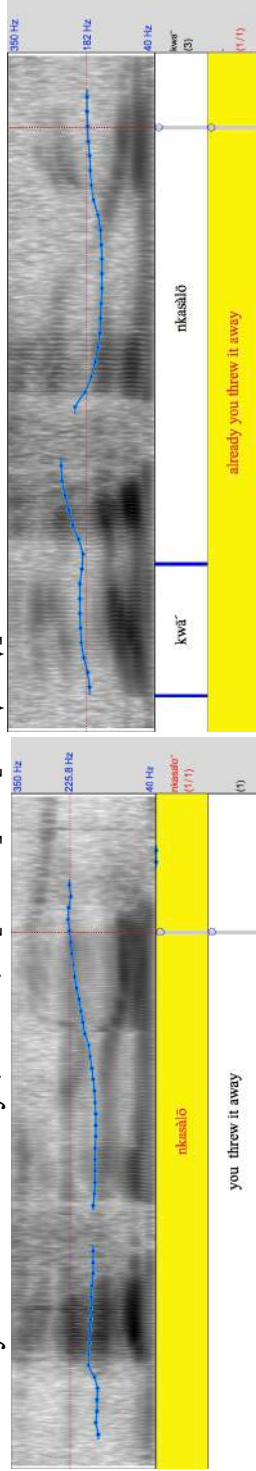
nkayakwēn 'he/she vomits it' /X-X-M (H)/: [L-L-M] → [M-H-M↓]



nkajijān 'I farted' /X-X-M/: [L-L-M] → [M-H-M↓]



nkasálò 'you threw it away' /X-L-M/: [L-L-M] → [H-L↓-M↓]



4.12 Conclusion

This chapter has demonstrated that ZAC's tonal system shows a wide range of tonal phenomena, making it a rich and complex system.

At the phonological level, it presents five mora-linked tones (/L/, /M/, /H/, /LH/ and /LS/) realizing four levels of pitch (Low, Mid, High and Super High), and three floating tones (/L)/, /(H)/, /(LS)/. It also presents moras unspecified for tone. Furthermore, the final pitch of /H/ and /LS/ tones persists into moras unspecified for tone until the end of an utterance (Spreading). Once linked, the High or Super High-ending floating tones also cause Spreading into subsequent tonally unspecified moras.

At the lexical and morphological level, there are fifteen Lexical Tone Classes defined by fifteen TS's hosted by the Word which have different realizations depending on the number of moras in the word. The TS's are morphological entities because some are specialized by part-of-speech, by inflectional category, or loan provenance, while others are open ended and general.¹⁹ Furthermore, it is the identity of the TS, not the tonal elements themselves which determines tonal ablaut pattern and tonal inflectional classes (as is demonstrated in chapter 5). Finally, in the Progressive, the aspect morpheme occurs with a /M/ tone which produces composed tonal melodies of the TS's beyond the extant fifteen TS's.

¹⁹Sequences of tones associated with some grammatical category is familiar within the tradition of africanist studies and more precisely for languages such as Tiv (McCawley J., 1970) and Etung (Edmondson & Bendor-Samuel, 1966).

Typologically, it is unusual to have such a large inventory of tones (five) and so few TS's. Indeed, the only allowed combination of tonal elements occur in fifteen TS's only. The main argument in support of such a large tonal inventory is that the tones actually show (almost) no alternation in sandhi context. A /H/ tone always stays a /H/ tone, a /LS/ is always an /LS/ tone etc. However, the /L/ tone is a little bit trickier because it is mutable when hit by a floating tone (as demonstrated in §4.11.2.3). Moreover, the fact that Spreading is maintained till the end of a utterance seems to be typologically unusual. For example, in Lachíxio Zapotec (Sicoli, 2007) the high tone only spreads till the end of the phonological word, and similarly to ZAC, the /L/ and /M/ tones do not spread.

Furthermore, this work makes important contributions to Chatino tone studies—both at the level of Eastern Chatino, and for Chatino in general. Contrary to most other Chatino varieties, ZAC conserves all non-final syllables of its roots, making it a centerpiece for the Chatino language puzzle as its transparent morphology tells the story of the evolution of more innovative Chatino varieties: beyond simply revealing lost segments/morphemes, it provides polymoraic structures that host clear sequences of tones that are not discernable in the monosyllabic/monomoraic varieties.

Villard and Woodbury (2012) offers typological observations about ZAC's tonal system. Some concepts (some of which are from Hyman (2011)) in table 4.37 are explained below:

ITEM	FEATURE	ZAC
	INVENTORY & ALIGNMENT FEATURES	
1	Lexical tone Classes	15
2	<i>Classes audible in isolation</i>	10
3	Tonal elements	5 + null
4	TBU	mora
5	Tonal Sequences	y
6	Restrictedness	y
7	Tonal Sequences' persistence	y
8	Duality of patterning	emergent
	TONE LINKED ALTERNATIONS	
9	Spreading into toneless TBU's	y
10	Floating tones	y
11	Tone-conditioned tone changes	few
	FUNCTIONAL FEATURES	
12	Word class specialization	y
13	Inflectional specialization	y
14	Provenance specialization	y
15	Unique grammatical function	2s
16	Contributing gram. function	1s; Aspect
	MORPHOLOGICAL FEATURES	
17	Tonal prefixation	M-

Figure 4.37: Summary of tonal typological features (Modified from Villard and Woodbury (2012))

Item 6: Restrictedness (Hyman, 2011): Not all theoretically possible elements sequences occur. There are five tonal elements but only fifteen possible Tonal Sequences.

Item 7: Tonal Sequences persistence (Hyman, 2011): Major Class Tonal Sequences associate with stems regardless of mora length. Even (relatively rare) monomoraic stems show all Major Class TS's (§4.10).

Item 8: Duality of patterning (Hyman, 2011): there is a strong distinction between TS's and tonal elements.

Item 11: Tone-conditioned tone changes: sandhi patterns do not result in tonal changes except in the case of the /L/ floating tone as demonstrated in §4.11.2.3.

Item 12: Word-class specialization: §4.10 discussed all of the fifteen Lexical Tone Classes indicating their prevalence in different areas of the lexicon. It showed how some Tone Classes are restricted or more prevalent in certain areas of the lexicon.

Item 14: Provenance specialization: §4.10 showed how Tone Class 7 is unique to Spanish loans.

Item 17: Tonal prefixation: the progressive aspect morpheme *ntā-* bears a /M/ tone which gets prefixed to verb stems resulting in composed TS's (§5.3.2.1).

Villard and Woodbury (2012) also offers typological observations for other studied Chatino varieties such as Zenzontepec Chatino and other

Eastern Chatino varieties. It demonstrates that the Chatino family as a whole presents a great variety of tonal phenomena. Cross-linguistically, the study of Chatino tone is very valuable because it provides ideal exploration grounds for studying rapidly evolving tonal systems within a single shallow language family. The level of diversity encountered could then be compared to other shallow tonal language families within or outside Mesoamerica.

Chapter 5

Inflectional morphology

5.1 Introduction

This chapter describes the inflectional system of ZAC, an area revealed to be quite complex at the morphological and the morphophonological level. Nevertheless, despite its *prima facie* maze of irregularities, this intricate inflectional system actually presents a high rate of predictability in its segmental (aspect prefixes) and its tonal conjugation Classes.

The data and the analysis presented in this chapter reinforce the claim already made in chapter 4 in §4.10 that the TS's are morphological entities that pertain to simplex words, whereas the tonal elements are phonological entities that pertain to moras (see chapter 4, figure 3.1). Indeed, it is the Tone Class (which corresponds to a specific TS) to which a particular verb belongs that determines tonal ablaut. For example, knowing the Tone Class of a 3s verb form (base), an inalienable noun or a predicative adjective allows for a fairly accurate prediction of the Tone Class for the corresponding 2s form.

This chapter presents the different patterns of inflection (segmental and tonal) for three different parts of speech: the inalienable noun, the

predicative adjective, and the verb. Furthermore, the analysis for segmental inflection in verbs only deals with the four basic aspects (Completive, Progressive, Habitual, and Potential) and does not include stative and imperative mood¹.

It is organized as follows: §5.2 presents some generalities regarding verbal inflection; §5.3 discusses aspectual verbal inflection presenting the prefix Classes and unveiling the tonal conjugation Classes marking aspect; §5.4 describes person marking first for inalienable nouns, followed by predicative adjectives; and finally, §5.4.3 illustrates subject person marking on verbs first discussing 2s, followed by 1s, and ending with a basic account of plural person marking.

5.2 Generalities about verbal inflection

ASP- (CAUS-) (DERIV-) *root* (= SBJ)

Figure 5.1: Simplex Verb template

The simplex Verb minimally consists of a root with an obligatory aspect prefix. In addition to an aspect prefix, a verb may also occur with two possible types of causative prefixes (*u-*, *ix-*) as well as with three possible types of derivational prefixes closest to the root: *t-*, *s-* transitivizer prefixes,

¹The segmental morphology of the completive and potential aspects are used to mark imperative mood.

and *y*- intransitivizing prefix. The root and all the possible prefixes constitute the simplex Word which was first introduced in the tone chapter (chapter 4). The optional plural subject enclitics following the root represented as (=SBJ) in figure 5.1 are a separate phonological entity as they form their own tonal domain, but inflectionally speaking they are part of the simplex Verb.

Verbal inflection in ZAC's consists in prefixation (aspect only), tonal alternation, final vowel nasalization (1s marking) and encliticization (plural persons marking). A particular inflected verb form may show as many as three of these features. Verbs are the only words that inflect for aspect, and the latter is obligatory although for a few verbs (Subclass A_c verbs whose root begins with /h/), the potential marker is zero. Prefixation with or without tonal ablaut marks four categories of aspect: Completive, Progressive, Habitual, and Potential. As a strong head-marking language, the majority of the morphology occurs on the verb which is the head of the clause.

Tonal ablaut, final-vowel nasalization, and encliticization mark subject person.

2s is usually marked by stem tone alternation only, 3s is unmarked, and 1s is marked by nasalization of the final vowel with or without stem tone alternation. All plural subjects are indicated by appending a person clitic to the verb which is represented by the optional (= *subj*) in figure 5.1. Plural person marking generally only consists of encliticization of plural clitics on the 3s stem, although in some cases, it also involves a tonal change as well

as encliticization (§5.4.3.3). As was demonstrated in chapter 4, the simplex word is the natural domain for the TS's. The pronominal enclitics are a separate phonological entity and form their own separate tonal domain. Because the plural clitics are unspecified for tone, their surface tonal pattern is affected by the tone of the verb stem (§5.4.3.3).

Table 5.1 presents an example of a complete verbal paradigm for the verb *-u-lukwǎ* 'to sweep it', Tone Class 8 (/LH/). For the completive, habitual and potential paradigms, the general plural marking rule applies: the plural forms are based on the tone of the 3s stem followed by the plural clitics. For the progressive paradigm, the 3s bears Tone Class 11 which marks 1PLIN, 1PLEX, and 2PL based on the tone of 2s stem which in this case is Tone Class 11 (and actually happens to be the same as 3s).

	COMPL	PROG	HAB	POT
1S	<i>nkalùkwǎn</i>	<i>ntālùkwǎn</i>	<i>ntulùkwǎn</i>	<i>kulùkwǎn</i>
2S	<i>nkalùkwá</i>	<i>ntālùkwá</i>	<i>ntulùkwá</i>	<i>kulùkwá</i>
3S	<i>nkalukwǎ</i>	<i>ntālùkwá</i>	<i>ntulukwà</i>	<i>kulukwà</i>
1PLINCL	<i>nkalukwǎ nan</i>	<i>ntālùkwá nan</i>	<i>ntulukwà nan</i>	<i>kulukwà nan</i>
1PLEX	<i>nkalukwǎ wa</i>	<i>ntālùkwá wa</i>	<i>ntulukwà wa</i>	<i>kulukwà wa</i>
2PL	<i>nkalukwǎ wan</i>	<i>ntālùkwá wan</i>	<i>ntulukwà wan</i>	<i>kulukwà wan</i>
3PL	<i>nkalukwǎ ne?</i>	<i>ntālùkwá ne?</i>	<i>ntulukwà ne?</i>	<i>kulukwà ne?</i>

Table 5.1: Example of a complete verbal paradigm for a Tone Class 8 verb

Pronouns have independent and dependent forms. The plural dependent pronouns are derived from the independent pronouns as shown in table 5.2:

	Independent pronouns	Dependent pronouns
1S	<i>nāā?</i>	(tonal alternation), stem vowel nasalization
2S	<i>nu?win</i>	tonal alternation
3S	<i>yukwi?</i>	
1PLINCL	<i>nan nteē'</i>	(tonal alternation), <i>nan</i>
1PLEX	<i>wa nteē'</i>	(tonal alternation), <i>wa</i>
2PL	<i>nku?wan</i>	(tonal alternation), <i>wan</i>
3PL	<i>yukwi? ne?</i>	<i>ne?</i>

Table 5.2: Independent and dependent subject pronouns

The dependent forms occur mainly with four lexeme classes, verbs, predicative adjectives, inalienable nouns and relational noun *?in* . As subjects, they attach to verbs and predicative adjectives, as possessors, they attach to inalienable nouns or to the relational noun *?in* in alienable possession constructions.

Subject marking may involve as many as two of these three features: vowel nasalization (1s), tonal alternation, and encliticization (plural forms). Syntactically speaking, all of those are markers of the subject argument (as opposed to agreement markers) because in the case where the verb is directly followed by an independent pronoun (subject position) as shown in examples (11) and (13), then the verb shows no person marking (tonal alternation).

When a verb is preceded by an independent pronoun (topic position), then it shows tonal alternation because in this case, the independent pronoun is not a subject but a topic as illustrated in examples (12) and (14).

However, 1s subject marking on verbs is anomalous, because the verb

is marked for person marking through vowel nasalization with or without tonal alternation even when the independent pronoun is placed directly after the verb (in subject slot) as illustrated in examples (15) and (16)

Consequently, for the non-1s person forms, there is no hint of double marking; because as was just demonstrated, the inflectional apparatus is the marker of the argument.

However, for the 1s person forms, nasalization and tonal ablaut remain as argument markers, but the 1s subject pronoun works like an optional, double subject marker (possibly having enclitic status).

(11) nka-lukwǎ yukwi?
 COMPL-sweep he/she
he/she swept

(12) yukwi? nka-lukwǎ
 he/she COMPL-sweep
her/him, he/she swept

(13) nka-lukwǎ nu?win
 COMPL-sweep you(sg)
you(sg) swept

(14) nu?win nka-lūkwa
 you(sg) COMPL-sweep.2s
you(sg), you swept

(15) nka-lùkwǎn nāā?
 COMPL-sweep.1s I
I swept

- (16) nāā? nka-lùkwǎn
 I COMPL-sweep.1s
 me, I swept

The underlying form of the verb stem is quite complex as it involves various morphological elements or *formatives* which are associated to various functions but not necessarily on a 'one-to-one fashion'. For example, the category 1s may be marked with two formatives: final vowel nasalization and tonal ablaut.

To follow is an illustration of the underlying form of a particular 1s progressive verb form. Some of the characteristics presented as part of the underlying form have not been discussed yet (such as the prefix Class), and are treated in this chapter.

ntā-lùkwǎn 'I am sweeping it'

- The verb root' segmental elements: /u-lukwa/
 - *The verb root's Tone Class: [Tone Class 8 (/LH/)]
 - *The verb root's prefix Class: A_u
 - The aspect morpheme' segmental elements: /nta-/
 - The aspect morpheme's tone: /M/
 - Nasal feature of final vowel marking 1s: [+nasal]
 - *Tone Class marking 1s for verb stems in completive aspect with Tone Class 8 is Tone Class 9 (/L-LS/)
- *The tonal ablaut rule replaces the root's inherent Tone Class 8 by Tone Class 9.

Before delving into the subject of conjugation Classes, two very important clarifications about the terminology used in the rest of this chapter ought to be made in order to avoid confusion. The following sections deal with two different types of conjugation classifications. One type of conjugation classification based on the segmental characteristics of the verb stem, and more precisely on which aspect allomorph a specific verb root takes. This conjugation classification is referred to as 'the prefix conjugation Class'. The other type of conjugation classification is based on the tonal characteristics of a particular verb stem, and more precisely, with which Tone Class a verb form occurs. This type of conjugation classification is referred to as 'the tonal conjugation Class'. The prefix conjugation Class determines the segmental aspectual paradigm of a verb whereas the tonal conjugation Class determines the tonal ablaut pattern of a verb. We will see that these two types of conjugations are somewhat independent from each other, but that some relationship between the two can be established when examining tonal ablaut for 1s especially.

5.3 Aspectual verbal inflection

5.3.1 Segmental aspectual conjugation Classes

Aspect is obligatorily marked on simplex verb forms. Considerable allomorphy exists in each category of aspect morphemes. A study by Campbell (Campbell, 2011) extended Kaufman's framework for verbal conjugation Classes of Zapotec languages (Kaufman, 1987) to aspect prefixa-

tion in segmentally conservative Zenzontepec Chatino. Following Kaufman (1987), Campbell (2011) classifies verbs based on which allomorphs of the potential, progressive, habitual, and completive prefixes they select, which is based both on valency as well as the phonological shape of the stem. That study offers extensive historical information and traces back most of the Zenzontepec aspect morphemes to proto-Zapotecan.

Following that study, in Villard (2009), I applied Campbell's analysis to ZAC chatino, and found that ZAC's prefix Classes largely aligned to Zenzontepec prefix Classes (and indirectly also corresponded well with the reconstructions presented in Kaufman (1987)). Indeed, Zenzontepec Chatino and ZAC share a conservative system which conserves nearly all non-final syllables of their roots (including aspect prefixes) allowing for the distinction of conjugation Classes on the basis of stem shape and prefix allomorphy. Just as is the case for Zenzontepec Chatino, in ZAC, the conjugation Classes based on prefix characteristics have functional integrity, especially with respect to causativity, transitivity and intransitivity.

5.3.1.1 Aspect markers

The surface forms of all aspect markers encountered in ZAC are presented in table 5.3:

The following comments about the aspect morphemes presented in table 5.3 will be discussed again later on when presenting actual data illus-

COMP	<i>nku-</i> , <i>nka-</i> , <i>nkwi-</i> , <i>nkay-</i> ~ <i>y-</i>
PROG	<i>ntā</i> , <i>ntī-k-</i>
HAB	<i>ntī-</i> , <i>n-</i> , <i>n-</i> + [LAM]
POT	<i>k-</i> , <i>tʰi-</i> , [LAM], \emptyset

Table 5.3: Aspect allomorphs

trating aspect marking.

They are introduced here despite the fact that the data has not been presented yet, only to give a general idea of their historical origin when available.

In ZAC, all aspect morphemes, except for the potential aspect, present an initial /n/. Zenzontepec Chatino shows very similar aspectual morphemes, and Campbell (2011) states that the origin of this nasal in Chatino may come from a proto-Otomanguean adverb **na* meaning 'now' (including for the completive marker).

Only one aspect morpheme bears a tone, i.e. the progressive morpheme *ntā-* (and its allomorph *ntī*).

The notation [LAM] stands for laminalization, which corresponds to an ancient palatalization process which occurred in ZAC when apico-dental sounds /t, ts, n, l, s/ were preceded by the vowel /i/. This process is not productive anymore but is still visible in potential and habitual verb forms when a root starts with an apico-dental sound and a prefix ends with a vowel /i/ (§2.3.2). Synchronically, [LAM] results in /t, ts, n, l, s/ becoming /t̚, t̚ʃ, ŋ, l̚, ʃ/ respectively.

Furthermore, the *tʰi-* potential marker is also a trace of the historic **ki-* as it is the underlying form for *tʰi-*; *tʰi-* is the result of a dissimilation process when two velar sounds co-occur in a word. This phenomenon may be an ancient phonological rule because the dissimilation does not always occur synchronically. This phenomenon is also found in Yaitepec, another Eastern Chatino variety (Rasch, 2002).

The *ntī-k-* progressive marker seems to be a combination of progressive *ntā-* and potential *k-* morphemes. Since the potential marker *k-* was historically *ki-*, it could be one way to explain why *ntā-* surfaces as *ntī-*, i.e. to satisfy a historic vowel harmony rule across syllables (also encountered in Zenzontepec Chatino (Campbell (2011))). *ntī-* only occurs instead of *ntā-* when the verbal root starts with a *y-* (Prefix Class B_y).

Finally, the *nkay-* and *y-* completive markers freely alternate. The morpheme *nkay-* appears to be a combination of *nka-* + *y-*, which then represents completive double marking. It seems to be losing ground as speakers prefer using just the *y-* morpheme instead.

5.3.1.2 The vowel hierarchy

As we can see in table 5.3, most aspect markers end with vowels. As a great number of ZAC's verb stems also begin with vowels, and ZAC disallows vowel sequences (§2.2.3), one is deleted in hiatus. Which vowel

gets deleted is dictated by the vowel hierarchy presented in figure 5.2²:

$$u > i > a, o$$

Figure 5.2: The vowel hierarchy

There is no need to include /e/ in the hierarchy as there is no morpheme including it, nor there are any verb roots starting with /e/ (see §2.2.1 for the restricted distribution of /e/). The highest ranked vowel is /u/ and the lowest ranked are both /a/ and /o/. The latter are not rankable with respect to one another because they never co-occur in hiatus. /u/ and /o/ do not co-occur in hiatus either because the only *o*-initial roots in the language (only 6 have been encountered) do not take the aspect morpheme *nku-* but instead they take the aspect morpheme *nkay-*

Table 5.4 illustrates the hierarchy presented in figure 5.2:

Prefix	Stem	Verb	Gloss	Ranking
<i>nku-</i>	<i>-ātsá</i>	<i>nkū-tsá</i>	<i>it got split</i>	<i>u > a</i>
<i>nti-</i>	<i>-u-lakwǎ</i>	<i>nt-ulakwǎ</i>	<i>he/she counts it</i>	<i>u > i</i>
<i>nti-</i>	<i>-ātsá</i>	<i>nti-cha</i>	<i>it gets split</i>	<i>i > a</i>
<i>nti-</i>	<i>-oʔo</i>	<i>nti-ʔyo</i>	<i>he/she drinks it</i>	<i>i > o</i>

Table 5.4: Vowel hiatus resolution

5.3.1.3 The aspect prefix Classes

The ZAC aspect prefix Classes and their respective aspect markers are presented in table 5.5.

²ZAC's vowel hierarchy is very similar to Zenzontepec Chatino hierarchy presented in Campbell (2011) except that the Zenzontepec vowel hierarchy includes the vowel /e/

	A			B				C	
	Ac	Au	A2	Bc	Bk	By	B _{post}	Ca	C2
POT	[LAM]	k-	[LAM], k-	[LAM]	ɬ'i-	k-	[LAM]	k-	k-
HAB	<i>nti-</i>	<i>nti-</i>	<i>nti-</i>	<i>nti-</i>	<i>ntɬ'i-</i>	<i>nti-k-</i>	<i>nti-</i>	<i>nti-</i>	<i>nti-</i>
PROG	<i>ntā-</i>	<i>ntā-</i>	<i>ntā-</i>	<i>ntā-</i>	<i>ntā-</i>	<i>nti-k-</i>	<i>ntā-</i>	<i>nky-</i>	<i>nky-</i>
COMPL	<i>nka-</i>	<i>nka-</i>	<i>nkwi-</i>	<i>nku-</i>	<i>nku-</i>	<i>nku-</i>	<i>nku-</i>	<i>nku-</i>	<i>nkay-</i>

Table 5.5: Aspect prefix Classes
(slightly modified from Villard 2009)

Because the completive aspect morpheme is where the most allomorphy occurs, the verb classification takes the completive aspect marker as its basis. By looking at the completive form of the verb, one can get the most precise idea of the prefix Class. However, the prefix Class is not the only characteristic to consider as it is also important to consider the morphemes for the habitual and the potential forms. On the other hand, the habitual morpheme presents the least allomorphy, and most of its surface forms are due to morphophonological processes (dissimilation and haplology), and as a result they are derived from *nti-*, except for the Subclasses B_k and B_y where the underlying habitual form is not solely *nti-* but *nti- *ki-*.

Below table 5.6 roughly describes the characteristics of all aspect prefix Classes. The characteristics of each Class align very well to the characteristics of Zenzontepec Chatino verb Classes presented in Campbell (2011). Furthermore, table 5.6 also shows that these Classes correlate with certain morphological, semantic and argument structure characteristics of the verbs.

Class	Stem characteristics	COMPL	PROG	HAB	POT
A _u	derived <i>u</i> - causative verbs	<i>nka-</i>	<i>ntā-</i>	<i>nti-</i>	<i>k-</i>
A _c	unergative or transitive verbs	<i>nka-</i>	<i>ntā-</i>	<i>nti-</i>	[LAM]
A2	transitive, derived <i>ix</i> - causative verbs and all <i>i</i> - initial	<i>nkwi-</i>	<i>ntā-</i>	<i>nti-</i>	[LAM], <i>k-</i>
B _c	unaccusative verbs	<i>nku-</i>	<i>ntā-</i>	<i>nti-</i>	[LAM]
B _{post}	posture and motion verbs	<i>nku-</i>	<i>ntā-</i>	<i>nti-</i>	[LAM]
B _k	<i>k</i> - initial verb roots mostly unaccusative	<i>nku-</i>	<i>ntā-</i>	<i>nɛ'i-</i>	<i>ɛ'i-</i>
B _y	<i>y</i> - initial verb roots mostly unaccusative	<i>nku-</i>	<i>nti-k-</i>	<i>nti-k-</i>	<i>k-</i>
C _a	unaccusative, <i>a</i> - initial verb roots	<i>nku-</i>	<i>nky-</i>	<i>nti-</i>	<i>k-</i>
C2	unergative or transitive begin in <i>a</i> -, <i>o</i> -, <i>u</i> -	<i>nkay-</i>	<i>nky-</i>	<i>nti-</i>	<i>k-</i>

Table 5.6: Characteristics of the prefix Classes
(slightly modified from Villard 2009)

5.3.1.3.1 Class A

This Class includes both intransitives as well as transitive roots but the latter are far more numerous. Subclass A_u consists of verb roots that are made transitive by adding the causative morpheme *u*-. They each have an intransitive counterpart occurring with the detransitivizer morpheme *-y* in Subclass B_c. Class A verbs share the same aspect markers except for Subclass A2 which take *nkwi-* in the completive. When A_c and A2 stems start with a coronal, the latter gets laminalized because of the *i* of the habitual marker *nti-* or from the historic vowel *i* of the potential marker **ki-*. All *j*-initial roots take a \emptyset marker in the potential because only coronal consonants can get laminalized.

5.3.1.3.1.1 Subclass A_u

By looking at the data presented in example (17) below, one can observe that Subclass A_u verbs represent an exception to the vowel hierarchy presented in figure 5.2. Indeed, in the completive forms, the /a/ from the aspect morpheme remains, and the /u/ from the causative morpheme *u-* gets deleted. This phenomenon is also recorded by Campbell (2011) for Subclass A_u verbs. Furthermore, a couple of verbs present irregularities (which can be explained): *-u-ʔnī* 'do it' and *-u-tāá* 'give it'. The first one takes the *nky-* morpheme which belongs to Subclass C2 (unergative or transitive, begin in *a-, o-, u-*). The second form suffers a common Chatino process of syllable deletion. Haplology often occurs in habitual forms whose verb roots start with /t/. So in this particular case, *nti-u-tāá* → *ntu-tāá* → *n-tāá*.

Furthermore, this work uses similar terminology to Campbell (2011) which calls this derivational pattern the *u-causative* derivation, and uses the terminology *less transitive* and *more transitive (causative)* to refer to derivationally related verb pairs such as Subclasses A_u, B_c, and B_y:

"The ZEN u-causative derivational pattern is just one of several formal manifestations of a system of verb pairs found in Zapotecan languages. Although many verb pairs consist of a syntactically transitive (causative) stem derived from a syntactically intransitive, inchoative stem, some pairs consist of two syntactically transitive verbs where one is more active than the other. Therefore, I use the terminology more transitive versus less transitive, [...] that aligns features such as higher agentivity with higher transitivity, and not solely the number of core arguments of a verb."

Example (17) presents examples of Subclass A_u verbs:

(17)	Subclass A _u verbs	Gloss	Stem	ASP	COMPL	PROG	HAB	POT
				Class				
	count it	-u-lakwǎ	A _u	nka-lakwǎ	ntā-lākǎwǎ	nt-u-lakwǎ	k-u-lakwǎ	
	strain it	-u-tikwǎ	A _u	nka-tikwǎ	ntā-tikwǎ	nt-u-tikwǎ	k-u-tikwǎ	
	sweep it	-u-lukwǎ	A _u	nka-lukwǎ	ntā-lūkǎwǎ	nt-u-lukwǎ	k-u-lukwǎ	
	spray it	-u-sǎnè	A _u	nkā-sǎnè	ntā-sǎnè	ntu-sanè	ku-sanè	
	blow it	-u-la?ǎ	A _u	nka-la?ǎ	ntā-lǎ?ǎ	nt-u-la?ǎ	k-u-la?ǎ	
	bless it	-u-nakwǎn	A _u	nka-nakwǎn	ntā-nakwǎn	nt-u-nakwǎn	k-u-nakwǎn	
	make it	-u-tin'ǎn	A _u	nka-tin'ǎn	ntā-tin'ǎn	nt-u-tin'ǎn	k-u-tin'ǎn	
	raise it	-u-s-akwǎn	A _u	nka-s-akwǎn	ntā-s-ākǎwǎn	nt-u-s-akwǎn	k-u-s-akwǎn	
	close it	-u-t-akǎn?	A _u	nka-t-akǎn?	ntā-t-ākǎn	nt-u-t-akǎn?	k-u-t-akǎn?	
	tie it	-u-s-akǎn?	A _u	nka-s-akǎn?	ntā-s-akǎn?	nt-u-s-akǎn?	k-u-s-akǎn?	
	do it	-u-?nǐ (irreg.)	A _u	nkā-?nǐ	nky-ū?nǐ	nt-u?nǐ	k-u?nǐ	
	transport it	-u-tēn	A _u	nka-tēn	ntā-tēn	nt-u-teèn	k-u-teèn	
	tighten it	-u-sin'ǎn?	A _u	nka-sin'ǎn?	ntā-sin'ǎn?	nt-u-sin'ǎn?	k-u-sin'ǎn?	
	take it down	-u-t-ǐyǎ	A _u	nka-tǐyǎ	nta-tǐyǎ	nt-u-tǐyǎ	k-u-tǐyǎ	
	look for it	-u-ǎnǎn	A _u	nkā-nǎn	ntā-nǎn	nt-ù-nǎn	k-ù-nǎn	
	cut it	-u-sǐyó	A _u	nka-sǐyó	ntā-sǐyó	nt-u-sǐyó	k-u-sǐyó	
	write it	-u-kǎ?ǎn	A _u	nka-kǎ?ǎn	ntā-kǎ?ǎn	nt-u-kǎ?ǎn	k-u-kǎ?ǎn	
	hit it	-u-jǐrǐn	A _u	nka-jǐrǐn	ntā-jǐrǐn	nt-u-jǐrǐn	k-u-jǐrǐn	
	weave it	-u-tǎjlǎ?	A _u	nka-tǎjlǎ?	ntā-tǎjlǎ?	nt-u-tǎjlǎ?	k-u-tǎjlǎ?	
	give it	-u-tǎǎ (irreg.)	A _u	nka-tǎǎ	ntā-tǎǎ	n-tǎǎ	k-u-tǎǎ	

5.3.1.3.1.2 Subclass A_c

Subclass A_c verbs are consonant initial so there is no hiatus resolution occurring. The aspect morphemes appear in their unaltered form for all aspects except for the potential where the morpheme *k-*, historically **ki-*, has disappeared leaving traces of laminalization of the initial consonant when it is a coronal. When the initial consonant is a glottal fricative, the laminalization process does not occur since only coronals can undergo this process. Some verbs are unergative, others transitive. This Subclass usually includes verbs that semantically relate to bodily functions such as 'defecate', 'fart', 'laugh', 'scream' etc. A_c verbs represent a different Subclass from A_u verbs because A_c verbs do not have intransitive counterparts like the A_u verbs. The verb *see it* is irregular because it lost the aspect morpheme in the completive. Furthermore, the verb 'walk' *-taʔan* starts with *t* and undergoes haplology: *nti-taʔan* → *nti-tʰaʔan* → *n-tʰaʔan*.

Example (18) presents examples of Subclass A_c verbs:

(18)	Class A _c verbs		ASP	COMPL	PROG	HAB	POT
	Gloss	Stem	Class				
	slap it	-jìkwán	A _c	nka-jìkwán	ntā-jìkwán	nti-jìkwán?	jìkwán?
	massage it	-jìkwí	A _c	nka-jìkwí	ntā-jìkwí	nti-jìkwí	jìkwí
	swallow it	-jìkwín?	A _c	nka-jìkwín?	ntā-jìkwín?	nti-jìkwín?	jìkwín?
	fart	-jìl'á	A _c	nka-jìl'á	ntā-jìl'á	nti-jìl'á	jìl'á
	defecate	-ticho?	A _c	nka-ticho?	ntā-tichò?	nticho?	ticho?
	ask for it	-jìn'án	A _c	nka-jìn'án	ntā-jìn'án	nti-jìn'án	jìn'án
	borrow it	-jìn'í?	A _c	nka-jìn'í?	ntā-jìn'í?	nti-jìn'í?	jìn'í?
	jump	-jì'akā?	A _c	nka-jì'akā?	ntā-jì'akā?	nti-jì'akā?	jì'akā?
	lick it	-lé?è	A _c	nka-lé?è	ntā-lé?è	nti-lé?è	lé?è
	see it	-nā?ān	A _c (irreg.)	nā?ān	ntā-nā?ān	nti-nā?ān	nā?ān
	confess	-néè	A _c	nka-néè	ntā-néè	nti-néè	néè
	pluck it	-sikwan	A _c	nka-sikwan	ntā-sikwàn	nti-sikwan	sikwan
	catch it	-sìn'i	A _c	nka-sìn'i	ntā-sìn'i	nti-sìn'i	sìn'i
	laugh	-sì'í	A _c	nka-sì'í	ntā-sì'í	nti-sì'í	sì'í
	buy it	-sì'í	A _c	nka-sì'í	ntā-sì'í	nti-sì'í	sì'í
	scream	-sì'iyá	A _c	nka-sì'iyá	ntā-sì'iyá	nti-sì'iyá	sì'iyá
	run	-suná	A _c	nka-suná	ntā-suná	nti-suná	xunà
	walk	-ta?an	A _c	nka-ta?an	ntā-ta?an	n-t'á?an	t'á?an

5.3.1.3.1.3 Subclass A2

Subclass A2 verbs form a separate Subclass within the Class A verbs because they take the completive aspect morpheme *nkwi-*. The majority of these roots have an unusual progressive morpheme which surfaces as *ntī* instead of *ntā-*.

Zenzontepec chatino shows a similar phenomenon in this particular Class except that all the progressive forms belonging to Subclass A2 verbs also present an additional *k-* (potential aspect morpheme) right after the progressive marker. Campbell (2011) explains that "the progressive of these verbs is formed by prefixing the progressive marker onto a verb in the potential".

In ZAC, the majority of the progressive forms occur with the marker *ntī-* as opposed to the usual *ntā-*. The fact that *ntā-* surfaces as *ntī-* may be the result of an ancient vowel harmony rule. The forms may have been historically: **ntā-ki-tāá* → *ntī-ki-tāá* → *ntī-t'āá* (where **ki-* was lost but left a trace of itself with the vowel *i* in the prefix and also with the laminalization of the root).

However, all the roots that include the causative morpheme *ix-* are part of the Subclass A2, and they also occur with the potential marker *k-* in all aspect. Another interesting fact about A2 is that it is the Subclass where there is a tendency for the forms to have the same tone across all aspects. The roots including the causative morpheme *ix-* are examined further in

example (20).

Furthermore, the verbs 'turn it in' *-tāá* and 'look alike' *-tō?ó* start with /t/ and undergo haplology in the habitual: *nti-t'āá* → *n-t'āá* and *nti-t'ō?ó* → *n-t'ō?ó*.

Example (19) presents examples of Subclass A2 verbs:

(19)	Class A2 verbs	Gloss	Stem	ASP	COMPL	PROG	HAB	POT
		<i>change clothes</i>	<i>-tsàʔán</i>	A2	<i>nkwi'-chàʔán</i>	<i>ntā-tsaʔán</i>	<i>nti-chàʔán</i>	<i>chàʔán</i>
		<i>turn it in</i>	<i>-tāá</i>	A2	<i>nkwi-t'āá</i>	<i>nti-t'āá</i>	<i>n-t'āá</i>	<i>t'āá</i>
		<i>look alike</i>	<i>-tōʔó</i>	A2	<i>nkwi-t'ōʔó</i>	<i>nti-t'ōʔó</i>	<i>n-t'ōʔó</i>	<i>t'ōʔó</i>
		<i>get lower</i>	<i>-iʔyā</i>	A2	<i>nkwi-iʔyā</i>	<i>nti-iʔyā</i>	<i>nti-iʔyā</i>	<i>k-iʔyā</i>
		<i>pick it up</i>	<i>-sooʔ</i>	A2	<i>nkwi-xooʔ</i>	<i>ntā-sooʔ</i>	<i>nti-xooʔ</i>	<i>xooʔ</i>
		<i>get widened</i>	<i>-sēén</i>	A2	<i>nkwi-sēén</i>	<i>ntā-sēén</i>	<i>nti-xēén</i>	<i>ki-xēén</i>
		<i>sew it</i>	<i>-s'ikwàn</i>	A2	<i>nkwi-x'ikwàn</i>	<i>nti-x'ikwàn</i>	<i>nti-x'ikwàn</i>	<i>x'ikwàn</i>
		<i>answer</i>	<i>-s'ákwèn</i>	A2	<i>nkwi-x'ákwèn</i>	<i>nti-x'ákwèn</i>	<i>nti-x'ákwèn</i>	<i>x'ákwèn</i>
		<i>leave it</i>	<i>-s-ānú</i>	A2	<i>nkwi-x-ānú</i>	<i>nti-x-ānú</i>	<i>nti-x-ānú</i>	<i>x-ānú</i>
		<i>untie it</i>	<i>-s-atìnʔ</i>	A2	<i>nkwi-x-atìnʔ</i>	<i>nti-x-atìnʔ</i>	<i>nti-x-atìnʔ</i>	<i>x-atìnʔ</i>
		<i>dress it</i>	<i>-ix-akōʔ</i>	A2	<i>nkwi-x-k-akōʔ</i>	<i>nti-x-k-akōʔ</i>	<i>nti-x-k-akōʔ</i>	<i>x-k-akōʔ</i>
		<i>bathe it</i>	<i>-ix-ata</i>	A2	<i>nkwi-x-k-āta</i>	<i>nti-x-k-āta</i>	<i>nti-x-k-āta</i>	<i>x-k-āta</i>
		<i>feed it</i>	<i>-ix-ako</i>	A2	<i>nkwi-x-k-ākó</i>	<i>nti-x-k-ākó</i>	<i>nti-x-k-ākó</i>	<i>x-k-ākó</i>
		<i>scare it</i>	<i>-ix-ütsēn</i>	A2	<i>nkwi-x-k-ütsēn</i>	<i>nti-x-k-ütsēn</i>	<i>nti-k-ütsēn</i>	<i>x-k-ütsēn</i>

As observed in example (19), Subclass A2 includes verb roots occurring with the causative morpheme *ix-* which generally are the causative counterparts of C2 verb roots. By observing the tonal pattern of the causative forms (A2 forms), one can notice that they always surface with the same tone across the board. The causative morpheme *ix-* seems to bear a high tone (at least historically) which sometimes affects the tone of the roots. This can be seen in the verb *bathe it* or *feed it* where the roots are not specified for tone *-ata* and *-ako* respectively, and the 3s completive form surfaces as *nkwixkātá* and *nkwixkākó* where the high tone of *ix-* seems to have spread into the stem giving a tonal pattern of [M-H] on the final moras of verb stem.

Furthermore, all causative forms occur with the potential marker *k-* in all aspects as opposed to just in the progressive for the non-causative A2 verbs presented in example (19) above.

Example (20) presents examples of A2 verbs occurring with causative morpheme *ix-* together with their respective intransitive forms:

(20) **Class A2 verbs with ix-**

Gloss	Stem	ASP	COMPL	PROG	HAB	POT
<i>dress it</i>	<i>-ix-k-akōʔ</i>	A2	nkwi-x-k-akōʔ	nti-x-k-akōʔ	nti-x-k-akōʔ	x-k-akōʔ
<i>get dressed</i>	<i>-akōʔ</i>	C2	nkay-akōʔ	nkay-ākōʔ	ntʔi-kòʔ	k-akòʔ
<i>bathe</i>	<i>-ata</i>	C2	nkay-ata	nkay-àtà	ntʔi-ta	k-ata
<i>bathe it</i>	<i>-x-k-ata</i>	A2	nkwi-x-k-àtà	nti-x-k-àtà	nti-x-k-àtà	x-k-àtà
<i>eat it</i>	<i>-ako</i>	C2	nkay-ako	nkay-ākò	nkay-ako	k-ako
<i>feed it</i>	<i>-ix-ako</i>	A2	nkwi-x-k-ākó	nti-x-k-ākó	nti-x-k-ākó	x-k-ākó
<i>scare it</i>	<i>-ix-k-ütsën</i>	A2	nkwi-x-k-ütsën	nti-x-k-ütsën	nti-k-ütsën	x-k-ütsën
<i>get scared</i>	<i>-ütsën</i>	C2	nkay-ütsën	nkay-ütsën	nt-ütsën`	k-ütsën`
<i>soften it</i>	<i>-ix-kütí</i>	A2	nkwi-x-kütí	nti-x-kütí	nti-x-kütí	x-kütí
<i>get soft</i>	<i>-kütí</i>	B _k	n-kyütí	ntá-kütí	ntʔi-kütí	tʔi-kütí
<i>boil it</i>	<i>-ix-lákwí</i>	A2	nkwi-x-lákwí	nti-x-lákwí	nti-x-lákwí	x-lákwí
<i>get boiled</i>	<i>-lákwí</i>	A2	nku-lákwí	ntá-lákwí	nti-lákwí	lákwí

5.3.1.3.2 Class B

Class B is a large Class which includes consonant-initial (but not all consonant-initial verbs), all y-initial, and generally intransitive verbs. There are three Subclasses of Class B: B_c, B_k, B_{post} and B_y. They take the completive aspect morpheme *nku-* as opposed to *nka-* and *nkwi-* for Class A.

5.3.1.3.2.1 Subclass B_c

Subclass B_c (labelled *c* for *consonant*) includes the less transitive counterparts of the Class A_u verbs³ (the one with consonant initial roots except /k/-initial roots). B_c verbs are inchoative verbs (verbs that reflect a change of state) which are translated as passives in English with the verb *get*, as in *it got swept* where the agent is unknown to the speaker. Also, because Subclass B_c verbs are consonant initial, there is no vowel conflict to be resolved and as a result, the aspect morphemes appear in their full forms.

Example (21) presents examples of Subclass B_c verbs, and example

³This work uses similar terminology as Campbell (2011): *less transitive* and *more transitive*, *causative* to refer to derivationally related verb pairs such as Subclasses A_u, B_c and B_y:

"The ZEN u-causative derivational pattern is just one of several formal manifestations of a system of verb pairs found in Zapotecan languages. Although many verb pairs consist of a syntactically transitive (causative) stem derived from a syntactically intransitive, inchoative stem, some pairs consist of two syntactically transitive verbs where one is more active than the other. Therefore, I use the terminology more transitive versus less transitive, [...] that aligns features such as higher agentivity with higher transitivity, and not solely the number of core arguments of a verb."

(22) presents examples of B_c verbs together with their less transitive counterparts (A_u roots).

(21)	Subclass B _c verbs		ASP	COMPL	PROG	HAB	POT
	Gloss	Stem	Class				
	<i>get counted</i>	-lakwǎ	B _c	nku-lakwǎ	ntā-lākwǎ	nti-l ^y akwǎ	l ^y akwǎ
	<i>get strained</i>	-tikwǎ	B _c	nku-tikwǎ	ntā-tikwǎ	n-t ^y ikwǎ	t ^y ikwǎ
	<i>get swept</i>	-lukwǎ	B _c	nku-lukwǎ	ntā-lūkwǎ	nti-l ^y ukwǎ	l ^y ukwǎ
	<i>get blessed</i>	-nakwǎn	B _c	nku-nakwǎn	ntā-nakwǎn	nti-n ^y akwǎn	n ^y akwǎn
	<i>get cut</i>	-sǐ?yó	B _c	nku-sǐ?yó	ntā-sǐ?yó	nti-xǐ?yó	xǐ?yó
	<i>get peeled</i>	-tūkwǐn?	B _c	nku-tūkwǐn?	ntā-tūkwǐn?	n-t ^y ūkwǐn?	t ^y ūkwǐn?
	<i>get broken</i>	-nu?un	B _c	nku-nu?un	ntā-nū?un	nti-n ^y u?un	n ^y u?un
	<i>escape (irreg.)</i>	-lǎá	B _c	nku-lǎá	ntā-lǎá	ntu-lǎá	l ^y ǎá
	<i>get boiled</i>	-lākwǐ	B _c	nku-lākwǐ	ntā-lākwǐ	nti-l ^y akwǐ	l ^y akwǐ
	<i>get born</i>	-tǐ?in	B _c	nku-tǐ?in	ntā-tǐ?in	n-t ^y ǐ?in	t ^y ǐ?in
	<i>get scraped</i>	-la?à	B _c	nku-la?à	ntā-lǎ?à	nti-l ^y a?à	l ^y a?à
	<i>get shaken</i>	-tsǐkwǐn	B _c	nku-tsǐkwǐn	ntā-tsǐkwǐn	n-chikwǐn	chikwǐn
	<i>get shaken (earth)</i>	-nākwǐn	B _c	nku-nākwǐn	ntā-nākwǐn	nti-n ^y akwǐn	n ^y akwǐn
	<i>get emptied</i>	-laja	B _c	nku-laja	ntā-lājà	nti-l ^y aja	l ^y aja

(22) Subclass B _c and A _u verb pairs		ASP	COMPL	PROG	HAB	POT
Gloss	Stem	Class				
<i>get counted</i>	-lakwǎ	B _c	nku-lakwǎ	ntǎ-lǎkwǎ	nti-l ^y akwǎ	l ^y akwǎ
<i>count it</i>	-u-lakwǎ	A _u	nka-lakwǎ	ntǎ-lǎkwǎ	nt-u-lakwǎ	k-u-lakwǎ
<i>get strained</i>	-tikwǎ	B _c	nku-tikwǎ	ntǎ-tikwǎ	n-t ^y ikwǎ	t ^y ikwǎ
<i>strain it</i>	-u-tikwǎ	A _u	nka-tikwǎ	ntǎ-tikwǎ	nt-u-tikwǎ	k-u-tikwǎ
<i>get swept</i>	-lukwǎ	B _c	nku-lukwǎ	ntǎ-lukwǎ	nti-l ^y ukwǎ	l ^y ukwǎ
<i>sweep it</i>	-u-lukwǎ	A _u	nka-lukwǎ	ntǎ-lukwǎ	nt-u-lukwǎ	k-u-lukwǎ
<i>get blessed</i>	-nakwǎn	B _c	nku-nakwǎn	ntǎ-nakwǎn	nti-n ^y akwǎn	n ^y akwǎn
<i>bless it</i>	-u-nakwǎn	A _u	nka-nakwǎn	ntǎ-nakwǎn	nt-u-nakwǎn	k-u-nakwǎn
<i>get cut</i>	-sǐŋyó	B _c	nku-sǐŋyó	ntǎ-sǐŋyó	nti-xǐŋyó	xǐŋyó
<i>cut it</i>	-u-sǐŋyó	A _u	nka-sǐŋyó	ntǎ-sǐŋyó	nt-u-sǐŋyó	k-u-sǐŋyó
<i>get shaken</i>	-tsǐkwǐn	B _c	nku-tsǐkwǐn	ntǎ-tsǐkwǐn	n-chǐkwǐn	chǐkwǐn
<i>shake it</i>	-u-tsǐkwǐn	A _u	nka-tsǐkwǐn	ntǎ-tsǐkwǐn	nt-u-tsǐkwǐn	k-u-tsǐkwǐn

5.3.1.3.2.2 Subclass B_k

Subclass B_k labelled as such because the roots are /k/-initial. They form a separate Subclass within Class B because they take the potential aspect morpheme *tʰi-* which is actually derived from **ki-*, and results from a dissimilation process between syllables starting with /k/. Despite the fact that the dissimilation process is mostly a phonological matter, B_k is a subcategory for convenience, or ease of analysis. It is a small class of verbs, and the data presented in example (23) is exhaustive.

The habitual morpheme *nti-* surfaces as *ntʰi-* because the habitual is formed by adding the habitual morpheme *nti-* to the potential form, then haplogy deletes the *ti-* as such: 'it gets painted' **nti-ki-kòʔó* → *nti-tʰi-kòʔó* → *n-tʰi-kòʔó*.

Another interesting fact to notice is the haplogy in the completive which is unusual because haplogy in ZAC usually occurs in the habitual forms when the root starts with /t/. The loss of the *ku-* from the completive morpheme *nku-* probably occurs in order to satisfy the dissimilation rule between two *k* initial syllables. As a result *nku-kūnáʔ* 'get lost' → *n-kūnáʔ*. One can note that this dissimilation rule does not occur in the form for *nko-kōʔó* 'get painted'. Furthermore, in the form *nkwaʔan* 'live in the countryside', the /u/ from the completive morpheme *nku-* remains but is moved to the subsequent first syllable of the root: *nku-kaʔan* → *n-kwaʔan*.

Example (23) presents examples of Subclass B_k verbs:

(23) Subclass B_k verbs

Gloss	Stem	ASP	COMPL	PROG	HAB	POT
<i>live in countryside</i>	-kaʔan	B _k	n-kwaʔan	ntā-kāʔàn	ntʔi-kaʔan	ʔʔi-kaʔan
<i>get toasted</i>	-kiʔi	B _k	n-kiʔi	ntā-kīʔi	ntʔi-kiʔi	kiʔi
<i>get painted</i>	-koʔo	B _k	nko-kōʔó	ntā-kōʔó	ntʔi-kòʔó	ʔʔi-kòʔó
<i>get lost</i>	-kūnáʔ	B _k	n-kūnáʔ	ntā-kūnáʔ	ntʔi-kùnáʔ	ʔʔi-kùnáʔ
<i>get soft</i>	-kūtí	B _k	n-kyūtí	ntā-kūtí	ntʔi-kūtí	ʔʔi-kūtí
<i>cool down, hurt</i>	-kūʔwā	B _k	n-kūʔwā	ntā-kūʔwā	ntʔi-kuʔwà	ʔʔi-kuʔwà
<i>itch</i>	-kejen	B _k	n-kejen	ntā-kējèn	ntʔi-kejen	ʔʔi-kejen
<i>cool down, hurt</i>	-kūʔwā	B _k	n-kūʔwā	ntā-kūʔwā	ntʔi-kuʔwà	ʔʔi-kuʔwà

5.3.1.3.2.3 Subclass B_{post}

Subclass B_{post} is labelled as such because it mostly includes posture or motion verbs. So this Subclass is separated from subclass B_c solely on a semantic basis. Because most roots start with /t/ the habitual forms have undergone haplogy but the initial coronal still surfaces laminalized from the /i/ of habitual morpheme *nti-*. Furthermore, the first two verbs presented in example (24) below show unusual progressive forms which include the prefix *tā-* right after the completive aspect prefix *nku-*. This *tā-* prefix has not been encountered in any other forms and its origin is unknown, although one may easily and logically speculate that it actually comes from the progressive prefix *ntā-*.

Example (24) presents examples of Class SubClass B_{post} verbs:

(24) Subclass B _{post} verbs		Stem	ASP	COMPL	PROG	HAB	POT
Gloss			Class				
lay down (in bed)		-suti	B _{post}	nku-suti	nku-tā-sūtí	nti-xuti	xuti
lay down (on ground)		-sukwa	B _{post}	nku-sukwà	nku-tā-sūkwà	nti-xukwà	xukwà
sit down (off the ground)		-tukwà	B _{post}	nku-tukwà	ntā-túkwà	n-t'ukwà	t'ukwà
arrive there (not base)		-tyàà	B _{post}	nkū-tyàà	ntā-tyàà	n-tyaà	tyaà
arrive there (base)		-tyààn	B _{post}	nkū-tyààn	ntā-tyààn	n-tyaàn	tyaàn
fly off		-tākwí	B _{post}	nku-tākwí	ntā-tākwí	n-t'ākwí	t'ākwí
go there (not base) (irreg.)		-taʔan/-aa	B _{post}	yāa	---	n-t'aʔan	tʂaa
get hung		-tūkwí	B _{post}	nku-tūkwí	ntā-tūkwí	n-t'ūkwí	t'ūkwí
fall		-tūʔó	B _{post}	nku-tūʔó	ntā-tūʔó	n-tūʔó	tūʔó
turn around		-tūʔō	B _{post}	nku-tūʔō	ntā-tūʔō	n-tūʔō	tūʔō
stand		-tuūn'	B _{post}	nku-tuūn'	ntā-tuūn	n-t'uūn'	nt'uūn'
go out		-tōʔó	B _{post}	nko-tōʔó	ntā-tōʔó	n-t'ōʔó	t'ōʔó

5.3.1.3.2.4 Subclass B_y

Subclass B_y is labelled as such because all its verb roots start with /j/. In fact, all the y-initial roots in ZAC belong to Subclass B_y. Many of the roots are the less transitive counterparts of the other derivationally derived roots from Subclass A_u. Some roots are y-initial but are not members of the derivational pairs A_u / B_y. /j/ conflicts with the vowel /u/ in the completive aspect morpheme so this Subclass only offers an altered form of *nku-* as *nk-*.

The progressive is formed by adding the progressive marker *ntā-* to the potential forms. Again, a vowel harmony process occurs in these forms and *ntā-* surfaces as *ntī-* as in 'get looked for' *ntī-k-y-ānán* from **ntā-ki-y-ānán*.

The habitual forms are also formed by adding the habitual marker *nti-* to the potential forms. Despite the fact that the roots do not start with /t/ (which is generally the trigger for haplology), the habitual forms undergo haplology and the habitual morpheme surfaces as *n-* only.

The segmentation of y- in the first five examples in (25) is based on the alternation presented next in example (26).

Example (25) presents examples of Subclass B_y verbs:

(25)	Subclass B _y verbs								
	Gloss	Stem	ASP	COMPL	PROG	HAB	POT		
	<i>get opened</i>	-y-àlá	B _y	nk-y-àlá	ntí-k-y-àlá	n-k-y-àlá	k-y-àlá		
	<i>get turned off</i>	-y-uwí?	B _y	nk-y-uwí?	ntí-k-y-uwí?	n-k-y-uwí?	k-y-uwí?		
	<i>get looked for</i>	-y-àńán	B _y	nk-y-àńán	ntí-k-y-àńán	n-k-y-àńán	k-y-àńán		
	<i>get tied</i>	-y-akǎn?	B _y	nk-y-akǎn?	ntí-k-y-akǎn?	n-k-yakǎn?	k-y-akǎn?		
	<i>get threshed</i>	-y-ùkwá?	B _y	nk-y-ùkwá?	ntí-k-y-ùkwá?	n-k-yùkwá?	k-y-ùkwá?		
	<i>sneeze</i>	-yǎjá	B _y	nk-yǎjá	ntí-k-yǎjá	n-k-yǎjá	k-yǎjá		
	<i>become</i>	-yaa?	B _y	nk-yaa?	ntí-k-yaa?	n-kyaa?	k-y-aà?		
	<i>enter</i>	-yatén	B _y	nka-yatén	ntí-k-yatén	n-k-yatén	k-yatén		
	<i>arrive</i>	-yālā	B _y	nk-yālā	ntí-k-yālā	n-kyalà	k-yalà		
	<i>stay</i>	-yānú	B _y	nk-yānú	ntí-k-yānú	n-k-yānú	k-yānú		
	<i>lighten</i>	-yūwí	B _y	nk-yūwí	ntí-k-yūwí	n-k-yūwí	k-yūwí		

Some B_y verbs are the less transitive counterparts of A_u roots. The verbs *-yaā?* 'become', *-yatěn* 'enter', and *-yānú* 'stay' are cognate with the Zenzontepec Chatino's forms, *-yāá?* 'to be made', *-y-atěn* 'enter', and *-y-ánō* 'stay', and Campbell (2011) offers a clear explanation of these derivationally related pairs which is also valid for ZAC data: "These pairs are equipollent, since their more transitive and less transitive stems are both derived by prefixes on uninflectable roots. The more transitive verb is derived by a transitivizing prefix, either *t-* or *s-*, on a root that begins in either *a* or *u*. The transitivizer in turn is often preceded by the causative *u-*. Like other *u-*causatives, the more transitive verbs derived in these pairs fall into Subclass A_u . The Subclass B_y , less transitive verb stems of these pairs are formed by adding an intransitivizing prefix *y-* to the root."

Example (26) presents examples of these pairs showing the *y-/u-t-* and *y-/u-s-* derivations:

(26) B_y and A_{u_i} verbs		Stem	ASP	COMPL	PROG	HAB	POT
Gloss			Class				
get opened	-y- <i>ālá</i>	B_y	nk-y- <i>ālá</i>	nti-k-y- <i>ālá</i>	n-k-y- <i>àlá</i>	k-y- <i>àlá</i>	
open it	-u-s- <i>ālá</i>	A_{u_i}	nka-s- <i>ālá</i>	ntā-s- <i>ālá</i>	nt-u-s- <i>àlá</i>	k-u-s- <i>àlá</i>	
get turned off	-y- <i>uwĩ</i>	B_y	nk-y- <i>uwĩ</i>	nti-k-y- <i>uwĩ</i>	n-k-y- <i>uwĩ</i>	k-y- <i>uwĩ</i>	
turn it off	-u-s- <i>uwĩ</i>	A_{u_i}	nka-s- <i>uwĩ</i>	ntā-s- <i>uwĩ</i>	ntu-s- <i>uwĩ</i>	k-u-s- <i>uwĩ</i>	
get looked for	-y- <i>ānán</i>	B_y	nk-y- <i>ānán</i>	nti-k-y- <i>ānán</i>	n-k-y- <i>ànán</i>	k-y- <i>ànán</i>	
look for it	-u- <i>ānán</i>	A_{u_i}	nkā-nán	ntā-nán	nt-ù-nán	k-ù-nán	
get tied	-y- <i>akǎn?</i>	B_y	nk-y- <i>akǎn?</i>	nti-k-y- <i>akǎn?</i>	n-k-y- <i>akǎn?</i>	k-y- <i>akǎn?</i>	
tie it	-u-s- <i>akǎn?</i>	A_{u_i}	nka-s- <i>akǎn?</i>	ntā-s- <i>akǎn?</i>	nt-u-s- <i>akǎn?</i>	k-u-s- <i>akǎn?</i>	
get threshed	-y- <i>ükwá?</i>	B_y	nk-y- <i>ükwá?</i>	nti-k-y- <i>ükwá?</i>	n-k-y- <i>ükwá?</i>	k-y- <i>ükwá?</i>	
thresh it	-u-s- <i>ükwá?</i>	A_{u_i}	nka-s- <i>ükwá?</i>	ntā-s- <i>ükwá?</i>	nti-xükwá?	xükwá?	
get burned	-y- <i>akìn'</i>	B_y	nk-y- <i>akìn'</i>	nti-k-y- <i>akìn'</i>	nk-y- <i>akìn'</i>	k-y- <i>akìn'</i>	
burn it	-u-t- <i>akìn'</i>	A_{u_i}	nka-t- <i>akìn'</i>	ntā-t- <i>akìn'</i>	nt-u-t- <i>akìn'</i>	k-u-t- <i>akìn'</i>	

5.3.1.3.3 Class C

Class C includes transitive and intransitive roots. It distinguishes itself from the other Classes A and B by taking the progressive marker *nky-*. Subclass C_a only includes intransitive roots and *a*-initial roots which in the completive aspect all take the marker *nku-*. Subclass C2 roots are also all vowel-initial (*a, o, u*) but take the marker *nkay-* in the completive, and only includes transitive verbs.

Despite the fact that the progressive marker *nky-* lacks a vowel, the /M/ tone of the progressive marker (like in *ntā-*) seems to be present. Indeed, most progressive forms in example (27) are composed TS's combining a /M/ tone linked to the penultimate mora with the inherent tone of the root linked to the final mora of the stem.

5.3.1.3.3.1 Subclass C_a

Subclass C_a verbs are all intransitive inchoative verbs. Some of them have more transitive counterparts which are part of the Subclass A_{ii}. The verb 'to die' *-aji* is very irregular because the completive form uses the root *-ujwi* 'kill it', the progressive marker is *ntī-* instead of *nky-*, and finally the potential form undergoes Progressive Laryngeal Harmony and surfaces as *kaja* instead of *kaji*.

Also, the habitual form of the verb 'to be' is actually a stative form so the *l-* is not an allomorph of the habitual aspect morpheme.

Example (27) presents examples of Subclass C_a verbs:

(27)	Subclass C _a verbs	Gloss	Stem	ASP	COMPL	PROG	HAB	POT
		<i>die</i>	- <i>aji</i>	Class C _a (<i>irreg.</i>)	nkū-jwī	nti-jà	nti-ji	k-aja
		<i>be</i>	- <i>akā'</i>	C _a (<i>irreg.</i>)	nkw-ā'	nky-ākā'	l-akà	k-akà
		<i>be born</i>	- <i>alá</i>	C _a	nkū-lá	nky-álá	nti-l'ya	k-ala
		<i>get broken</i>	- <i>ātsá</i>	C _a	nkū-tśá	nky-ātsà	nti-cha	k-atsa
		<i>rot</i>	- <i>akwī</i>	C _a	nku-kwī	nky-ākwī	n't'i-kwī	k-akwī
		<i>ripen</i>	- <i>āwēn</i>	C _a	nkū-wēn	nky-āwēn	n't'i-wen	k-awen
		<i>grow</i>	- <i>alō</i>	C _a	nko-lō	nky-ālō	nti-l'ò	k-alō
		<i>explode</i>	- <i>atsō</i>	C _a	nkō-tsō	nky-ātsò	nti-cho	k-atso
		<i>get wet</i>	- <i>atsā?</i>	C _a	nkū-tsā?	nky-ātsà?	nti-cha?	k-atsa?
		<i>drip</i>	- <i>akwā?</i>	C _a	nkū-kwā?	nkyā-kwà?	nti-kwa?	k-akwa?
		<i>get cooked</i>	- <i>akě?</i>	C _a	nku-kě?	nky-ākě?	n't'i-kè?	k-akè?
		<i>grow old</i>	- <i>asō?</i>	C _a	nko-sō?	nky-āsō?	nti-xò?	k-asò?
		<i>get distinguished</i>	- <i>atàkán?</i>	C _a (<i>irreg.</i>)	nku-tàkán?	----	n-t'ákán?	k-at'ákán?

5.3.1.3.3.2 Subclass C2

Subclass C2 roots are all transitive (except 'to cry' and 'get scared'). They are all vowel-initial (*a, o, u*). They take the same aspect morphemes as Subclass C_a except for the completive where they show an alternation with *nkay-* and *y-*. Speakers tend to prefer using the shorter form using *y-* but both forms are in free alternation with *nkay-* loosing ground.

The verb 'to vomit it' is irregular in the progressive *ntʰi-kwèn* because *nti-* surfaces as *ntʰi-* without any trigger for laminalization (preceding vowel /i/). Furthermore, the verb *to grind it* also presents some irregularities in the progressive where it takes the morpheme *nty-* instead of *ngy-*, and in the habitual the palatal glide gets inserted between the aspect morpheme and the root as in *nti-y-oð*.

Example (28) presents examples of Subclass C2 verbs:

(28)	Subclass C2 verbs									
	Gloss	Stem	ASP	COMPL	PROG	HAB	POT			
	<i>play it (music)</i>	-ulǎ	C2	nka-y-ulǎ	nky-ūlǎ	nt-ulǎ	k-ulǎ			
	<i>hear it</i>	-ūnǎ	C2	nka-y-ūnǎ	nky-ūnǎ	nt-unǎ	k-unǎ			
	<i>cry</i>	-unǎ	C2	nka-y-unǎ	nky-ūnǎ	nt-unǎ	k-unǎ			
	<i>bathe</i>	-ata	C2	nka-y-ata	nky-ātà	nti-tʼa	k-ata			
	<i>kill it</i>	-ūjwǐ	C2	nka-y-ūjwǐ	nky-ūjwǐ	nt-ujwǐ	k-ujwǐ			
	<i>get scared</i>	-ūtsēn	C2	nka-y-ūtsēn	nky-ūtsēn	nt-utsēn	k-utsēn			
	<i>vomit it</i>	-akwēn' (irreg.)	C2	nka-y-akwēn'	nky-ākwen'	nt'i-kwēn'	k-akwēn'			
	<i>eat it</i>	-ako	C2	nka-y-ako	nky-ākò	nky-ako	k-ako			
	<i>grind it</i>	-oō' (irreg.)	C2	nka-y-oō'	nty-òò'	nti-y-oò'	k-oò'			
	<i>drink it</i>	-o?ò	C2	nka-y-o?ò	nti-?ò	nky-alò	k-o?ò			
	<i>sell it</i>	-ujwǐ?	C2	nka-y-ujwǐ?	nky-ūjwǐ?	nt-ujwǐ?	k-ujwǐ?			

5.3.1.4 Conclusion

ZAC shows a fairly regular verbal system despite a *prima facie* maze of allomorphy in the aspect markers. Almost all surface allomorphy can be explained by morphophonological processes such as haplology and vowel harmony. As expected, the most irregular verbs are the high frequency roots such as *want, like, speak, be* etc., and also all the deictic motion verbs. The ZAC prefix Classes reflect older patterns of inflectional and derivational prefixation, and correlate with valency (especially causativity).

Table 5.7 shows how the database counting 218 simplex roots is divided among the Classes and Subclasses. It shows that Class B is the largest Class, and Class C the least populated:

A			B				C		Total
88			95				35		
<i>A_c</i>	<i>A_u</i>	<i>A₂</i>	<i>B_c</i>	<i>B_{post}</i>	<i>B_k</i>	<i>B_y</i>	<i>C_a</i>	<i>C₂</i>	
28	57	14	14	19	10	41	15	20	218

Table 5.7: Prefix Classes statistics

Despite the high functional load of tone in ZAC in general (tone has both a lexical and grammatical function), aspect is almost never solely marked by tone. One prefix Class does present exceptions to this tendency. Subclass *B_y* often has the same forms for the completive and the habitual aspects because of the fact that all its verb roots start with *y-* which conflicts with the vowel in the aspect morphemes so the completive morpheme *nku-* surfaces as *nk-* giving forms such as *nkyālá*. The habitual forms are formed

by adding the habitual marker *nti-* to the potential forms. Despite the fact that the roots do not start with *t* (which is generally the trigger for haplology), the habitual forms undergo a similar process of segmental deletion, and the habitual morpheme surfaces as *n-* only, giving forms such as *nkyàlǎ́*. Both forms end up being the same segmentally and differing solely in the tone.

When the data presented in this section is reviewed again, but this time examining tonal patterns for each prefix Class, it shows that prefix-defined and tone-defined conjugational Classes are largely independent from each other. Indeed, prefixation and tonal patterns each define conjugational Classes—but they do so largely separately.

One exception to this fact is found in Subclass A2 which shows a clear correlation between tonal characteristics and prefix Class. This was demonstrated and discussed in examples (19) and (20).

As was observed in examples (19) and (20), Subclass A2 includes verb roots occurring with the causative morpheme *ix-*. The tonal pattern of the causative forms always surface with the same tone across aspects. The morpheme *ix-* seems to bear a high tone (at least historically) which may affect the tonal pattern of the roots.

In the sections to follow, this question of orthogonality between the prefix Classes and the tonal patterns is examined further.

5.3.2 Tonal aspectual conjugation Classes

We have seen in the previous section that ZAC groups verbs into three main prefix Classes based on which completive aspect marker a verb root selects, and secondarily, its marking for other aspects. As a result the segmental aspectual paradigm of a verb can be fairly accurately predicted by looking at which aspect morpheme a particular root selects for the 3s completive form. This section shows that ZAC also classifies conjugations based on the tone pattern marking aspect, and more precisely the Tone Class for the 3s completive form. Thus, the tonal paradigm of a verb for all aspects can be narrowed down by looking at which Tone Class a particular root occurs with in the 3s completive aspect.

The potential and habitual tonal conjugation pattern, i.e. the pattern that holds from one element in a paradigm to another, is always the same, and since the aspect prefixes for these aspects do not bear a tone, the roots are never tonally disturbed due to aspect prefixation. As a result, in the data presented in the examples to follow, the Tone Class for the habitual and potential forms is marked only once (just after the potential forms).

On the other hand, the tone pattern for the completive and progressive forms is also generally (underlyingly) the same but because the progressive aspect prefix bears a mid tone, the surface tonal patterns of progressive forms are different from the completive forms, and in some cases the progressive surface pattern is not among the fifteen TS's that define the fifteen Tone Classes. These particular tonal patterns are composed TS's because

they consist of a /M/ tone prefixed to a stem with a completive tonal pattern.

Below is an example of a complete verbal paradigm for the verb *-ulukwǎ* 'to sweep it', Tone Class 8 (/LH/), which was already presented in §5.2, but is included here again for convenience:

	COMPL	PROG	HAB	POT
1S	<i>nkalùkwǎn</i>	<i>ntālùkwǎn</i>	<i>ntulùkwǎn</i>	<i>kulùkwǎn</i>
2S	<i>nkalùkwá</i>	<i>ntālùkwá</i>	<i>ntulùkwā</i>	<i>kulùkwā</i>
3S	<i>nkalukwǎ</i>	<i>ntālùkwá</i>	<i>ntulukwà</i>	<i>kulukwà</i>
1PLINCL	<i>nkalukwǎ nan</i>	<i>ntālùkwá nan</i>	<i>ntulukwà nan</i>	<i>kulukwà nan</i>
1PLEX	<i>nkalukwǎ wa</i>	<i>ntālùkwá wa</i>	<i>ntulukwà wa</i>	<i>kulukwà wa</i>
2PL	<i>nkalukwǎ wan</i>	<i>ntālùkwá wan</i>	<i>ntulukwà wan</i>	<i>kulukwà wan</i>
3PL	<i>nkalukwǎ ne?</i>	<i>ntālùkwá ne?</i>	<i>ntulukwà ne?</i>	<i>kulukwà ne?</i>

Table 5.8: Example of a complete verbal paradigm for a Tone Class 8 verb

5.3.2.1 Composed TS's in progressive verb forms

Some progressive tonal patterns can be accounted for among the inventory of the fifteen Tone Classes. For example, Tone Class 12 (/M-M-L/) often occurs on progressive forms whose 3s completive tonal pattern is Tone Class 1 (unspecified for tone); or Tone Class 13 (/M-LS-L (L)/) often occurs on progressive forms whose 3s completive tonal pattern is Tone Class 3 (/L (L)/). However, Tone Class 12 and Tone Class 13 are not exclusive to the progressive aspect marking because they are also encountered in other parts of speech such as noun, adverbs or adjectives (although somewhat rare). One may speculate that this tonal composition process may be how

new tonal Classes arose in the lexicon. Some TS's originated as composed tonal patterns which spread to other parts of speech in the lexicon and as a result became lexicalized over time.

One progressive tonal pattern (Tone Class 14 (/M-H-M/)) is accounted for among the fifteen Lexical Tone Classes but is generally exclusive to 2s progressive forms whose 3s completive tonal pattern is Tone Class 11 (/M-H/). This shows that ZAC presents inflectional specialization because a tonal Class may have a specialized function dedicated to a particular type of inflected forms (see chapter 4 §4.10).

Example (29) shows that for some progressive forms the tonal pattern is not among the fifteen TS's that define the fifteen Tone Classes and for some others, the progressive tonal pattern corresponds to an actual TS. The composed TS's are marked with an M- before the Class number.

In example (29), items *g*, *h*, *i*, *j*, *k*, *l* and *n* are composed TS's, and all the other progressive forms occur with tonal patterns which fall under an existing Tone Class.

However, one phenomenon still remains in need of an explanation: What happens when the tone of the progressive prefix (/M/) and the tone of the stem collide, as they do in progressive forms in items *a*, *f*, *m*, *p* and *q*?

In item *a*, the stem tone of progressive form occurs with Tone Class 12 whose tonal representation is /M-M-L/. Since the tonal domain of TS's

is the simplex word (which includes the aspect prefix), the /M/ tone of the aspect prefix *ntā-* collides with the antepenultimate /M/ of Tone Class 12.

In item *f*, the stem tone of progressive form occurs with Tone Class 13 whose tonal representation is /M-LS-L (L)/. In this case, the /M/ tone of the aspect prefix *ntā-* collides with the antepenultimate /M/ of Tone Class 13.

In item *m*, the stem tone of progressive form occurs with Tone Class 12 whose tonal representation is /M-M-L/. In this case, the /M/ tone of the aspect prefix collides with the penultimate /M/ tone of Tone Class 10 (/M-M/).

In items *p* and *q*, the stem tone of progressive forms occur with Tone Class 12 whose tonal representation is /M-M-L/. In this case, the /M/ tone of the aspect prefix collides with the antepenultimate /M/ tone of Tone Class 12.

In order to account for this phenomenon, a deletion rule is needed:

When in the process of aspectual prefixation in progressive verb forms, one of the tonal element of the stem's TS collides with the /M/ of the aspect prefix, the tonal element of the stem gets deleted, and the /M/ tone of the aspect marker is always preserved.

Figure 5.3: Tone deletion rule in progressive forms

(29) **TS's and composed TS's in progressive forms**

Item	Gloss	Root	3S COMPL	Tone	3S PROG	Tone
a	<i>get emptied</i>	-laja	nkulaja	1	ntālājà	12
b	<i>bathe</i>	-ata	nkayata	1	nkyātà	12
c	<i>get cracked</i>	-la?à`	nkula?à`	3	ntālá?à`	13
e	<i>get sprayed</i>	-y-anè`	nkyanè`	3	ntíkyánè`	13
f	<i>distribute it</i>	-u-títsà`	nkātítsà`	13	ntātítsà`	13
g	<i>find it</i>	-y-ajǎ´	nkyajǎ´	4	ntíkyajǎ´	M-4
h	<i>drink it</i>	-o?ó´	nkayo?ó´	4	ntí?ó´	M-4
i	<i>melt</i>	-y-alǎ	nkyalǎ	8	ntíkyalǎ	M-8
j	<i>play it</i>	-ulǎ	nkayulǎ	8	nkyulǎ	M-8
k	<i>change clothes</i>	-tsà?ǎn	nkwichà?ǎn	9	ntātsà?ǎn	M-9
l	<i>hurt</i>	-kū?wā	nkū?wā	10	ntākū?wā	M-10
m	<i>get lower</i>	-i?yā	nkwi?yā	10	nt ^y i?yā	12
n	<i>spend it</i>	-u-lijí	nkalijí	11	ntālijí	M-11
o	<i>weave it</i>	-tājlá?	nkatājlá?	11	ntātājlá?	14
p	<i>get ground</i>	-y-āà	nkyāà	12	ntíkyāà	12
q	<i>arrive there (base)</i>	-tyāàn	nkūtyāàn	12	ntātyāàn	12

To follow is a series of examples which consist of a list of verb paradigms in 3s for all four aspects. Each example is dedicated to a specific Tone Class in completeive 3s verb stems.

The following data shows that there are two substantial conjugation subclasses that are revealed by the relationship between the completeive tonal pattern and the habitual/potential tonal pattern. The generalization is that for almost every conjugation class, there is an invariant-potential pattern (where the completeive forms and the habitual/potential forms show the same tonal pattern) and a changed-potential pattern (where the completeive forms and the habitual/potential forms have a different tonal pattern). The changed-potential forms have potential/habitual forms marked with Tone Class 3 or Tone Class 9.

Some rows show --- and lack the corresponding aspectual form either for semantic reasons or just because the verb form in question could not be elicited at the time of data collection.

5.3.2.2 Tone Class 1 aspectual conjugation

Example (30) shows that if a completeive verb form bears Tone Class 1 (/X/), the progressive form occurs with Tone Class 12 (/M-M-L/), and the potential and habitual forms also bear Tone Class 1 (only one exception 'spread it). As a result, the aspectual tonal pattern of this conjugation class can be predicted on the basis of the completeive tonal pattern alone. We are going to see that this is generally not the case for other conjugation classes.

Tone Class 12 probably emerged historically from an internal sandhi process resulting from the prefixation of a morpheme bearing a mid tone and a root bearing Tone Class 1 (unspecified for tone). This Tone Class 12 is prominent in progressive forms because it marks the progressive aspect of Tone Class 1 completive stems, but it is not exclusive to those forms. It is also encountered in other parts of speech in the language, although quite rarely.

(30) Verbs with Tone Class 1 (unspecified for tone) in the completive aspect

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
defecate	-ticho? (A _c)	nkaticho?	1	ntātichò?	12	nticho?	ticho?	1
catch it	-sɪnʷi (A _c)	nkasinʷi	1	ntāsɪnʷi	12	ntixinʷi	xinʷi	1
walk	-taʔan (A _c)	nkataʔan	1	ntātaʔàn	12	nʔaʔan	tʔaʔan	1
pluck it	-sikwan (A _c)	nkasikwan	1	ntāsikwàn	12	ntixikwan	xikwan	1
wait for it	-u-ita (A _u)	nkiwita	1	ntāwità	12	ntiwita	kiwita	1
get emptied	-laja (B _c)	nkulaja	1	ntālājà	12	ntilʷaja	lʷaja	1
be born	-tʔin (B _c)	nkutiʔin	1	ntātʔin	12	nʔin	tʔin	1
get broken	-nuʔun (B _c)	nkunuʔun	1	ntānūʔùn	12	ntinʷuʔun	nʷuʔun	1
speak	-akwi? (B _c)	nkayakwi?	1	nkyākwi?	12	nʔikwi?	kikwi?	1
get filled	-tsaʔan (B _c)	nkutsaʔan	1	ntātsāʔàn	12	nchaʔan	chaʔan	1
end	-tii (B _c)	nkutʷii	1	ntātii	12	nʔii	tʷii	1
exist	-tsuʔwi (B _c)	yurwi	1	---	---	ntsuʔwi	chuʔwi	1
get deflated	-y-ase? (B _y)	nkyase?	1	ntikyasè?	12	nkyase?	kyase?	1
get toasted	-kiʔi (B _k)	nkiʔi	1	ntākʔi	12	nʔikiʔi	kiʔi	1
eat it	-ako (C2)	nkayako	1	nkyākò	12	nkyako	kako	1
touch it	-alaʔ (C2)	nkayalaʔ	1	nkyālàʔ	12	ntilʷaʔ	kalaʔ	1
suck it	-ati? (C2)	nkayati?	1	nkyātʔi?	12	ntitʷi?	kati?	1
poke it	-ojo? (C2)	nkayajo?	1	ntʷojò?	12	ndʷijyo?	kojo?	1
bathe	-ata (C2)	nkayata	1	nkyātà	12	ntitʷa	kata	1
spread it	-u-taʔan (A _u) irreg.	nkataʔan	1	ntātaʔàn	12	ntutaʔán	kutaʔán	9

5.3.2.3 Tone Class 3 aspectual conjugation

Example (31) shows that if a 3s completive verb form bears Tone Class 3 (/L (L)/), the 3s progressive form occurs with Tone Class 13 (/M-LS-L (L)/), and the potential and habitual 3s forms also bear Tone Class 3. Again, as was the case for the preceding Tone Class 1 conjugation, the aspectual tonal pattern of this conjugation class can be predicted on the basis of the completive tonal pattern alone.

Tone Class 13 probably emerged historically from the prefixation of a morpheme bearing a mid tone with a floating tone and a root bearing Tone Class 3 (/L (L)/). Just as is the case for Class 12 (/M-M-L/), Class 13 is now lexicalized as the language presents other part of speech with this tonal pattern, although also quite rare, and even more so than Class 12 nouns, adjectives or adverbs. Verbs with Tone Class 3 in the completive are quite rare. However, Tone Class 3 is widespread to mark the potential or habitual aspects.

The list presented below is exhaustive. As a result, it is not the optimal set of data to make generalizations but still one fact is quite salient: all (except one) completive 3s forms occurring with Tone Class 3 belong to prefix Class B_y, and as a result includes mostly intransitive verbs. Tone Class 3 and Tone Class 13 verbs represent a set since the former are mostly intransitives and the latter (as shown in the next section 5.3.2.4) are generally transitives.

(31) Verbs with Tone Class 3 (/L (L)/) in the completive aspect

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>go there (base)</i>	-yaà (B _y)	nkyaa`	3	ntíkyáà`	13	nkyaa`	kyaà`	3
<i>get scraped</i>	-y-là` (B _y)	nkil'`à`	3	ntíklí'`à`	13	nkil'`à`	kil'`à`	3
<i>get cracked</i>	-la?à` (B _c)	nkula?à`	3	ntálá?à`	13	ntil'`a?à`	l'a?à`	3
<i>get sprayed</i>	-y-anè` (B _y)	nkyanè`	3	ntíkyánè`	13	nkyanè`	kyanè`	3
<i>get split</i>	-y-a?wè` (B _y)	nkyar'wè`	3	ntíkyá?wè`	13	nkyar'wè`	kya?wè`	3
<i>get thrown away</i>	-y-alò` (B _y)	nkyalò`	3	ntíkyá!ò`	13	nkyalò`	kyalò`	3
<i>get untied</i>	-y-atin'` (B _y)	nkyatin'`	3	ntíkyá!in'`	13	nkyatin'`	kyatin'`	3

5.3.2.4 Tone Class 13 aspectual conjugation

Example (32) shows a list of verbs that occur with Tone Class 13 (/M-LS-L (L)/) in the 3s completive forms. Since Tone Class 3 and Tone Class 13 are historically related, it is important to present the data for Tone Class 13 right after Tone Class 3 in order to show their relationship. This tonal conjugation Class is also rather small and very regular. Tone Class 3 and Tone Class 13 present the same tonal ablaut pattern. The 3s completive and progressive forms both occur with Tone Class 13 and both have the same surface tonal pattern because of the fact that Class 13 has a mid tone that links to the antepenultimate mora in trimoraic forms. The completive forms probably surface with Tone Class 13 by analogy with the progressive forms. The 3s habitual and potential forms occur with Tone Class 3.

This conjugation Class only includes Class A verbs, particularly from Subclass A_u and A2. The outliers that show the invariant-potential pattern (where the completive forms and the habitual/potential forms show the same tonal pattern) are the A2 forms including the causative morpheme *ix-*.

As a result, the aspectual tonal pattern of this conjugation class cannot be predicted on the basis of the completive tonal pattern alone. Two characteristics ought to be considered: the 3s completive Tone Class AND the prefix Class. As opposed to the verb forms occurring with Tone Class 3 presented in example (31), the verb forms occurring with Tone Class 13 are mostly transitive.

(32) Verbs with Tone Class 13 (/M-LS-L (L)/) in the completive aspect

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
distribute it	-u-títsà (A _u)	nkā́títsà	13	ntā́títsà	13	ntutítsà	kutítsà	3
put it	-u-su?wà (A _u)	nkāsú?wà	13	ntāsú?wà	13	ntusu?wà	kusu?wà	3
fart	-jil'á (A _c)	nkā́jil'á	13	ntā́jil'á	13	ntujil'á	jil'á	3
shatter it	-u-lá?à (A _u)	nkā́lá?à	13	ntā́lá?à	13	ntula?à	kula?à	3
confess	-neè (A _c)	nkā́neè	13	ntā́neè	13	ntin'èè	n'èè	3
spray it	-u-s-anè (A _u)	nkāsā́nè	13	ntāsā́nè	13	ntusanè	kusanè	3
split it	-u-s-a?wè (A _u)	nkāsá?wè	13	ntāsá?wè	13	ntusa?wè	kusa?wè	3
lick it	-le?è (A _c)	nkā́le?è	13	ntā́le?è	13	ntil'e?è	l'e?è	3
heat it up	-u-katsò (A _u)	nkwátsò	13	ntākwátsò	13	ntukwatsò	kwatsò	3
throw it away	-u-s-alò (A _u)	nkāsálo	13	ntāsálo	13	ntusalò	kusalò	3
remove it	-u-toò (A _u)	nkā́loò	13	ntā́loò	13	ntoloò	koloò	3
teach it	-u-to?ò (A _u)	nkā́lo?ò	13	ntā́lo?ò	13	ntolo?ò	kolo?ò	3
scrape it	-u-s-uwè? (A _u)	nkāsúwè?	13	ntāsúwè?	13	ntusuwè?	kusuwè?	3
sew it	-s-íkwàn (A ₂)	nkwxíkwàn	13	ntíxíkwàn	13	ntíxíkwàn	xíkwàn	13
answer	-s-ákwèn (A ₂)	nkwxákwèn	13	ntíxákwèn	13	ntíxákwèn	xákwèn	13
untie it	-s-atín? (A ₂)	nkwxátín?	13	ntíxátín?	13	ntíxátín?	xátín?	13

5.3.2.5 Tone Class 4 aspectual conjugation

Examples (33) and (34) show that if a completive verb form bears Tone Class 4 (/M (H)/), the conjugation presents two patterns: the invariant-potential pattern (33) and the changed-potential pattern (34).

The progressive forms with a tone M- 4 (mid tone prefixed to a Tone Class 4 root (/M (H)/) are phonetically [M-L-M] (with an unrealized high floating tone in isolation) when trimoraic, and they are [M-M] (with an unrealized high floating tone) when dimoraic. The dimoraic progressive forms surface as [M-M] (with an unrealized high floating tone) which in isolation sounds exactly like Tone Class 10 (/M-M/) but when placed in phrasal context, the high floating tone gets realized on subsequent unspecified moras.

The aspectual tonal pattern of this conjugation class cannot be predicted on the basis of the completive tonal pattern alone. Which of the two patterns a verb shows seems to be unpredictable. Nevertheless, if we examine the prefix Class of the verbs showing the invariant-potential pattern presented in example (33), we may want to note that most of them belong to Subclass B_y. Furthermore, as expected the habitual/potential forms showing the changed-potential pattern occur with Tone Class 3.

Example (34) presents two irregular progressives forms, one of them belonging to Subclass A_c -*jin^yi?* 'borrow it', and the other belonging to Subclass B_c-*tuūn'* 'stand'. This irregularity cannot be based on the prefix Class nor on the stem shape (in the case of the long vowel stem).

(33) Verbs with Tone Class 4 (/M (H)/) in the Completive (invariant-potential pattern)

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>find it</i>	-y-ajǎ́ (B _y)	nkyajǎ́	4	ntikyajǎ́	M- 4	nkyajǎ́	kyajǎ́	4
<i>get picked up</i>	-y-oǒǎ́ (B _y)	nkyoǒǎ́	4	ntkyoǒǎ́	M- 4	nkyoǒǎ́	kyoǒǎ́	4
<i>turn into, heal</i>	-y-akǎ́ (B _y)	nkyakǎ́	4	ntkyakǎ́	M- 4	nkyakǎ́	kyakǎ́	4
<i>pick it up</i>	-y-ukwǎ́n (B _y)	nkyukwǎ́n	4	ntkyukwǎ́n	M- 4	nkyukwǎ́n	kyukwǎ́n	4
<i>revive</i>	-y-oǒǎ́ (B _y)	nkyoǒǎ́	4	ntkyoǒǎ́	M- 4	nkyoǒǎ́	kyoǒǎ́	4
<i>throw it away</i>	-skwaǎ́n (A _c)	nkaskwaǎ́n	4	ntaskwaǎ́n	M- 4	ntixkwaǎ́n	xkwaǎ́n	4
<i>pick it up</i>	-s-oǒǎ́ (A ₂)	nkwixoǒǎ́	4	ntasoǒǎ́	M- 4	ntixoǒǎ́	xoǒǎ́	4

(34) Verbs with Tone Class 4 (/M (H)/) in the Completive (changed-potential pattern)

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>burn it</i>	-u-t-akín (A _n)	nkatakín	4	ntātakín	M- 4	ntutakín	kutakín	3
<i>play</i>	-ajyǎ́ (A _c /(A _n))	nkajyǎ́	4	ntājyǎ́	M- 4	ntijyǎ́	kajyǎ́	3
<i>jump</i>	-j-lakǎ́ (A _c)	nkajlakǎ́	4	ntāj-lakǎ́	M- 4	ntij-lakǎ́	j-lakǎ́	3
<i>buy it</i>	-siǎ́ (A _c)	nkasiǎ́	4	ntāsiǎ́	M- 4	ntixiǎ́	xiǎ́	3
<i>shoot it</i>	-u-kuún (A _n)	nkakuún	4	ntākuún	M- 4	ntukuún	kukuún	3
<i>get burnt</i>	-y-akín (B _y)	nkyakín	4	ntkyakín	M- 4	nkyakín	kyakín	3
<i>become</i>	-y-aǎ́ (B _y)	nkyaaǎ́	4	ntkyaaǎ́	M- 4	nkyaaǎ́	kyaaǎ́	3
<i>be</i>	-akǎ́ (C _a)	nkwaǎ́	4	nkyakǎ́	M- 4	lakǎ́	kakǎ́	3
<i>vomit it</i>	-akwén (C ₂)	nkayakwén	4	nkyakwén	M- 4	nt'ikwén	kakwén	3
<i>grind it</i>	-oǒ́ (C ₂)	nkayoǒ́	4	ntyóǒ́	M- 4	ntiyóǒ́	koǒ́	3
<i>drink it</i>	-oǒ́ (C ₂)	nkayoǒ́	4	ntiǒ́	M- 4	nkyalò	koǒ́	3
<i>live</i>	-oǒ́ (C ₂)	nkoǒ́	4	---	---	loǒ́	koǒ́	3
<i>sell it</i>	-ujwí (C ₂)	nkayujwí	4	nkyujwí	M- 4	ntujwí	kujwí	3
<i>get dressed</i>	-akǒ́ (C ₂)	nkayakǒ́	4	nkyakǒ́	M- 4	nt'ikǒ́	kakǒ́	3
<i>borrow it</i>	-jinǎ́ (A _c) (irreg.)	nkajinǎ́	4	ntājinǎ́	M-11	ntijinǎ́	jinǎ́	3
<i>stand</i>	-tuún (B _c) (irreg.)	nkutuún	4	ntātutuún	12	nt'utuún	t'utuún	3

5.3.2.6 Tone Class 8 aspectual conjugation

Examples (35) and (36) show that if a 3s completive verb form bears Tone Class 8 (/LH/), the general rule is that a 3s progressive form occurs with Tone Class 8 on the stem prefixed with a mid tone (M-8) or the progressive form may also surface with a different tonal pattern (M-11). The potential and habitual forms bear Tone Class 3 (/L (L)/). Completive verb forms with Tone Class 8 are widespread in the lexicon. One important fact to note is that this conjugation class does not present a potential-invariant pattern as is the case for most other conjugation classes.

Most progressive forms bear a M-8 tone (mid tone prefixed to a Tone Class 8 root (/LH/)), but others bear a M-11 (mid tone prefixed to a Tone Class 11 root (/M-H/)). The first pattern mentioned (M-8) is phonetically [M-L-LH] in trimoraic forms and it is [M-LH] in dimoraic forms. The second progressive tonal pattern (M-11) is [M-M-H] in trimoraic forms and is [M-H] in dimoraic forms. Both composed TS's sound fairly similar although they are discernible on the basis of the middle mora in trimoraic forms which sounds low in one tonal pattern and high in the other.

The difference in tonal ablaut patterns in the progressive forms seems to be random. However, one may notice that the M-11 tonal pattern occurs on roots belonging to prefix Class (mostly A_u, some B_c and only one B_y). The M-8 tonal pattern also occurs on roots belonging to these particular prefix Classes but also on C₂, C_a and A_c roots. So there seem to be no clear relationship where between the tonal ablaut pattern and the prefix Class.

Example (35) presents two irregular verbs 'rot' -*akwĩ* and 'sleep' - *ajǎ?*. The irregular tone pattern of the first verb cannot be explained by its moraic shape nor its prefix Class since we can see that there are other dimoraic verb forms belonging to Subclass C_a that occur with the regular progressive tonal pattern for this conjugation class (M-8). As for the second verb 'sleep', the form indicated in the progressive column is actually a stative form.

(35) Verbs with Tone Class 8 (/LH/) in the completive aspect and M-8 in the progressive aspect

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>run</i>	- <i>sunǎ</i> (A _c)	nkasunǎ	8	ntāsunǎ	M-8	ntixunǎ	xunǎ	3
<i>carry it</i>	- <i>uyǎ</i> (A _u /C2)	nka?yǎ	8	nkyū?yǎ	M-8	ntu?yǎ	ku?yǎ	3
<i>bless it</i>	- <i>u-nakwǎn</i> (A _u)	nkanakwǎn	8	ntānakwǎn	M-8	ntunakwǎn	kunakwǎn	3
<i>cook it</i>	- <i>uké?</i> (A _u /C2)	nkaké?	8	nkyūké?	M-8	ntuké?	kuké?	3
<i>turn it off</i>	- <i>u-s-uwǐ?</i> (A _u)	nkasuwǐ?	8	ntāsuwǐ?	M-8	ntusuwǐ?	kusuwǐ?	3
<i>tie it</i>	- <i>u-s-akǎn?</i> (A _u)	nkasakǎn?	8	ntāsakǎn?	M-8	ntusakǎn?	kusakǎn?	3
<i>warn</i>	- <i>itsǎ?</i> (A2)	nkitsǎ?	8	ntikitsǎ?	M-8	ntitsǎ?	kitsǎ?	3
<i>melt</i>	- <i>y-alǎ</i> (B _y)	nkyalǎ	8	ntīkyalǎ	M-8	nkyalǎ	kyalǎ	3
<i>get risen</i>	- <i>y-akwén</i> (B _y)	nkyakwén	8	ntīkyakwén	M-8	nkyakwén	kyakwén	3
<i>get turned off</i>	- <i>y-uwǐ?</i> (B _y)	nkyuwǐ?	8	ntīkyuwǐ?	M-8	nkyuwǐ?	kyuwǐ?	3
<i>get tied</i>	- <i>y-akǎn?</i> (B _y)	nkyakǎn?	8	ntīkyakǎn?	M-8	nkyakǎn?	kyakǎn?	3
<i>get blessed</i>	- <i>nakwǎn</i> (B _c)	nkunakwǎn	8	ntānakwǎn	M-8	ntin?akwǎn	n?akwǎn	3
<i>grow</i>	- <i>alǎ</i> (C _a)	nkolǎ	8	nkyālǎ	M-8	ntil?ǎ	kalǎ	3
<i>get cooked</i>	- <i>aké?</i> (C _a)	nkuké?	8	nkyāké?	M-8	nt?iké?	kaké?	3
<i>grow old</i>	- <i>asǎ?</i> (C _a)	nkosǎ?	8	nkyāsǎ?	M-8	ntixǎ?	kasǎ?	3
<i>rot</i>	- <i>akwǐ</i> (C _a) (irreg.)	nkukwǐ	8	nkyākwi	10	nt?ikwǐ	kakwǐ	3
<i>chew it</i>	- <i>atǎ?</i> (C2)	nkayatǎ?	8	ntāyatǎ?	M-8	nti?ǎ?	katǎ?	3
<i>play it</i>	- <i>ulǎ</i> (C2)	nkayulǎ	8	nkyulǎ	M-8	ntulǎ	kulǎ	3
<i>cry</i>	- <i>unǎ</i> (C2)	nkayunǎ	8	nkyunǎ	M-8	ntunǎ	kunǎ	3
<i>sleep</i>	- <i>ajǎ?</i> (C2)(irreg.)	nkayajǎ?	8	lejǎ?	3	ntijǎ?	kajǎ?	3

(36) Verbs with Tone Class 8 (/LH/) in the completive aspect and M-11 in the progressive aspect

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>count it</i>	-i-lakwǎ (A _u)	nkulakwǎ	8	ntālākǎ	M-11	ntil'akwǎ	l'akwǎ	3
<i>strain it</i>	-i-tikwǎ (A _u)	nkatikwǎ	8	ntātīkwǎ	M-11	ntutikwǎ	kutikwǎ	3
<i>sweep it</i>	-i-lukwǎ (A _u)	nkulukwǎ	8	ntālūkǎ	M-11	ntulukwǎ	kulukwǎ	3
<i>water it</i>	-i-ji'ǎ (A _u)	nkajil'ǎ	8	ntājil'ǎ	M-11	ntujil'ǎ	kujil'ǎ	3
<i>blow it</i>	-i-la'ǎ (A _u)	nkala'ǎ	8	ntālā'ǎ	M-11	ntula'ǎ	kula'ǎ	3
<i>make it</i>	-i-tin'ǎn (A _u)	nkatin'ǎn	8	ntātin'ǎn	M-11	ntutin'ǎn	kutin'ǎn	3
<i>raise it</i>	-i-s-akwǎn (A _u)	nkasakwǎn	8	ntāsākǎn	M-11	ntusakwǎn	kusakwǎn	3
<i>close it</i>	-i-t-akǎn (A _u)	nkatakǎn	8	ntātākǎn	M-11	ntutakǎn	kutakǎn	3
<i>bury it</i>	-i-kwatsi' (A _u)	nkwatsi'	8	ntākǎnsi'	M-11	ntukwatsi'	kwatsi'	3
<i>get counted</i>	-lakwǎ (B _c)	nkalakwǎ	8	ntālākǎ	M-11	ntulukwǎ	kulukwǎ	3
<i>get strained</i>	tikwǎ (B _c)	nkutikwǎ	8	ntātīkwǎ	M-11	nt'ikwǎ	t'ikwǎ	3
<i>get swept</i>	-lukwǎ (B _c)	nkulukwǎ	8	ntālūkǎ	M-11	ntil'ukwǎ	l'ukwǎ	3
<i>enter</i>	-y-atǎn (B _y)	nkayatǎn	8	ntīkyātǎn	M-11	nkyatǎn	kyatǎn	3
<i>get closed</i>	-y-akǎn (B _y)	nkyakǎn	8	ntīkyākǎn	M-11	nkyakǎn	kyakǎn	3

5.3.2.7 Tone Class 9 aspectual conjugation

Example (37) shows that if a completive verb form bears Tone Class 9 (/L-LS/), all 3s forms also bear the same tone (underlingly) across aspects. This conjugation class only shows the potential-invariant pattern. The progressive forms occur with a mid tone prefix and as a result surface as /M-L-LS/. Roots with Tone Class 9 are very rare in the language and the list presented in example (37) is exhaustive. Tone Class 9 is widespread to mark potential and habitual forms.

(37) Verbs with Tone Class 9 (/L-LS/) in the completive aspect

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>change clothes</i>	-tsàʔán (A2)	nkwichàʔán	9	ntàtsàʔán	M-9	ntichàʔán	chàʔán	9
<i>hang it</i>	-ix-tíkwi (A2)	ngwíxtíkwi	9	ntúxtíkwi	M-9	ntúxtíkwi	kíxtíkwi	9
<i>put it</i>	-ix-éʔaa (A2)	ngwíxʔáá	9	ntúxʔáá	M-9	ntúxʔáá	kíxʔáá	9
<i>get distinguished</i>	-atákán? (C _a)	nkutákán?	9	ntátákán?	M-9	ntʔákán?	katʔákán?	9

5.3.2.8 Tone Class 10 aspectual conjugation

Data in this section shows that Tone Class 10 conjugation is not as straightforward as most other conjugation classes. It presents one invariant-potential pattern (38) and three different changed-potential pattern labelled for convenience as pattern a, b, and c, illustrated in (39), (40) and (41) respectively.

The invariant-potential pattern shown in example (38) only includes Class B verbs, and mostly from Subclass B_y.

The changed-potential pattern a shown in example (39) also mostly includes Class B verbs, and two irregular forms 'cool down' and slim down'. The progressive forms occur with Tone Class 13 (and not with a composed TS as is the case for the progressive forms in (example (38): M-10).

The changed-potential pattern b shown in example (40) also mostly includes Subclass A_u and Class C verbs with a few Class B. The progressive forms occur with Tone Class 12, and the habitual and potential forms occur with Tone Class 3.

The changed-potential pattern c shown in example (41) only includes Subclass C_a verbs. The progressive forms occur with Tone Class 12, and the habitual and potential forms occur with Tone Class 1. Tone Class 1 does not usually occur on habitual and potential verb forms showing a changed-potential pattern, the more widespread Tone Classes are Tone Class 3 or Tone Class 9. In this case, it seems that the prefix Class is the basis for the

split in conjugation pattern.

(38) Verbs with Tone Class 10 (/M-M/) in the completive aspect: invariant-potential pattern

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>hurt</i>	-kū?wā (B _k)	nkū?wā	10	ntākū?wā	M-10	nt'ikū?wā	t'ikū?wā	10
<i>wilt</i>	-y-ānān (B _y)	nkyānān	10	ntūkyānān	M-10	nkyānān	kyānān	10
<i>get wrinkled</i>	-yōō? (B _y)	nkyōō?	10	ntūkyōō?	M-10	nkyōō?	kyōō?	10
<i>turn around</i>	-tilyō (B _{post})	nkutilyō	10	ntātilyō	M-10	ntilyō	tilyō	10

(39) Verbs with Tone Class 10 (/M-M/) in the completive aspect: changed-potential pattern a

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>cough</i>	-tōō? (A _c)	nkatōō?	10	ntātōō?	13	nt'ōō?	t'ōō?	3
<i>get rung</i>	-y-ānē (B _y)	nkyānē	10	ntūkyānē	13	nkyānē	kyānē	3
<i>arrive</i>	-yālā (B _y)	nkyālā	10	ntūkyālā	13	nkyālā	kyālā	3
<i>come here</i> (to base)	-yāān (B _y)	nkyāān	10	ntūkyāān	13	n'yāān	kyaān	3
<i>cool down</i>	-kū?wā (B _k) (irreg.)	nkū?wā	10	ntākū?wā	M-10	nt'ikū?wā	t'ikū?wā	3
<i>slim down</i>	-lāti (B _c) (irreg.)	nkulāti	10	ntālāti	M-10	---	l'yātī	3

(40) Verbs with Tone Class 10 (/M-M/) in the completive aspect: changed-potential pattern a

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>see it</i>	-nā?ān (A _c)	nā?ān	10	ntānā?ān	12	ntin?ā?ān	n?ā?ān	3
<i>do it</i>	-ū?mī (A _u /C2)	nkā?mī	10	nkyū?mī	12	ntu?mī	ku?mī	3
<i>transport it</i>	-u-tēn (A _u)	nkateēn	10	ntātēn	12	ntuteēn	kuteēn	3
<i>burst</i>	-ōchō (A _u /C2)	nkāchō	10	nkyōchō	12	ntochō	kochō	3
<i>pull it out</i>	-u-sōō (A _u)	nkasōō	10	ntāsōō	12	ntosoō	kosōō	3
<i>overthrow it</i>	-u-āp'ēn (A _u /C2)	nkāp'ēn	10	nkyūp'ēn	12	---	ku?p'ēn	3
<i>get lower</i>	-i?yā (A2)	nkwi?yā	10	nt?i?yā	12	nt?i?yā	ki?yā	3
<i>wet it</i>	-u-āchā? (B _c)	nkāchā?	10	nkyūchā?	12	ntuchā?	kuchā?	3
<i>leave there</i> (not base)	-āā, ā?ān (B _{post})	yāā	10	---	---	nt?ā?ān	tsāā	3
<i>wash it</i>	-yā?ān (B _y)	nkyā?ān	10	ntkyā?ān	12	nkyā?ān	kya?ān	3
<i>hear it</i>	-ūnā (C2)	nkayūnā	10	nkyūnā	12	ntunā	kunā	3
<i>kill it</i>	-ūjwī (C2)	nkayūjwī	10	nkūjwī	12	ntujwī	kujwī	3
<i>get scared</i>	-ūtsēn (C2)	nkayūtsēn	10	nkyūtsēn	12	ntutsēn	kutsēn	3
<i>smell it</i>	-ūkwīn? (C2)	nkayūkwīn?	10	nkyūkwīn?	12	ntukwīn?	kukwīn?	3

(41) Verbs with Tone Class 10 (/M-M/) in the completive aspect: changed-potential pattern c

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>get wet</i>	-ātsā? (C _a)	nkūtsā?	10	nkyātsà?	12	nticha?	katsa?	1
<i>drip</i>	-ākwā? (C _a)	nkūkwā?	10	nkyākwà?	12	ntikwa?	kakwa?	1
<i>explode</i>	-ātsō (C _a)	nkōtsō	10	nkyātsò	12	nticho	katso	1
<i>ripen</i>	-āwēn (C _a)	nkūwēn	10	nkyāwèn	12	nt'iwēn	kawēn	1
<i>die</i>	-qja (C _a)	nkūjwī	10	ntijà	12	ntiji	kaja	1

5.3.2.9 Tone Class 11 aspectual conjugation

Examples (42), (43) and (44) show that when a completive verb form bears Tone Class 11 (/M-H/), the changed-potential pattern across aspects is the most widespread. It occurs on verbs of all prefix Classes except Subclass A2. The progressive forms also occur with Tone Class 11 but surface as [M-M-H] for trimoraic forms (they are composed TS's) and as [M-H] for dimoraic forms. The potential and habitual forms occur with Tone Class 9.

With such a large set of data within a conjugation Class, it is easy to note that Subclass A_u is the most prevalent prefix Class. All prefix Classes occur except Subclass A_c and Subclass A2.

Example (43) shows a different type of changed-potential pattern (pattern b) where the habitual and potential forms occur with Tone Class 1 instead of Tone Class 9. Also, it seems that this pattern only occurs on verbs belonging to prefix Class C_a. Interestingly, example (41) in preceding section also presents the same split in pattern based on the prefix Class C_a.

(42) Verbs with Tone Class 11 (/M-H/) in the completive aspect: changed-potential pattern a

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
open it	-u-s-áǎ́ (A _U)	nkasáǎ́	11	ntásáǎ́	M-11	ntusáǎ́	kusáǎ́	9
tighten it	-u-sínʸánʸ (A _U)	nkasinʸánʸ	11	ntasinʸánʸ	M-11	ntusinʸánʸ	kusinʸánʸ	9
take it down	-u-tǎ́yá (A _U)	nkatiʸyá	11	ntatiʸyá	M-11	ntutiʸyá	kutiʸyá	9
look for it	-u-ánán (A _U)	nkánán	11	ntánán	M-11	ntúnán	kúnán	9
squeeze it	-u-sǎ́nʸ (A _U)	nkasinʸ	11	ntásinʸ	M-11	ntusinʸ	kusinʸ	9
spend it	-u-tǎ́jǎ́ (A _U)	nkaliǎ́	11	ntáǎ́jǎ́	M-11	ntuliǎ́	kuliǎ́	9
cut it	-u-sǎ́yó (A _U)	nkasiʸyó	11	ntásiʸyó	M-11	ntusiʸyó	kusiʸyó	9
give it	-u-táǎ́ (A _U)	nkataǎ́	11	ntátaǎ́	M-11	ntàǎ́	kutáǎ́	9
say bye	-u-s-áǎ́ (A _U)	nkasáǎ́	11	ntásáǎ́	M-11	ntusáǎ́	kusáǎ́	9
sort it	-u-s-uwí (A _U)	nkasuwí	11	ntásuwí	M-11	ntusuwí	kusuwí	9
write it	-u-káǎ́ (A _U)	nkakáǎ́	11	ntákáǎ́	M-11	ntukáǎ́	kukáǎ́	9
spread it	-táǎ́ (A _U)	nkataǎ́	11	ntátaǎ́	M-11	ntutáǎ́	kutáǎ́	9
incline it	-u-s-áǎ́ (A _U)	nkasáǎ́	11	ntásáǎ́	M-11	ntusáǎ́	kusáǎ́	9
clean it	-u-ní (A _U)	nkanií	11	ntánií	M-11	ntuní	kuní	9
rock it	-u-s-áǎ́ (A _U)	nkasáǎ́	11	ntásáǎ́	M-11	ntusáǎ́	kusáǎ́	9
hit it	-u-jǎ́ (A _U)	nkajiǎ́	11	ntáǎ́jǎ́	M-11	ntujǎ́	kujǎ́	9
peel it	-u-túkwinʸ (A _U)	nkatiúkwinʸ	11	ntatiúkwinʸ	M-11	ntutiúkwinʸ	kutiúkwinʸ	9
lie	-urʸí (A _U /C2)	nkánʸí	11	nkyúnʸí	M-11	ntúnʸí	kúnʸí	9
loose it	-u-kúná (A _U)	nkatiúná	11	ntatiúná	M-11	ntutúná	kutúná	9
peck it	-u-tǎ́yá (A _U)	nkatiʸyá	11	ntatiʸyá	M-11	ntutiʸyá	kutiʸyá	9
paint it	-u-kóǎ́ (A _U)	nkakóǎ́	11	ntakóǎ́	M-11	ntokóǎ́	kokóǎ́	9
turn it on	-u-káǎ́ (A _U)	nkakáǎ́	11	ntákáǎ́	M-11	ntukáǎ́	kukáǎ́	9
break it	-u-áǎ́ (A _U /C2)	nkáchá	11	nkyúchá	M-11	ntúchá	kúchá	9
repass it	-u-tǎ́ (A _U)	nkatiǎ́	11	ntátiǎ́	M-11	ntutiǎ́	kutiǎ́	9
shake it	-u-tsikwinʸ (A _U)	nkatsikwinʸ	11	ntatsikwinʸ	M-11	ntutsikwinʸ	kutsikwinʸ	9
let it loose	-u-láǎ́ (A _U)	nkalaǎ́	11	ntalaǎ́	M-11	ntulaǎ́	kulaǎ́	9
weave it	-u-tǎ́jǎ́ (A _U)	nkatiǎ́jǎ́	11	ntatiǎ́jǎ́	M-11	ntutiǎ́jǎ́	kutiǎ́jǎ́	9
toast it	-u-kǎ́ (A _U)	nkakiǎ́	11	ntakiǎ́	M-11	ntukiǎ́	kukiǎ́	9

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>swallow it</i>	-jìkwín? (A _c)	nkajìkwín?	11	ntàjìkwín?	M-11	ntijìkwín?	jìkwín?	9
<i>laugh</i>	-sìp'í (A _c)	nkasìp'í	11	ntàsìp'í	M-11	ntixìp'í	xìp'í	9
<i>marry</i>	-tē?én (A _c)	nkate?én	11	ntātē?én	M-11	nt'è?én	t'è?én	9
<i>whistle</i>	-jìwí (A _c)	nkajìwí	11	ntàjìwí	M-11	ntijìwí	jìwí	9
<i>thresh it</i>	-s-ùkwá? (A _c)	nkasùkwá?	11	ntàsùkwá?	M-11	ntixùkwá?	xùkwá?	9
<i>massage it</i>	-jìkwí (A _c)	nkajìkwí	11	ntàjìkwí	M-11	ntijìkwí	jìkwí	9
<i>ask for it</i>	-jìr'án (A _c)	nkajìr'án	11	ntàjìr'án	M-11	ntijìr'án	jìr'án	9
<i>scream</i>	-sì?yá (A _c)	nkasì?yá	11	ntàsì?yá	M-11	ntixì?yá	xì?yá	9
<i>slap it</i>	-jìkwán (A _c)	nkajìkwán	11	ntàjìkwán	M-11	ntijìkwán?	jìkwán?	9
<i>fight</i>	-s-tùún (A _c)	nkasùún	11	ntàsùún	M-11	ntixùún	xùún	9

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
get cut	-sɪyó (B _c)	nkusiɾyó	11	ntāsiɾyó	M-11	ntixiɾyó	xɪɾyó	9
escape	-u-lāá/lāá (B _c)	nkulāá	11	ntālāá	M-11	ntulāá	lʼāá	9
get boiled	-lākwi (B _c)	nku-lākwi	11	ntā-lākwi	M-11	nti-lʼākwi	lʼākwi	9
boil	-lākwi (B _c)	nkulākwi	11	ntālākwi	M-11	ntilʼākwi	lʼākwi	9
get shaken	-tsikwín (B _c)	nkutsikwín	11	ntātsikwín	M-11	nchikwín	chikwín	9
shake (earth)	-nākwín (B _c)	nkunākwín	11	ntānākwín	M-11	ntinʼākwi	nʼākwi	9
get threshed	-y-ūkwaá (B _y)	nkyūkwaá?	11	ntikyūkwaá?	M-11	nkyūkwaá?	kyūkwaá?	9
sneeze	-yājá (B _y)	nkyājá	11	ntikyājá	M-11	nkyājá	kyājá	9
get opened	-y-ālá (B _y)	nkyālá	11	ntikyālá	M-11	nkyālá	kyālá	9
get looked for	-y-ānán (B _y)	nkyānán	11	ntikyānán	M-11	nkyānán	kyānán	9
get inclined	-y-ākí (B _y)	nkyākí	11	ntikyākí	M-11	nkyākí	kyākí	9
get rocked	-y-ānán (B _y)	nkyānán	11	ntikyānán	M-11	nkyānán	kyānán	9
lighten	-yūwí (B _y)	nkyūwí	11	ntikyūwí	M-11	nkyūwí	kyūwí	9
get soft	-kūtí (B _k)	n-kyūtí	11	ntā-kūtí	M-11	ntʼi-kūtí	tʼi-kūtí	9
get softened	-kūtí (B _k)	nkyūtí	11	ntākūtí	M-11	ntʼikūtí	tʼikūtí	9
get lost	-kūná? (B _k)	nkūná?	11	ntākūná?	M-11	ntʼikūná?	tʼikūná?	9
get painted	-kō?ó (B _k)	nkō?ó	11	ntākō?ó	M-11	ntʼikō?ó	tʼikō?ó	9
get hung	-tūkwí (B _{post})	nkutūkwí	11	ntātūkwí	M-11	ntʼikwí	tʼikwí	9
go out	-tō?ó (B _{post})	nkotō?ó	11	ntātō?ó	M-11	ntʼō?ó	tʼō?ó	9
fall	-tīlʼó (B _{post})	nkutīlʼó	11	ntātīlʼó	M-11	ntīlʼó	tīlʼó	9
get peeled	-tūkwín? (B _{post})	nkutūkwín?	11	ntātūkwín?	M-11	ntʼūkwín?	tʼūkwín?	9

(43) Verbs with Tone Class 11 (/M-H/): changed-potential pattern b

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>get broken</i>	-āísá (C _a)	nkútsá	11	nkyātsà	12	ntícha	katsa	1
<i>be born</i>	-áíá (C _a)	nkúlá	11	nkyālá	11	ntil'ya	kala	1

Example (44) presents a list of Subclass A2 verbs presenting the invariant-potential pattern. In this case, it is obvious that the split in pattern is based on the prefix Class. Most of the verbs occur with the causative morpheme *ix-*. The fact that causative verbs including the prefix *ix-* are always part of Subclass A2 was already discussed in §5.3.1.3 in example (20).

(44) Verbs with Tone Class 11 (/M-H/): invariant-potential pattern

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>bathe it</i>	-ix-ata (A2)	nkwi-x-k-átá	11	ntí-x-k-átá	M-11	nti-x-k-átá	x-k-átá	11
<i>feed it</i>	-ix-ako (A2)	nkwi-x-k-ákó	11	ntí-x-k-ákó	M-11	nti-x-k-ákó	x-k-ákó	11
<i>soften it</i>	-ix-kütí (A2)	nkwi-x-kütí	11	ntí-x-kütí	M-11	nti-x-kütí	x-kütí	11
<i>boil it</i>	-ix-lákwí (A2)	nkwi-x-l'ákwí	11	ntí-x-l'ákwí	M-11	nti-x-l'ákwí	x-l'ákwí	11
<i>return</i>	-ix-tíkwí (A2)	nkwi-x-tíkwí	11	ntí-x-tíkwí	M-11	nti-x-tíkwí	x-tíkwí	11
<i>look alike</i>	-ix-to?o (A2)	nkwi-x-t'ó?ó	11	ntí-x-t'ó?ó	M-11	nti-x-t'ó?ó	x-t'ó?ó	11
<i>leave it</i>	-s-ánú (A2)	nkwi-x-ánú	11	ntí-x-ánú	M-11	nti-x-ánú	x-ánún	11
<i>turn it in</i>	-táá (A2)	nkwi-t'áá	11	ntí-t'áá	M-11	n-t'áá	t'áá	11
<i>pinch it</i>	-u-tìxó (A _n)	nka-tìxó	11	ntā-tìxó	M-11	ntu-tìxó	k-utìxó	11
<i>stay</i>	-yānú (B _y)	nk-yānú	11	ntí-k-yānú	M-11	n-k-yānú	k-yānú	11

5.3.2.10 Tone Class 12 aspectual conjugation

Example (45) shows a list of the only three verbs that occur with Tone Class 12 in the completive aspect. As this list shows Tone Class 12 is very rare in completive forms but as was shown in example (30), it is a Tone Class that is widespread in progressive forms whose 3s completive forms occur with Tone Class 1 (/X/). All verbs belong to prefix Class B, and two of them are motion verbs.

(45) Verbs with Tone Class 12 (/M-M-L/) in the completive aspect

Gloss	Root	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>get ground</i>	-y-āā (B _v)	nkyāā	12	ntīkyāā	12	ntīkyāā	kyāā	12
<i>arrive there (not base)</i>	-tyāā (B _{post})	nkutyāā	12	ntātyāā	12	ntyāā	tyāā	3
<i>arrive there (base)</i>	-tyāān (B _{post})	nkutyāān	12	ntātyāān	12	ntyāān	tyāān	3

5.3.2.11 Conclusion

Table 5.9 on page 353 presents statistics for each tone conjugation Class. It shows that the habitual and potential forms always have the same stem tone, and that the tonal pattern for progressive forms is usually derived from the completive tonal pattern with a mid tone prefix, sometimes resulting in composed TS's. Furthermore, the habitual/potential forms showing the changed-potential pattern are usually marked with Tone Class 3 or Tone Class 9.

As a result, the relationship that proves to be most relevant for describing tonal conjugational patterns is the one between the completive and the potential/habitual forms.

Each conjugation class includes two general patterns: the invariant-potential pattern and the changed-potential pattern (except Tone Class 8 conjugation). In some cases, which of the two patterns occurs on a specific verb is based on the prefix Class.

The rows highlighted in grey show the invariant versus changed-potential pattern for each of conjugation Class. By examining the number of forms showing the invariant pattern, one can note that the latter tend to be the minor pattern as opposed to the changed-potential pattern which tend to be more widespread. Nevertheless, this is not true for Tone Class 1 conjugation since the invariant pattern occurs on most of the verbs belonging to this conjugation class. This is not true either for Tone 3 and 9

conjugation Classes since all verbs show the invariant pattern.

What is unique about Tone Classes 1, 3 and 9 is that their aspectual tonal ablaut is predictable solely based on the 3s completive form. As for the other Tone Classes, we have to rely on multiple characteristics such as 3s completive tone, prefix Class, and other characteristics to derive the conjugation class.

Now that we have examined the different tonal conjugation classes, the following question may be answered: What is the relationship between the prefix Class and the Tone Class of the 3s completive form, since the latter is the base form to derive the tonal aspectual paradigm for a verb?

A couple of Tone Classes showed a clear prevalence of a specific prefix Class: subClass B_y, subClass A_u, and subClass A2. Tone Class 3 was largely dominant on roots belonging to subClass B_y, and Tone Class 11 was quite prevalent on roots occurring with causative prefix *ix-* belonging to subClass A2. Furthermore, the majority of roots belonging to subClass A_u occurred with Tone Class 11.

Since Subclass A_u is the most populated prefix Subclass, it is important to note which of its tonal ablaut patterns across aspects is the most prevalent. Examples (42), (43) and (44) showed that the most widespread tonal ablaut pattern is the changed-potential pattern: Tone Class 11 (3s completive and progressive forms) and Tone Class 9 (3s habitual and potential forms).

COMPL	PROG	HAB	POT	Count	Prefix Class & Characteristics
1	12	1	1	29/30	
1	12	9	9	1/30	
3	13	3	3	8/8	mostly intransitive; B _y
13	13	3	3	14/17	mostly A _u
13	13	13	13	3/17	A2; caus. -ix
4	M-4	4	4	7/24	mostly B _y
4	M-4	3	3	13/24	
4	12	3	3	1/24	
4	M-11	3	3	3/24	
8	M-8	3	3	15/30	
8	M-11	3	3	14/30	tend to be A _u
8	3	3	3	1/30	
9	M-9	9	9	4/4	mostly A2
10	12	3	3	16/32	
10	12	1	1	6/32	
10	M-10	10	10	6/32	mostly B _y
10	13	3	3	4/32	
11	M-11	9	9	63/71	
11	12	1	1	2/71	only C _a
11	M-11	11	11	4/71	mostly A2
12	12	3	3	2/3	Class B, motion verbs long vowel stems
12	12	12	12	1/3	
Total				217	

Table 5.9: Tone conjugation Classes statistics

5.4 Subject person marking

Before delving into the topic of subject person marking on verbs, it is helpful to quickly examine person marking on nouns and adjectives. The system being quite straightforward and regular, it provides a good orienting point for discussing the much trickier subject person marking patterns of the verb.

The two sections to follow only provide the basic tonal ablaut patterns for person marking on nouns and on adjectives, and do not intend to cover the topic in depth. Including data on nouns and adjectives allows for a more holistic picture of how person marking generally works in the language.

5.4.1 Person marking on inalienable nouns

In ZAC, there are two main Classes of nouns: alienable and inalienable nouns. The latter are intrinsically marked for person. The person a noun is inflected for indicates its possessor rather than its subject. Person marking for the 2s is done by tone alternation only, whereas 1s marking involves nasalization of the final vowel, with or without tonal ablaut.

The examples in this section only include 3s forms occurring with Tone Classes, 1, 2, 4, 8, 10 and 11 because other Tone Classes do not seem to occur on inalienable nouns.

Examples (46), (47), (48), (49), (50), and (51) below show the tonal

ablaut patterns for 2s and 1s person marking according to 3s Tone Class. The tonal ablaut patterns for 2s and 1s are predictable based on 3s forms.

As shown in example (46), if a 3s noun form occurs with Tone Class 1, the corresponding 2s form occurs with Tone Class 6 (Tone Class 12 for dimoraic monosyllables and Tone Class 15 for trimoraic disyllables), and the 1s form occurs with Tone Class 1. There is only one exception to this tonal ablaut rule which is found in 'your elbow'.

Only inalienable nouns occurring with Tone Class 1 in 3s, occur with the same Tone Class in 1s. As a result, when the final syllable of an inalienable noun includes a nasal segment, the nasalization marking 1s becomes vacuous, and both 3s and 1s forms are homophonous (see 'tail of', 'skin of', 'tall' and 'ear of' etc. in example (46)).

(46) **Person marking on inalienable nouns with Tone Class 1 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>tooth of</i>	liʔya	1	liʔyā	6	liʔnʔan	1
<i>village of</i>	chitʔi	1	chitʔī	6	chitʔiin	1
<i>tail of</i>	jnʔeʔen	1	jnʔèʔèn	6	jnʔeʔen	1
<i>skin of</i>	kijin	1	kìjin	6	kijin	1
<i>feet of</i>	kiyaʔ	1	kìyāʔ	6	kinʔanʔ	1
<i>spouse of</i>	kwilʔoʔo	1	kwilʔòʔō	6	kwilʔuʔun	1
<i>ear of</i>	nxakan	1	nxàkān	6	nxakan	1
<i>offspring of</i>	sinʔeʔ	1	sìnʔēʔ	6	sinʔeʔ	1
<i>father of</i>	suti	1	sùtī	6	sutin	1
<i>mouth of</i>	tuʔwa	1	tùʔwā	6	tuʔwan	1
<i>tongue of</i>	lutseʔ	1	lùtsēʔ	6	lutsenʔ	1
<i>feather of</i>	skitʔin	1	skìtʔīn	6	skitʔin	1
<i>home of</i>	natʔi	1	nàtʔī	6	natʔin	1
<i>fontanelle of</i>	sitʔa	1	sìtʔā	6	sitʔan	1
<i>penis/vagina of</i>	skuwe	1	skùwē	6	skuwen	1
<i>leg of</i>	ntaan	1	ntāàn	12	ntaan	1
<i>liver of</i>	loo	1	lōò	12	luun	1
<i>eye of</i>	kiloo	1	kìlōò	15	kiluun	1
<i>elbow of</i>	skokoʔ	1	skokōʔ	5	skukunʔ	1

Example (47), shows a 3s inalienable noun occurring with Tone Class 2, and its corresponding 2s and 1s Tone Class are Tone Class 6 and Tone Class 5 respectively. No other example of an inalienable noun with Tone Class 2 has been encountered so far.

(47) **Person marking on inalienable nouns with Tone Class 2 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>hoof of</i>	skwalàʔ	2	skwàlāʔ	6	skwalānʔ	5

Example (48), shows a 3s inalienable noun occurring with Tone Class 4, and its corresponding 2s and 1s Tone Class are Tone Class 11 and Tone Class 9 respectively. One exception to this tonal ablaut rule is found in word for 'your plate' which occurs with Tone Class 12.

(48) **Person marking on inalienable nouns with Tone Class 4 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>hand of</i>	yaāʔ	4	yāáʔ	11	nʲáǎnʔ	9
<i>excrement of</i>	seʔēnʹ	4	sēʔén	11	sèʔén	9
<i>arm of</i>	sikūnʹ	4	síkún	11	sìkún	9
<i>plate of</i>	skiʔnǎʹ	4	skìʔnà	12	skìʔnǎ	9

Example (49), shows a 3s inalienable noun occurring with Tone Class 8, and its corresponding 2s and 1s Tone Class are Tone Class 11 and Tone Class 9 respectively.

(49) **Person marking on inalienable nouns with Tone Class 8 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>calf of</i>	xutʲínʔ	8	xūtʲínʔ	11	xùtʲínʔ	9
<i>shirt of</i>	chikǎnʔ	8	chikánʔ	11	chìkǎnʔ	9

Example (50), shows a 3s inalienable noun occurring with Tone Class 10, and its corresponding 2s and 1s Tone Class are Tone Class 12 and Tone Class 5 respectively. One exception to this tonal ablaut rule is found in word for 'my wing' which occurs with Tone Class 10.

(50) **Person marking on inalienable nouns with Tone Class 10 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>forehead of</i>	jnʲakāān	10	jnʲākāān	12	jnʲakaān	5
<i>head of</i>	jnʲakē	10	jnʲakè	12	jnʲakēn	5
<i>sandal of</i>	skīnā	10	skīnà	12	skinā	5
<i>nail of</i>	skītānʔ	10	skītànʔ	12	skitānʔ	5
<i>bone of</i>	tījnʲān	10	tījnʲān	12	tijnʲān	5
<i>sibling of</i>	tāʔā	10	tāʔà	12	taʔān	5
<i>neck of</i>	yānī	10	yānì	12	yanī	5
<i>hair of</i>	kīchānʔ	10	kīchànʔ	12	kichānʔ	5
<i>back of</i>	tīchūnʔ	10	tīchùnʔ	12	tichūnʔ	5
<i>wing of</i>	jlʲiwēʔē	10	jlʲiwēʔè	12	jlʲiwēʔēn	10

Example (50), shows a 3s inalienable noun occurring with Tone Class 11, and its corresponding 2s and 1s Tone Class are Tone Class 10 (or Tone Class 12 for long vowel forms) and Tone Class 9 respectively.

(51) **Person marking on inalienable nouns with Tone Class 11 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>mother of</i>	jn ^y āʔán	11	jn ^y āʔān	10	jn ^y àʔǎn	9
<i>flesh of</i>	kwínáʔ	11	kwínāʔ	10	kwìnǎʔ	9
<i>maw of</i>	slākó	11	slākō	10	slàkúŋ	9
<i>stomach of</i>	tikéé	11	tikèè	12	tikèén	9

Table 5.10 summarizes the tonal ablaut patterns for inalienable nouns.

The Tone Classes in () are for long vowel stems.

3s	2s	1s
1	6	1
	(12/15)	
2	6	5
4	11	9
	(10/12)	
8	11	9
10	12	5
11	10	1

Table 5.10: Tonal ablaut patterns for person marking on inalienable nouns

5.4.2 Subject person marking on predicative adjectives

In ZAC, predicative adjectives are marked for subject person resulting in non-verbal predicates. Similarly to verbs and inalienable nouns, subject marking on predicative adjectives for the 2s is also done by tone alternation only, but unlike inalienable nouns, 1s subject marking only involves nasalization of the final vowel without tonal ablaut (except for 3s adjectives occurring with Tone Class 3).

Table 5.11 presents an example of a paradigm for the predicative adjective *tsaʔwě* 'be good, generous' (Tone Class 8: /LH/). In this case the general rule for plural marking applies: the plural forms are based on the tone of the 3s stem followed by the plural clitics.

	Form	Gloss
1S	<i>tsaʔwě̃n</i>	<i>I am generous</i>
2S	<i>tsāʔwé</i>	<i>you are generous</i>
3S	<i>tsaʔwě</i>	<i>he/she is generous</i>
1PLINCL	<i>tsaʔwě nan</i>	<i>we are generous</i>
1PLEX	<i>tsaʔwě wa</i>	<i>we are generous</i>
2PL	<i>tsaʔwě wan</i>	<i>you are generous</i>
3PL	<i>tsaʔwě neʔ</i>	<i>they are generous</i>

Table 5.11: Example of a paradigm for the predicative adjective *tsaʔwě* 'be good, generous'

Examples (52), (53), (54), (55), (56), (57), (58), and (59) below show the tonal ablaut patterns for 2s person marking grouped by Tone Class in 3s. The 1s forms occur with the 3s Tone Class. As a result, when the final syllable of a predicative adjective includes a nasal segment, the nasalization

marking 1s becomes vacuous, and both 3s and 1s forms are homophonous (see 'pregnant', 'tired', 'tall' and 'large' in example (52)).

One interesting fact to notice about the 2s marking on predicative adjectives is that Tone Class 5 which usually exclusively serves the function of marking 1s on verbs, marks 2s as well as 1s on predicative adjectives.

Furthermore, the examples in this section only include 3s forms occurring with Tone Classes, 1, 2, 4 (only one example), 8, 10, 11 and 12 (only one example) because other Tone Classes do not seem to occur on predicative adjectives.

Example (52) shows that if a 3s predicative adjective occurs with Tone Class 1, 2s is marked with Tone Class 5, and 1s also occurs with Tone Class 1.

(52) **Person marking on predicative adjectives with Tone Class 1 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>pregnant</i>	tana	1	tanā	5	tana	1
<i>tired</i>	tin ^ʏ an?	1	tin ^ʏ ān?	5	tin ^ʏ an?	1
<i>fast</i>	lakasa	1	lakasā	5	lakasan	1
<i>male</i>	kyula	1	kyulā	5	kyulan	1
<i>old</i>	kula	1	kulā	5	kulan	1
<i>tall</i>	tikwin	1	tikwīn	5	tikwin	1
<i>large</i>	tanu	1	tanū	5	tanu	1
<i>stingy</i>	tiji	1	tijī	5	tijin	1

Example (53) shows that if a 3s predicative adjective occurs with Tone Class 3, 2s is marked with Tone Class 5, and 1s occurs with Tone Class 5. Only predicative adjectives occurring with Tone Class 3 in 3s show a tone alternation for the 1s.

(53) **Person marking on predicative adjectives with Tone Class 3 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>pretty</i>	ntiʔyà	3	ntiʔyā	5	ntiʔnʔan	5
<i>bad</i>	xaʔàn	3	xaʔān	5	xaʔān	5
<i>dark skinned</i>	nkatà	3	nkatā	5	nkatān	5
<i>poor</i>	tiʔi	3	tiʔi	5	tiʔin	5
<i>jealous</i>	xulʔà	3	xulʔā	5	xulʔān	5
<i>frigid</i>	tukuʔwà	3	tukuʔwā	5	tukuʔwān	5
<i>aroused</i>	tikèʔ	3	tikēʔ	5	tikēnʔ	5
<i>heavy</i>	tiʔin	3	tiʔin	5	tiʔin	5

Example (54) shows that if a 3s predicative adjective occurs with Tone Class 4, 2s is marked with Tone Class 11, and 1s also occurs with Tone Class 4. This is the only example of a predicative adjective with Tone Class 4 encountered so far.

(54) **Person marking on predicative adjectives with Tone Class 4 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>big</i>	tilʔó	4	tilʔó	11	tilʔún	4

Example (55) shows that if a 3s predicative adjective occurs with Tone Class 8, 2s is marked with Tone Class 11, and 1s also occurs with Tone Class 8.

(55) **Person marking on predicative adjectives with Tone Class 8 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>drunk</i>	kuʔwĩ	8	kūʔwí	11	kuʔwĩn	8
<i>blind</i>	kwitʔinʔ	8	kwitʔinʔ	11	kwitʔinʔ	8
<i>delicate</i>	tikatĩ	8	tikā tí	11	tikatĩn	8
<i>dressed up</i>	siyěʔ	8	sīyéʔ	11	sinʔěnʔ	8
<i>good</i>	tsaʔwě	8	tsāʔwé	11	tsaʔwě n	8
<i>rich</i>	kuliyǎʔ	8	kuliyáʔ	11	kulinʔǎnʔ	8
<i>fierce</i>	yalǎ	8	yā lá	11	yalǎ n	8
<i>naughty</i>	chiyóʔ	8	chīyóʔ	11	chinʔúnʔ	8

Example (56) shows that if a 3s predicative adjective occurs with Tone Class 9, 2s is marked with Tone Class 10 (or Tone Class 12 in the case of long vowel stems), and 1s also occurs with Tone Class 9.

(56) **Person marking on predicative adjectives with Tone Class 9 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>small</i>	lʷóʔ	9	lʷóʔ	10	lʷínʔ	9
<i>fair skinned</i>	píí	9	píì	12	píín	9
<i>intelligent</i>	tyàá	9	tyàà	12	tyàán	9

Example (57) shows that if a 3s predicative adjective occurs with Tone Class 10, 2s is marked with Tone Class 12, and 1s also occurs with Tone Class 10.

(57) **Person marking on predicative adjectives with Tone Class 10 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>skinny</i>	tíjnʷán	10	tíjnʷàn	12	tíjnʷán	10
<i>dirty</i>	kōōʔ	10	kōòʔ	12	kūūnʔ	10
<i>bitter</i>	lʷāāʔ	10	lʷāàʔ	12	lʷāānʔ	10

Example (58) shows that if a 3s predicative adjective occurs with Tone Class 11, 2s is marked with Tone Class 10, and 1s also occurs with Tone Class 11.

(58) **Person marking on predicative adjectives with Tone Class 11 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>young</i>	kwīnéʔ	11	kwīnéʔ	10	kwīnéʔ	11
<i>lazy</i>	tājá	11	tājā	10	tāján	11
<i>soft</i>	lukūtí	11	lukūtí	10	lukūtín	11

Example (59) shows that if a 3s predicative adjective occurs with Tone Class 12, 2s and 1s also occur with Tone Class 12.

(59) **Person marking on predicative adjective with Tone Class 12 in 3s**

Gloss	3s	Tone	2s	Tone	1s	Tone
<i>hard</i>	tīkīlā	12	tīkīlā	12	tīkīlān	12

Table 5.12 summarizes the tonal ablaut patterns for person marking on predicative adjectives. The Tone Classes in () are for long vowel stems. As the data presented in this section has demonstrated, person marking on predicative adjectives is very straightforward, and seems to have no exceptions. The tonal ablaut pattern for 2s and 1s can be derived solely on the basis of the 3s Tone Class.

3s	2s	1s
1	5	1
3	5	5
4	11	4
8	11	8
9	10	9
	(12)	
10	12	10
11	10	11
12	12	12

Table 5.12: Tonal ablaut patterns for person marking on predicative adjectives

Table 5.13 summarizes the tonal ablaut patterns for person marking for both inalienable nouns and predicative adjectives. The Tone Classes in () are for long vowel stems. The data in the table below shows that 2s marking functions similarly in nouns and in adjectives as the tonal ablaut patterns are similar.

	3s	2s	1s
IN	1	6	1
		(12/15)	
PA	1	5	1
IN	2	6	5
PA	---	---	---
IN	---	---	---
PA	3	5	5
IN	4	11	9
		(10/12)	
PA	4	11	4
IN	8	11	9
PA	8	11	8
IN	---	---	---
PA	9	10	9
		(12)	
IN	10	12	5
PA	10	12	10
IN	11	10	1
PA	11	10	11
IN	---	---	---
PA	12	12	12

Table 5.13: Tonal ablaut patterns for person marking on inalienable nouns and predicative adjectives

5.4.3 Subject person marking on verbs

As already discussed earlier in §5.2, subject person is marked on the verb by tonal ablaut alone (2s), final vowel nasalization with or without tonal ablaut (1s) or by encliticization with or without tonal ablaut (plural persons). We just saw in the previous section that the tonal paradigm for a verb for all aspects can be narrowed down based on the Tone Class for the 3s completive form. Section §5.4.3.1 demonstrates that tonal ablaut pattern for 3s to 2s can be very accurately predicted based on the Tone Class of 3s. However, §5.4.3.2 demonstrated this relationship is not maintained between the 3s and the 1s, and that a more accurate way of predicting the 1s tonal pattern for a particular verb across aspects is to look at the tonal pattern for 3s across aspects. §5.4.3.3 deals with a brief description of subject plural marking on verbs.

To follow, the verb database (about 220 verb roots) is organized by Tone Class unveiling the regular ablaut patterns marking 2s subject based on 3s.

5.4.3.1 2s subject person marking on verbs

5.4.3.1.1 Tone Class 1 person conjugation

Example (60) shows that if a 3s verb form occurs with Tone Class 1 (/X/), 2s always occurs with Tone Class 6 (/L-M/). As was discussed in chapter 4 §4.10, Tone Class 6 (/L-M/) serves the exclusive function of marking 2s on verbs (or nouns and predicative adjectives). Example (60) only

present verb forms in the completive, habitual or potential aspects because Tone Class 1 never occurs on progressive forms because the progressive prefix bearing a mid tone and affects the stem tonal pattern.

If we examine the tonal ablaut patterns from 3s to 2s, it seems that there is no relationship between the prefix Class a root belongs to and the tonal ablaut pattern. All roots regardless of the prefix Class present the same tonal ablaut pattern.

Furthermore, the data in this example also shows that aspect does not matter since the completive, habitual and potential forms all show the same ablaut pattern. What matters is the Tone Class of the 3s.

(60) **Verb forms with Tone Class 1 (/X/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>catch it</i>	COMPL	nkasin ^y i	1	nkasìn ^y ī	6
(A _c)	HAB	ntixin ^y i	1	ntixìn ^y ī	6
	POT	xin ^y i	1	xìn ^y ī	6
<i>pluck it</i>	COMPL	nkasikwan	1	nkasìkwān	6
(A _c)	HAB	ntixikwan	1	ntixìkwān	6
	POT	xikwan	1	xìkwān	6
<i>defecate</i>	COMPL	nkaticho?	1	nkatic̄hō?	6
(A _c)	HAB	ntichō?	1	ntich̄ō?	6
	POT	tichō?	1	t̄ich̄ō?	6
<i>walk</i>	COMPL	nkata?an	1	nkata?ān	6
(A _c)	HAB	nt ^y a?an	1	nt ^y à?ān	6
	POT	t ^y a?an	1	t ^y à?ān	6
<i>wait for it</i>	COMPL	nkiwita	1	nkiwità	6
(A _u)	HAB	ntiwita	1	ntiwità	6
	POT	kiwita	1	kiwità	6
<i>exist</i>	COMPL	yu?wi	1	yù?wī	6
(B _{post})	HAB	ntsu?wi	1	ntsù?wī	6
	POT	chu?wi	1	chù?wī	6
<i>ring it</i>	COMPL	nkwa?an	1	nkwa?ān	6
(B _k)	HAB	nt ^y ika?an	1	nt ^y ikà?ān	6
	POT	t ^y ika?an	1	t ^y ikà?ān	6
<i>be born</i>	COMPL	nkuti?in	1	nkutì?in	6
(B _c)	HAB	nt ^y i?in	1	nt ^y ì?in	6
	POT	t ^y i?in	1	t ^y ì?in	6

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>poke it</i> (C2)	COMPL	nkayojɔ?	1	nkayòjō?	6
	HAB	nd ^y ijyo?	1	nd ^y ijyō?	6
	POT	kojɔ?	1	kòjō?	6
<i>suck it</i> (C2)	COMPL	nkayati?	1	nkayàtī?	6
	HAB	ntit ^y i?	1	ntìt ^y i?	6
	POT	kati?	1	kàtī?	6
<i>speak</i> (C2)	COMPL	nkayakwi?	1	nkayàkwī?	6
	HAB	nt ^y ikwi?	1	nt ^y ikwī?	6
	POT	kikwi?	1	kìkwī?	6
<i>eat it</i> (C2)	COMPL	nkayako	1	nkayàkō	6
	HAB	nkyako	1	nkyàkō	6
	POT	kako	1	kàkō	6
<i>touch it</i> (C2)	COMPL	nkayala?	1	nkayàlā?	6
	HAB	ntil ^y a?	1	ntìl ^y ā?	6
	POT	kala?	1	kàlā?	6
<i>bathe</i> (C2)	COMPL	nkayata	1	nkayàtā	6
	HAB	ntit ^y a	1	ntìt ^y ā	6
	POT	kata	1	kàtā	6

5.4.3.1.2 Tone Class 3 person conjugation

Examples (61), (62), (63), (64) present examples of verb forms occurring with Tone Class 3 (/L (L)/) in 3s organized by prefix Classes. Example (61) present the prefix Class A verb forms, (62) shows prefix Class B verb forms, and (63) illustrates prefix Class C verb forms occurring with Tone Class 3. Example (64) groups all the long vowel stems occurring with Tone Class 3.

Again, data in these examples show that tonal ablaut patterns for person marking of verb forms with Tone Class 3 in the 3s is very straight forward. All roots regardless of the prefix Class present the same tonal ablaut pattern: 3s: Tone Class 3; 2s: Tone Class 6.

Furthermore, because Tone Class 6 does not occur on long vowel stems, verb forms featuring long vowels occurring with Tone Class 3 in 3s mark 2s with Tone Class 12 (/M-M-L/) in monomoraic disyllabic forms, and Tone Class 15 (/L-M-L/) in dimoraic disyllabic verb forms as shown in example 64). The latter was also discussed in chapter 4 in §4.6.2 and §4.6.5.

As the extent of data presented suggests it, Tone Class 3 (/L (L)/) is a prominent Tone Class in 3s verb forms, and in particular in habitual and potential 3s forms. This Tone Class is not reserved exclusively for marking these forms but it is the preferred Tone Class for marking habitual and potential aspects.

(61) **Class A verb forms with Tone Class 3 (/L (L)/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>play</i>	HAB	ntijyà`	3	ntìjyā	6
(A _c /A _u)	POT	kajyà`	3	kàjyā	6
<i>borrow it</i>	HAB	ntijin ^y ìʔ	3	ntìjìn ^y īʔ	6
(A _c)	POT	jin ^y ìʔ	3	jìn ^y īʔ	6
<i>jump</i>	HAB	ntijl ^y akàʔ	3	ntìjl ^y ākāʔ	6
(A _c)	POT	jl ^y akàʔ	3	jìl ^y ākāʔ	6
<i>run</i>	HAB	ntixunà`	3	ntìxunā	6
(A _c)	POT	xunà`	3	xùnā	6
<i>buy it</i>	HAB	ntixiʔì`	3	ntìxiʔī	6
(A _c)	POT	xiʔì`	3	xìʔī	6
(A _u)	POT	kusakwèn`	3	kusàkwēn	6
<i>close it</i>	HAB	ntutakùn`	3	ntutākūn	6
(A _u)	POT	kutakùn`	3	kutākūn	6
<i>cook it</i>	HAB	ntukèʔ	3	ntùkēʔ	6
(A _u /C2)	POT	kukèʔ	3	kùkēʔ	6

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>burn it</i>	HAB	ntutakìn`	3	ntutàkìn	6
(A _u)	POT	kutakìn`	3	kutàkìn	6
<i>count it</i>	HAB	ntulakwà`	3	ntulàkwā	6
(A _u)	POT	kulakwà`	3	kulàkwā	6
<i>strain it</i>	HAB	ntutikwà`	3	ntutìkwā	6
(A _u)	POT	kutikwà`	3	kutìkwā	6
<i>sweep it</i>	HAB	ntulukwà`	3	ntulùkwā	6
(A _u)	POT	kulukwà`	3	kulùkwā	6
<i>water it</i>	HAB	ntujil ^y à`	3	ntujìl ^y ā	6
(A _u)	POT	kujil ^y à`	3	kujìl ^y ā	6
<i>carry it</i>	HAB	ntu [?] yà`	3	ntù [?] yā	6
(A _u /C2)	POT	ku [?] yà`	3	kù [?] yā	6
<i>blow it</i>	HAB	ntula [?] à`	3	ntulà [?] ā	6
(A _u)	POT	kula [?] à`	3	kulà [?] ā	6
<i>make it</i>	HAB	ntutin ^y àn`	3	ntutin ^y ān	6
(A _u)	POT	kutin ^y àn`	3	kutin ^y ān	6
<i>raise it</i>	HAB	ntusakwèn`	3	ntusakwēn	6
(A _u)	POT	kusakwèn`	3	kusakwēn	6
(A _u /C2)	POT	kukè [?]	3	kùkē [?]	6
<i>burry it</i>	HAB	ntukwatsì [?]	3	ntukwàtsī [?]	6
(A _u)	POT	kwatsì [?]	3	kwàtsī [?]	6
<i>turn it off</i>	HAB	ntusuwì [?]	3	ntusùwī [?]	6
(A _u)	POT	kusuwì [?]	3	kusùwī [?]	6
<i>tie it</i>	HAB	ntusakàn [?]	3	ntusakān [?]	6
(A _u)	POT	kusakàn [?]	3	kusakān [?]	6
<i>do it</i>	HAB	ntu [?] nì`	3	ntù [?] nī	6
(A _u /C2)	POT	ku [?] nì`	3	kù [?] nī	6
<i>see it</i>	HAB	ntin ^y a [?] àn`	3	ntin ^y à [?] ān	6
(A _u)	POT	n ^y a [?] àn`	3	n ^y à [?] ān	6
<i>burn it</i>	HAB	ntutakìn`	3	ntutàkìn	6
(A _u)	POT	kutakìn`	3	kutàkìn	6
<i>count it</i>	HAB	ntulakwà`	3	ntulàkwā	6
(A _u)	POT	kulakwà`	3	kulàkwā	6

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>strain it</i>	HAB	ntutikwà`	3	ntutikwā	6
(A _u)	POT	kutikwà`	3	kutikwā	6
<i>sweep it</i>	HAB	ntulukwà`	3	ntulùkwā	6
(A _u)	POT	kulukwà`	3	kulùkwā	6
<i>water it</i>	HAB	ntujil ^y à`	3	ntujil ^y ā	6
(A _u)	POT	kujil ^y à`	3	kujil ^y ā	6
<i>carry it</i>	HAB	ntu [?] yà`	3	ntù [?] yā	6
(A _u /C2)	POT	ku [?] yà`	3	kù [?] yā	6
<i>blow it</i>	HAB	ntula [?] à`	3	ntulà [?] ā	6
(A _u)	POT	kula [?] à`	3	kulà [?] ā	6
<i>make it</i>	HAB	ntutin ^y àn`	3	ntutin ^y ān	6
(A _u)	POT	kutin ^y àn`	3	kutin ^y ān	6
<i>raise it</i>	HAB	ntusakwèn`	3	ntusakwēn	6
(A _u)	POT	kusakwèn`	3	kusakwēn	6
<i>warn</i>	HAB	ntitsà [?]	3	ntìtsā [?]	6
(A2)	POT	kitsà [?]	3	kìtsā [?]	6

(62) **Class B Verb forms with Tone Class 3 (/L (L)/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>bless it</i>	HAB	ntunakwàn`	3	ntunàkwān	6
(B _c)	POT	kunakwàn`	3	kunàkwān	6
<i>enter</i>	HAB	nkyatèn`	3	nkyàtēn	6
(B _y)	POT	kyatèn`	3	kyàtēn	6
<i>arrive</i>	HAB	nkyalà`	3	nkyàlā	6
(B _y)	POT	kyalà`	3	kyàlā	6
<i>wash it</i>	HAB	nkyà [?] àn`	3	nkyà [?] ān	6
(B _y)	POT	kya [?] àn`	3	kyà [?] ān	6

(63) **Class C Verb forms with Tone Class 3 (/L (L)/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>burst</i>	HAB	ntochò	3	ntòchō	6
(C _a)	POT	kochò	3	kòchō	6
<i>grow old</i>	HAB	ntixòʔ	3	ntìxōʔ	6
(C _a)	POT	kasòʔ	3	kàsōʔ	6
<i>grow</i>	HAB	ntil ^y ò	3	ntìl ^y ō	6
(C _a)	POT	kalò	3	kàlō	6
<i>cry</i>	HAB	ntunà	3	ntùnā	6
(C2)	POT	kunà	3	kùnā	6
<i>sleep</i>	HAB	ntijyàʔ	3	ntìjyāʔ	6
(C2)	POT	kajàʔ	3	kàjāʔ	6
<i>chew it</i>	HAB	nt ^y it ^y àʔ	3	nt ^y it ^y āʔ	6
(C2)	POT	katàʔ	3	kàtāʔ	6
<i>hear it</i>	HAB	ntunà	3	ntùnā	6
(C2)	POT	kunà	3	kùnā	6
<i>kill it</i>	HAB	ntujwì	3	ntùjwī	6
(C2)	POT	kujwì	3	kùjwī	6
<i>get scared</i>	HAB	ntutsèn	3	ntùtsēn	6
(C2)	POT	kutsèn	3	kùtsēn	6
<i>vomit it</i>	HAB	nt ^y ikwèn	3	nt ^y ikwén	6
(C2)	POT	kakwèn	3	kàkwēn	6
<i>drink it</i>	HAB	ntiʔyò	3	ntìʔyō	6
(C2)	POT	koʔò	3	kòʔō	6
<i>sell it</i>	HAB	ntujwìʔ	3	ntùjwīʔ	6
(C2)	POT	kujwìʔ	3	kùjwīʔ	6
<i>get dressed</i>	HAB	nt ^y ikòʔ	3	nt ^y ikōʔ	6
(C2)	POT	kakòʔ	3	kàkōʔ	6
<i>play it (music)</i>	HAB	ntulà	3	ntùlā	6
(C2)	POT	kulà	3	kùlā	6
<i>live</i>	HAB	loʔò	3	lòʔō	6
(C2)	POT	koʔò	3	kòʔō	6

(64) **Long vowel verb stems with Tone Class 3 (/L (L)/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>shoot</i>	HAB	ntukuùṅ̀	3	ntùkū̀ùn	15
(A _u)	POT	kukuùṅ̀	3	kùkū̀ùn	15
<i>transport it</i>	HAB	ntuteèṅ̀	3	ntùtḕèn	15
(A _u)	POT	kuteèṅ̀	3	kùtḕèn	15
<i>stand</i>	HAB	nt ^y uùṅ̀	3	nt ^y ū̀ùn	12
(B _{post})	POT	t ^y uùṅ̀	3	t ^y ū̀ùn	12
<i>leave base</i>	HAB	nkyā̀à	3	nkyā̀à	12
(B _y)	POT	kyā̀à	3	kyā̀à	12
<i>grind it</i>	HAB	ntiyò̀	3	ntìyò̀	15
(C2)	POT	kò	3	kò̀	12

5.4.3.1.3 Tone Class 13 person conjugation

Examples (65) and (66) present the tonal ablaut patterns for 3s verb forms occurring with Tone Class 13 (/M-LS-L (L)/). Tone Class 13 is historically related to Tone Class 3 which was just discussed, and all 3s verb forms occurring with Tone Class 13 or Tone Class 3 show the same tonal ablaut patterns.

All verb forms (except long vowel stems) present the same tonal ablaut pattern: 3s: Tone Class 3; 2s: Tone Class 6. Furthermore, because Tone Class 6 does not occur on long vowel stems, verb forms featuring long vowels occurring with Tone Class 13 in 3s mark 2s with Tone Class 15 (/L-M-L/).

This conjugation Class is quite small and only includes prefix Class A roots.

(65) Verb forms with Tone Class 13 (/M-LS-L (L)/) in 3s

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>fart</i>	COMPL	nkājílʸà	13	nkajìlʸā	6
(A _c)	PROG	ntājìlʸà	13	ntajìlʸā	6
<i>lick it</i>	COMPL	nkāl'é?è	13	nkalè?ē	6
(A _c)	PROG	ntāl'é?è	13	ntalè?ē	6
<i>distribute it</i>	COMPL	nkātít'sà	13	nkatìtsā	6
(A _u)	PROG	ntātít'sà	13	ntatìtsā	6
<i>shatter it</i>	COMPL	nkāl'á?à	13	nkala?ā	6
(A _u)	PROG	ntāl'á?à	13	ntala?ā	6
<i>split it</i>	COMPL	nkāsá?wè	13	nkasa?wē	6
(A _u)	PROG	ntāsá?wè	13	ntasa?wē	6
<i>throw it away</i>	COMPL	nkāsálò	13	nkasàlō	6
(A _u)	PROG	ntāsálò	13	ntasàlō	6
<i>teach it</i>	COMPL	nkāl'ó?ò	13	nkalo?ō	6
(A _u)	PROG	ntāl'ó?ò	13	ntalo?ō	6
<i>scrape it</i>	COMPL	nkāsúwè?	13	nkàsùwē?	6
(A _u)	PROG	ntāsúwè?	13	ntàsùwē?	6
<i>put it</i>	COMPL	nkāsú?wà	13	nkasù?wā	6
(A _u)	PROG	ntāsú?wà	13	ntàsù?wā	6
<i>spray it</i>	COMPL	nkāsánè	13	nkasanē	6
(A _u) (irreg.)	PROG	ntāsánè	13	ntasanē	11
<i>heat it up</i>	COMPL	nkwátsùn`	13	nkwàtsūn	6
(A _u)	PROG	ntākwátsùn`	13	ntakwàtsūn	6
<i>untie it</i>	COMPL	nkwxátìn?	13	nkwxàtìn?	6
(A ₂)	PROG	ntixátìn?	13	ntixàtìn?	6
	HAB	ntixátìn?	13	ntixàtìn?	6
	POT	xátìn?	13	xàtìn?	6
<i>answer</i>	COMPL	nkwxákwèn`	13	nkwxàkwēn	6
(A ₂)	PROG	ntixákwèn`	13	ntixàkwēn	6
	HAB	ntixákwèn`	13	ntixàkwēn	6
	POT	xákwèn`	13	xàkwēn	6
<i>sew it</i>	COMPL	nkwxíkwàn`	13	nkwxìkwān	6
(A ₂)	PROG	ntixíkwàn`	13	ntixìkwān	6

(66) **Long vowel verb stems with Tone Class 13 in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>confess</i>	COMPL	nkānēè	13	nkànēè	15
(A _c)	PROG	ntānēè	13	ntānēè	12
<i>remove it</i>	COMPL	nkālóò	13	nkàlōò	15
(A _u)	PROG	ntālóò	13	ntālōò	12

5.4.3.1.4 Tone Class 4 person conjugation

Examples (67), (68), and (69) present examples of verb forms in 3s occurring with Tone Class 4 (/M (H)/) organized according to prefix Class. Example (67) shows Class A verb forms, (68) presents Class B verb forms, and (69) illustrates Class C verb forms occurring with Tone Class 4.

3s verb forms occurring with this Tone Class 4 are not too frequent in the lexicon, and their tonal ablaut from 3s to 2s is very regular. All roots regardless of the prefix Class present the same tonal ablaut pattern: 3s: Tone Class 4; 2s: Tone Class 11.

The 3s progressive forms which occur with the aspect prefix *ntā-*, are composed TS's, i.e., the verb stem occurs with the TS for Tone Class 4 and the aspect prefix occurs with a /M/ tone. Their surface pattern depends on the moraic shape of the verb form. If the verb is trimoraic, the surface pattern is [M-L-M] (H) and the dimoraic forms surface as [M-M] (H).

The dimoraic progressive forms merge with another Tone Class with the same surface tone pattern (Tone Class 10 /M-M/) but the two distinguish

themselves in phrasal context where the progressive verb forms with Tone Class 4 are followed by a floating tone whereas the verb forms occurring with Tone Class 10 do not have a floating tone. Of course, these two Tone Classes are only distinguishable in phrasal context if and only if they are followed by a tonally unlinked moras which would allow the high floating tone of Tone Class 4 to be realized. Otherwise, they are indistinguishable from each other (see chapter 4 §4.5.2).

(67) **Class A verb forms with Tone Class 4 (/M (H)/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>borrow it</i> (A _c)	COMPL	nkajin ^v iʔ	4	nkajin ^v íʔ	11
<i>buy it</i> (A _c)	COMPL	nkasiʔɿ	4	nkasiʔí	11
<i>throw it away</i> (A _c)	COMPL	nkaskwaān´	4	nkaskwāán	11
	PROG	ntāskwaān´	4	ntāskwāán	11
	HAB	ntixkwaān´	4	ntixkwāán	11
	POT	xkwaān´	4	xkwāán	11
<i>play</i> (A _c)	COMPL	nkajyá´	4	nkājyá	11
	PROG	ntājyá´	4	ntājyá	11
<i>shoot it</i> (A _u)	COMPL	nkakuūn´	4	nkakūún	11
	PROG	ntākuūn´	4	ntākūún	11
<i>burn it</i> (A _u)	COMPL	nkatakín´	4	nkatakín	11
	PROG	ntātakín´	4	ntātakín	11
<i>pick it up</i> (A2)	COMPL	nkwxioōʔ	4	nkwxioóʔ	11
	PROG	ntāsoōʔ	4	ntāsoóʔ	11
	HAB	ntixioōʔ	4	ntixioóʔ	11

(68) **Class B verb forms with Tone Class 4 (/M (H)/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>find it</i> (<i>B_y</i>)	COMPL	nkyajǎ́	4	nkyājǎ́	11
	PROG	ntíkyajǎ́	4	ntíkyājǎ́	11
	HAB	nkyajǎ́	4	nkyājǎ́	11
	POT	kyajǎ́	4	kyājǎ́	11
	POT	xoóʔ	4	xoóʔ	11
<i>heal</i> (<i>B_y</i>)	COMPL	nkyakǎ́	4	nkyākǎ́	11
	PROG	ntíkyakǎ́	4	ntíkyākǎ́	11
	HAB	nkyakǎ́	4	nkyākǎ́	11
	POT	kyakǎ́	4	kyākǎ́	11
<i>pick it up</i> (<i>B_y</i>)	COMPL	nkyukwǎ́n	4	nkyūk wǎ́n	11
	PROG	ntíkyukwǎ́n	4	ntíkyūk wǎ́n	11
	HAB	nkyukwǎ́n	4	nkyūk wǎ́n	11
	POT	kyukwǎ́n	4	kyūk wǎ́n	11
<i>revive</i> (<i>B_y</i>)	COMPL	nkyoʔǎ́	4	nkyoʔǎ́	11
<i>stand</i> (<i>B_{post}</i>)	COMPL	nkutuū́n	4	nkutū́n	11

(69) **Class C verb forms with Tone Class 4 (/M (H)/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>be</i>	COMPL	nkwā́	4	nkwá	11
(C _a)	PROG	nkyāká́	4	nkyāká	11
<i>jump</i>	COMPL	nkajlakāʔ	4	nkajlākáʔ	11
(C _a)	PROG	ntājlakāʔ	4	ntājlākáʔ	11
<i>vomit it</i>	COMPL	nkayakwḗn	4	nkayākwen	11
(C ₂)	PROG	nkyākwḗn	4	nkyākwén	11
<i>grind it</i>	COMPL	nkayoó́	4	nkayōó	11
(C ₂)	PROG	ntyóó́	4	ntyōó	11
<i>drink it</i>	COMPL	nkayoʔó́	4	nkayōʔó	11
(C ₂)	PROG	ntiʔó́	4	ntiʔó	11
<i>sell it</i>	COMPL	nkayujwíʔ	4	nkayūjwíʔ	11
(C ₂)	PROG	nkyūjwíʔ	4	nkyūjwíʔ	11
<i>get dressed</i>	COMPL	nkayakōʔ	4	nkayākóʔ	11
(C ₂)	PROG	nkyākōʔ	4	nkyākóʔ	11

5.4.3.1.5 Tone Class 8 person conjugation

Examples (70) and (71) present verb forms occurring with Tone Class 8 (/LH/) in 3s. 3s verb forms occurring with this Tone Class are not too widespread, out of about 220 roots, only 23 bear Tone Class 8. Their tonal ablaut is very regular. All roots (except one) regardless of the prefix Class present the same tonal ablaut pattern: 3s: Tone Class 8; 2s: Tone Class 11.

Furthermore, example (70) presents verb roots that occur with Tone Class 8 in the completive aspect, and do not show the corresponding progressive forms. This is due to the fact that the 3s progressive forms occur with a different Tone Class (Tone Class 11). If we examine the prefix Class

to which the roots in question belong to, we can see that most of them belong to prefix Class A_u. Although if we look at the data in example (70), we can also note that there are a couple of roots belonging to subClass A_u which show a regular tonal ablaut, i.e progressive forms with a composed TS consisting of a mid tone on the prefix and Tone Class 8 on the final mora of the stem.

The fact that some prefix Class A_u progressive forms belonging to tonal conjugation of Tone Class 8 migrated to Tone Class 11 is not totally surprising as we have seen in section 5.3.2 that Tone Class 11 is the most prevalent tonal pattern in subClass A_u roots.

(70) Class A verb forms with Tone Class 8 (/LH/) in 3s					
Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>run</i>	COMPL	nkasunǎ	8	nkayūná	11
(A _c)	PROG	ntāsunǎ	8	ntāsūná	11
<i>warn</i>	COMPL	nkitsǎ?	8	nkítsǎ?	11
(A ₂)	PROG (<i>irreg.</i>)	ntíkitsǎ?	8	ntíkítsǎ?	6
<i>carry it</i>	COMPL	nka?yǎ	8	nkā?yá	11
(A _u /C ₂)	PROG	nkyū?yǎ	8	nkyū?yá	11
<i>bless it</i>	COMPL	nkanakwǎn	8	nkanākwán	11
(A _u)	PROG	ntānakwǎn	8	ntānākwán	11
<i>cook it</i>	COMPL	nkakě?	8	nkāké?	11
(A _u /C ₂)	PROG	nkyūkě?	8	nkyūké?	11
<i>turn it off</i>	COMPL	nkasuwǐ?	8	nkasūwǐ?	11
(A _u)	PROG	ntāsuwǐ?	8	ntāsūwǐ?	11
<i>tie it</i>	COMPL	nkasakǎn?	8	nkasākán?	11
(A _u)	PROG	ntāsakǎn?	8	ntāsākán?	11
<i>count it</i>	COMPL	nkulakwǎ	8	nkulākwá	11
(A _u)					
<i>strain it</i>	COMPL	nkatikwǎ	8	nkatikwá	11
(A _u)					

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>sweep it</i> (A _u)	COMPL	nkalu ^{kw} ǎ	8	nkalu ^k kwá	11
<i>water it</i> (A _u)	COMPL	nkajil ^y ǎ	8	nkajil ^y á	11
<i>blow it</i> (A _u)	COMPL	nkala [?] ǎ	8	nkala [?] á	11
<i>make it</i> (A _u)	COMPL	nkatin ^y ǎn	8	nkatin ^y án	11
<i>raise it</i> (A _u)	COMPL	nkasakwě ⁿ	8	nkasāk ^w wén	11
<i>close it</i> (A _u)	COMPL	nkatak ^ũ n	8	nkata ^k ákún	11
<i>burry it</i> (A _u)	COMPL	nkwatsi [?]	8	nkwā ^t sí [?]	11
<i>enter</i> (B _y)	COMPL	nkayatě ⁿ	8	nkayā ^t én	11

(71) **Class C verb forms with Tone Class 8 (/LH/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>grow</i> (C _a)	COMPL	nkol ^õ	8	nkō ^l ó	11
	PROG	nkyāl ^õ	8	nkyā ^l ó	11
<i>grow old</i> (C _a)	COMPL	nkos ^õ ?	8	nkō ^s ó?	11
	PROG	nkyās ^õ ?	8	nkyā ^s ó?	11
<i>play it</i> (C ₂)	COMPL	nkayul ^ǎ	8	nkayū ^l á	11
	PROG	nkyū ^l ǎ	8	nkyū ^l ǎ	11
<i>cry</i> (C ₂)	COMPL	nkayun ^ǎ	8	nkayū ⁿ á	11
	PROG	nkyū ⁿ ǎ	8	nkyū ⁿ á	11
<i>sleep</i> (C ₂)	COMPL	nkayaj ^ǎ ?	8	nkayā ^j ǎ?	11
<i>chew it</i> (C ₂)	COMPL	nkayat ^ǎ ?	8	nkayā ^t ǎ?	11
	PROG	ntāyat ^ǎ ?	8	ntāyā ^t ǎ?	11

5.4.3.1.6 Tone Class 9 person conjugation

Examples (72), (73), and (74) present examples of verb forms occurring with Tone Class 9 (/L-LS/) in 3s organized according to prefix Class. 3s verb forms occurring with this Tone Class are frequent in the lexicon, and their tonal ablaut from 3s to 2s is very regular. All short vowel roots regardless of the prefix Class (except prefix Class A2) present the same tonal ablaut pattern: 3s: Tone Class 9; 2s: Tone Class 10.

If one examines the prefix Classes of the roots occurring with Tone Class 9, one can note that they are overwhelmingly subClass A_u. This fact is not surprising as was noted earlier in example (42) on page 343 that the aspectual tonal ablaut for roots occurring with Tone Class 11 (/M-H/) in the 3s completive aspect is: Tone Class 11 in the 3s progressive and Tone Class 9 in the 3s habitual and potential forms. Furthermore, as was also noted then, Tone Class 11 is the most widespread tonal pattern in roots belonging to prefix subClass A_u. Tone Class 9 is the preferred Tone Class to mark potential and habitual aspects.

Furthermore, example (72) presents verb forms belonging to subClass A2 with an irregular tonal ablaut pattern. One of the forms occurs with the causative morpheme *ix-* ('hang it'). One may notice that in the completive, habitual and potential forms, when the stem occurs with Tone Class 9, the antepenultimate mora surfaces with a high tone (/H/). This phenomenon only happens when a causative verb stem bears Tone Class 9.

Example (74) presents all the long vowel stems occurring with Tone Class 9. Verb forms featuring long vowels occurring with Tone Class 9 in 3s mark 2s with Tone Class 12 (/M-M-L/) in dimoraic forms, and Tone Class 15 (/L-M-L/) in trimoraic verb forms.

(72) **Class A verb forms with Tone Class 9 (/L-LS/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>open it</i>	HAB	ntusàlá	9	ntusālā	10
(A _u)	POT	kusàlá	9	kusālā	10
<i>tighten it</i>	HAB	ntusìn ^y ǎn?	9	ntusìn ^y ān?	10
(A _u)	POT	kusìn ^y ǎn?	9	kusìn ^y ān?	10
<i>take it down</i>	HAB	ntutì?yǎ	9	ntutì?yā	10
(A _u)	POT	kutì?yǎ	9	kutì?yā	10
<i>say bye</i>	HAB	ntusàlá?	9	ntusālā?	10
(A _u)	POT	kusàlá?	9	kusālā?	10
<i>write it</i>	HAB	ntukà?ǎn	9	ntukā?ān	10
(A _u)	POT	kukà?ǎn	9	kukā?ān	10
<i>spend it</i>	HAB	ntulìjǐ	9	ntulijī	10
(A _u)	POT	kulìjǐ	9	kulijī	10
<i>spend it</i>	HAB	ntixì?yǎ	9	ntixì?yā	10
(A _u)	POT	xì?yǎ	9	xì?yā	10
<i>spread it</i>	HAB	ntutà?ǎn	9	ntutā?ān	10
(A _u)	POT	kutà?ǎn	9	kutā?ān	10
<i>incline it</i>	HAB	ntusàkǐ	9	ntusākī	10
(A _u)	POT	kusàkǐ	9	kusākī	10

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>rock it</i>	HAB	ntusà?nán	9	ntusā?nān	10
(A _u)	POT	kusà?nán	9	kusā?nān	10
<i>lie</i>	HAB	ntùn ^{yí}	9	ntūn ^{yī}	10
(A _u /C2)	POT	kùn ^{yí}	9	kūn ^{yī}	10
<i>hit it</i>	HAB	ntujì?ín	9	ntujī?īn	10
(A _u)	POT	kujì?ín	9	kujī?īn	10
<i>peel it</i>	HAB	ntutùkwín?	9	ntutūkwīn?	10
(A _u)	POT	kutùkwín?	9	kutūkwīn?	10
<i>loose it</i>	HAB	ntutùnǎ?	9	ntutūnā?	10
(A _u)	POT	kutùnǎ?	9	kutūnā?	10
<i>paint it</i>	HAB	ntokò?ó	9	ntokō?ō	10
(A _u)	POT	kokò?ó	9	kokō?ō	10
<i>turn it on</i>	HAB	ntukà?ǎn	9	ntukā?ān	10
(A _u)	POT	kukà?ǎn	9	kukā?ān	10
<i>look for it</i>	HAB	ntùnán	9	ntūnān	10
(A _u)	POT	kùnán	9	kūnān	10
<i>break it</i>	HAB	ntùchá	9	ntūchā	10
(A _u /C2)	POT	kùchá	9	kūchā	10
<i>repass it</i>	HAB	ntutì?ín	9	ntutī?īn	10
(A _u)	POT	kutì?ín	9	kutī?īn	10
<i>shake it</i>	HAB	ntutsikwín	9	ntutsikwīn	10
(A _u)	POT	kutsikwín	9	kutsikwīn	10
<i>weave it</i>	HAB	ntutàjlá?	9	ntutājā?	10
(A _u)	POT	kutàjlá?	9	kutājā?	10
<i>toast it</i>	HAB	ntukì?í	9	ntukī?ī	10
(A _u)	POT	kukì?í	9	kukī?ī	10
<i>peck it</i>	HAB	ntutìjyǎ?	9	ntutījā?	10
(A _u)	POT	kutìjyǎ?	9	kutījā?	10

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>slap it</i>	HAB	ntijìkwǎn?	9	ntijìkwān?	10
(A _c)	POT	jìkwǎn?	9	jìkwān?	10
<i>swallow it</i>	HAB	ntijìkwín?	9	ntijìkwīn?	10
(A _c)	POT	jìkwín?	9	jìkwīn?	10
<i>whistle</i>	HAB	ntijìwí	9	ntijìwī	10
(A _c)	POT	jìwí	9	jìwī	10
<i>cut it</i>	HAB	ntusì?yǒ	9	ntusì?yō	10
(A _c)	POT	kusì?yǒ	9	kusì?yō	10
<i>thresh it</i>	HAB	ntixùkwǎ?	9	ntixùkwā?	10
(A _c)	POT	xùkwǎ?	9	xùkwā?	10
<i>laugh</i>	HAB	ntixìt ^{yí}	9	ntixìt ^{yī}	10
(A _c)	POT	xìt ^{yí}	9	xìt ^{yī}	10
<i>massage it</i>	HAB	ntijìkwí	9	ntijìkwī	10
(A _c)	POT	jìkwí	9	jìkwī	10
<i>ask for it</i>	HAB	ntijìn ^{yǎn}	9	ntijìn ^{yān}	10
(A _c)	POT	jìn ^{yǎn}	9	jìn ^{yān}	10
<i>marry</i>	HAB	nt ^{yè} ?én	9	nt ^{yē} ?ēn	10
(A _c)	POT	t ^{yè} ?én	9	t ^{yē} ?ēn	10
<i>hang it</i>	COMPL	ngwíxtìkwí	9	ngwíxtìkwī	6
(A ₂) (irreg.)	PROG	ntíxtìkwí	9	ntíxtìkwī	6
	HAB	ntíxtìkwí	9	ntíxtìkwī	6
	POT	kíxtìkwí	9	kíxtìkwī	6
<i>change clothes</i>	COMPL	nkwichà?ǎn	9	nkwichà?ān	6
(A ₂) (irreg.)	PROG	ntātsà?ǎn	9	ntātsà?ān	6
	HAB	ntichà?ǎn	9	ntichà?ān	10
	POT	chà?ǎn	9	chā?ān	10

(73) **Class B verb forms with Tone Class 9 (/L-LS/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>sneeze</i>	HAB	nkyàǎǎ	9	nkyàǎǎ	10
(B _y)	POT	kyàǎǎ	9	kyāǎǎ	10
<i>fall</i>	HAB	ntìl ^y ǒ	9	ntìl ^y ō	10
(B _{post})	POT	tìl ^y ǒ	9	tìl ^y ō	10
<i>go out</i>	HAB	nt ^y òǒǒ	9	nt ^y ōǒǒ	10
(B _{post})	POT	t ^y òǒǒ	9	t ^y ōǒǒ	10

(74) **Long vowel verb forms with Tone Class 9 (/L-LS/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>escape</i>	HAB	ntulāǎǎ	9	ntulāà	15
(B _c)	POT	l ^y āǎǎ	9	l ^y āà	12
<i>squeeze it</i>	HAB	ntusìǎǎ?	9	ntùsìǎǎ?	15
(A _u)	POT	kusìǎǎ?	9	kùsìǎǎ?	15
<i>let it loose</i>	HAB	ntulāǎǎ	9	ntulāà	15
(A _u)	POT	kulāǎǎ	9	kùlāà	15
<i>sort it</i>	HAB	ntusuwǎǎ	9	ntusùwǎǎ	15
(A _u)	POT	kusuwǎǎ	9	kusùwǎǎ	15
<i>give it</i>	HAB	ntāǎǎ	9	ntāà	12
(A _u)	POT	kutāǎǎ	9	kùtāà	15
<i>clean it</i>	HAB	ntunǎǎ	9	ntùnǎǎ	15
(A _u)	POT	kunǎǎ	9	kùnǎǎ	15
<i>fight</i>	HAB	ntixùǎǎ	9	ntìxùǎǎ	15
(A _c)	POT	xùǎǎ	9	xùǎǎ	12
<i>put it</i>	COMPL	ngwǎǎǎǎ	9	ngwǎǎǎǎ	15
(A2)	PROG	ntǎǎǎǎ	9	ntǎǎǎǎ	15
	HAB	ntǎǎǎǎ	9	ntǎǎǎǎ	15
	POT	kǎǎǎǎ	9	kǎǎǎǎ	15

5.4.3.1.7 **Tone Class 10 person conjugation**

Examples (75), (76), and (77) present 3s verb forms occurring with

Tone Class 10 (/M-M/). They show that 3s verb forms bearing Tone Class 10 are present in all three prefix Classes, but they are not widespread. All roots regardless of the prefix Class present the same tonal ablaut pattern:
 3s: Tone Class 10; 2s: Tone Class 12.

(75) **Class A verb forms with Tone Class 10 (/M-M/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>cough</i> (A _c)	COMPL	nkātōōʔ	10	nkātōòʔ	12
<i>see it</i> (A _c)	COMPL	nāʔān	10	nāʔàn	12
<i>transport it</i> (A _u)	COMPL	nkātēēn	10	nkātēèn	12
<i>do it</i> (A _u /C2)	COMPL	nkāʔnī	10	nkāʔnì	12
<i>overthrow it</i> (A _u /C2)	COMPL	nkātʔēn	10	nkātʔèn	12
<i>burst</i> (A _u /C2)	COMPL	nkāchō	10	nkāchò	12
<i>pull it out</i> (A _u)	COMPL	nkasōō	10	nkāsōò	12
<i>wet it</i> (A _u /C2)	COMPL	nkāchāʔ	10	nkāchàʔ	12

(76) **Class B verb forms with Tone Class 10 (/M-M/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>turn around</i> (B _{post})	COMPL	nkutīl ^y ō	10	nkūtīl ^y ò	12
	PROG	ntātīl ^y ō	10	ntātīl ^y ò	12
	HAB	ntīl ^y ō	10	ntīl ^y ò	12
	POT	tīl ^y ō	10	tīl ^y ò	12
<i>slim down</i> (B _c)	COMPL	nkulātī	10	nkūlātì	12
<i>arrive</i> (B _y)	COMPL	nkyālā	10	nkyālà	12
<i>wash it</i> (B _y)	COMPL	nkyā?ān	10	nkyā?àn	12
<i>come here</i> (to base) (B _y)	COMPL	nkyāān	10	nkyāàn	12
<i>leave there</i> (not base)(B _{post})	COMPL	yāā	10	yāà	12

(77) **Class C verb forms with Tone Class 10 (/M-M/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>come here</i> (not base)(C _a)	COMPL	n ^y āān	10	n ^y āàn	12
<i>die</i> (C _a)	COMPL	nkūjwī	10	nkūjwì	12
<i>explode</i> (C _a)	COMPL	nkōtsō	10	nkōtsò	12
<i>hear it</i> (C ₂)	COMPL	nkayūnā	10	nkāyūnà	12
<i>kill it</i> (C ₂)	COMPL	nkayūjwī	10	nkāyūjwì	12
<i>get scared</i> (C ₂)	COMPL	nkayūtsēn	10	nkāyūtsèn	12
<i>smell it</i> (C ₂)	COMPL	nkayūkwīn?	10	nkāyūkwìn?	12

5.4.3.1.8 Tone Class 11 person conjugation

Examples (78), (79), (80), (81), and (82) present the tonal ablaut patterns for 3s verb forms occurring with Tone Class 11 (/M-H/). As suggested by the large amount of data presented in the examples to follow, 3s verb stems with Tone Class 11 are among the most widespread in the lexicon (3s verb stems occurring with Tone Class 9 may be the second most widespread tonal pattern).

The most salient fact revealed here is that the majority 3s stems with Tone Class 11 belong to the prefix Class A and particularly to SubClass A_u.

Example (78) presents a list of SubClass A_u and A_c verb forms occurring with Tone Class 11. Their tonal ablaut pattern is very regular: 3s completive forms occur Tone Class 11, 2s completive forms occurs with Tone Class 10 (/M-M/). The corresponding 3s progressive forms occur with Tone Class 11 (because of the /M/ tone prefix, the surface pattern is a composed TS), 2s occurs with Tone Class 14 (/M-H-M/).

(78) SubClasses A_u and A_c verb forms with Tone Class 11 in 3s

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>open it</i>	COMPL	nkasālá	11	nkasālā	10
(A _u)	PROG	ntāsālá	11	ntāsālā	14
<i>tighten it</i>	COMPL	nkasīn ^y án?	11	nkasīn ^y ān?	10
(A _u)	PROG	ntāsīn ^y án?	11	ntāsīn ^y ān?	14
<i>take it down</i>	COMPL	nkati?yá	11	nkati?yā	10
(A _u)	PROG	ntāti?yá	11	ntāti?yā	14
<i>hit it</i>	COMPL	nkaji?ín	11	nkaji?in	10
(A _u)	PROG	ntājí?ín	11	ntājí?in	14
<i>paint it</i>	COMPL	nkakō?ó	11	nkakō?ō	10
(A _u)	PROG	ntākō?ó	11	ntākó?ō	14
<i>say bye</i>	COMPL	nkasālá?	11	nkasālā?	10
(A _u)	PROG	ntāsālá?	11	ntāsālā?	14
<i>write it</i>	COMPL	nkakā?án	11	nkakā?ān	10
(A _u)	PROG	ntākā?án	11	ntākā?ān	14
<i>weave it</i>	COMPL	nkatajílá?	11	nkatajlā?	10
(A _u)	PROG	ntātājílá?	11	ntātājlā?	14
<i>toast it</i>	COMPL	nkakí?í	11	nkakí?i	10
(A _u)	PROG	ntākí?í	11	ntākí?i	14

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>peel it</i>	COMPL	nkatūkwin?	11	nkatūkwin?	10
(A _u)	PROG	ntātūkwin?	11	ntātūkwin?	14
<i>loose it</i>	COMPL	nkatūná?	11	nkatūnā?	10
(A _u)	PROG	ntātūná?	11	ntātūnā?	14
<i>peck it</i>	COMPL	nkatijyá?	11	nkatijyā?	10
(A _u)	PROG	ntātijyá?	11	ntātijyā?	14
<i>shake it</i>	COMPL	nkatsikwin	11	nkatsikwin	10
(A _u)	PROG	ntātsikwin	11	ntātsikwin	14
<i>cut it</i>	COMPL	nkasi?yó	11	nkasi?yō	10
(A _u)	PROG	ntāsī?yó	11	ntāsī?yō	14
<i>spend it</i>	COMPL	nkalijí	11	nkalijī	10
(A _u)	PROG	ntālijí	11	ntālijī	14
<i>incline it</i>	COMPL	nkasākí	11	nkasākī	10
(A _u)	PROG	ntāsākí	11	ntāsākī	14
<i>rock it</i>	COMPL	nkasā?nán	11	nkasā?nān	10
(A _u)	PROG	ntāsā?nán	11	ntāsā?nān	14
<i>pinch it</i>	COMPL	nkatixó	11	nkatixō	10
(A _u)	PROG	ntātixó	11	ntātixō	14

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>swallow it</i>	COMPL	nkajikwín?	11	nkajikwīn?	10
(A _c)	PROG	ntājikwín?	11	ntājikwīn?	14
<i>laugh</i>	COMPL	nkasit ^y í	11	nkasit ^y ī	10
(A _c)	PROG	ntāsít ^y í	11	ntāsít ^y ī	14
<i>slap it</i>	COMPL	nkajikwán?	11	nkajikwān?	10
(A _c)	PROG	ntājikwán?	11	ntājikwān?	14
<i>ask for it</i>	COMPL	nkajin ^y án	11	nkajin ^y ān	10
(A _c)	PROG	ntājín ^y án	11	ntājín ^y ān	14
<i>scream</i>	COMPL	nkasi [?] yá	11	nkasi [?] yā	10
(A _c)	PROG	ntāsí [?] yá	11	ntāsí [?] yā	14
<i>massage it</i>	COMPL	nkajikwí	11	nkajikwī	10
(A _c)	PROG	ntājikwí	11	ntājikwī	14
<i>thresh it</i>	COMPL	nkasūkwá?	11	nkasūkwā?	10
(A _c)	PROG	ntāsūkwá?	11	ntāsūkwā?	14
<i>marry</i>	COMPL	nkate [?] én	11	nkate [?] ēn	10
(A _c)	PROG	ntāté [?] én	11	ntāté [?] ēn	14
<i>whistle</i>	COMPL	nkajiwí	11	nkajiwī	10
(A _c)	PROG	ntājiwí	11	ntājiwī	14

Example (79) presents a small group of verb forms occurring with Tone Class 11 which present an irregular tonal ablaut pattern. Some of those forms are irregular because the progressive forms occur with the same Tone Class as the completive forms. Others are irregular because the 2s progressive forms occur with Tone Class 6. This irregularity cannot be explained on the basis of the prefix Class since it includes A_u roots nor the stem shape since it includes dimoraic as well as trimoraic verb forms

(79) **Irregular Class A_u verb forms with Tone Class 11 in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>break it</i>	COMPL	nkāchá	11	nkāchā	10
(A _u /C2)	PROG	nkyūchá	11	nkyūchā	10
<i>lie</i>	COMPL	nkān ^{yí}	11	nkān ^{yī}	10
(A _u /C2)	PROG	nkyūn ^{yí}	11	nkyūn ^{yī}	10
<i>look for it</i>	COMPL	nkānán	11	nkānān	10
(A _u)	PROG	ntānán	11	ntānān	10
<i>turn it on</i>	COMPL	nkakā?án	11	nkakā?ān	10
(A _u)	PROG	ntākā?án	11	ntākā?ān	6
<i>repass it</i>	COMPL	nkati?ín	11	nkati?īn	10
(A _u)	PROG	ntāti?ín	11	ntāti?īn	6
<i>burry it</i>	PROG	ntākwātsí?	11	ntākwātsi?	6
(A _u)					
<i>water it</i>	PROG	ntājil ^{yá}	11	ntājil ^{yā}	6
(A _u)					

Example (80) presents a small group of irregular progressive forms occurring with Tone Class 11 both for the 3s and 2s. Those forms are irregular for two reasons: first because their corresponding 3s completive forms do not occur with Tone Class 11 as expected but with Class 8 (/LH/) or Class 4 (/M (H)/), and that's the reason why those completive forms are not shown here; second, because they do not show any tonal alternation between the 3s and 2s.

(80) **Irregular SubClass A_u progressive verb forms**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>count it</i> (A _u)	PROG	ntālākwá	11	ntālākwá	11
<i>strain it</i> (A _u)	PROG	ntātīkwá	11	ntātīkwá	11
<i>sweep it</i> (A _u)	PROG	ntālūkwa	11	ntālūkwa	11
<i>blow it</i> (A _u)	PROG	ntālāʔá	11	ntālāʔá	11
<i>raise it</i> (A _u)	PROG	ntāsākwén	11	ntāsākwén	11
<i>close it</i> (A _u)	PROG	ntātākón	11	ntātākón	11

Example (81) groups all the A2 roots. As was discussed in §5.3.1.3 SubClass A2 includes all the causative verb forms occurring with causative morpheme *ix-*. It was also shown that the tonal ablaut pattern across aspects for these causative forms is unusual because the tone is invariant, i.e, the tone is the same for all 3s aspectual forms. Another interesting fact to point out is that these causative forms present the only examples of tone 14 (/M-H-M/) in dimoraic stems. This Tone Class is usually exclusive to 2s progressive forms whose corresponding 3s completive form occurs with Tone Class 11 and usually only occurs on trimoraic stems.

(81) **Class A2 verb forms with Tone Class 11 (/M-H/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>bathe it</i> (A ₂)	COMPL	nkwixkātá	11	nkwixkātā	10
	PROG	ntixkātá	11	ntixkātā	14
	HAB	ntixkātá	11	ntixkātā	14
	POT	xkātá	11	xkātā	14
<i>feed it</i> (A ₂)	COMPL	nkwixkākó	11	nkwixkākō	10
	PROG	ntixkākó	11	ntixkākō	14
	HAB	ntixkākó	11	ntixkākō	14
	POT	xkākó	11	xkākō	14
<i>soften it</i> (A ₂)	COMPL	nkwixkūtí	11	nkwixkūtī	10
	PROG	ntixkūtí	11	ntixkūtī	14
	HAB	ntixkūtí	11	ntixkūtī	14
	POT	xkūtí	11	xkūtī	14
<i>boil it</i> (A ₂)	COMPL	nkwixl ^y ákwí	11	nkwixl ^y ákwī	10
	PROG	ntixl ^y ákwí	11	ntixl ^y ákwī	14
	HAB	ntixl ^y ákwí	11	ntixl ^y ákwī	14
	POT	xl ^y ákwí	11	xl ^y ákwī	14
<i>return</i> (A ₂)	COMPL	nkwixtikwí	11	nkwixtikwī	10
	PROG	ntixtikwí	11	ntixtikwī	14
	HAB	ntixtikwí	11	ntixtikwī	14
	POT	xtikwí	11	xtikwī	14
<i>look alike</i> (A ₂)	COMPL	nkwit ^y ó?ó	11	nkwit ^y ó?ō	10
	PROG	ntit ^y ó?ó	11	ntit ^y ó?ō	14
	HAB	nt ^y ó?ó	11	nt ^y ó?ō	10
	POT	t ^y ó?ó	11	t ^y ó?ō	10
<i>leave it</i> (A ₂)	COMPL	nkwixānú	11	nkwixānū	10
	PROG	ntixānú	11	ntixānū	14
	HAB	ntixānú	11	ntixānū	10
	POT	xānú	11	xānū	10

Example (82) groups verbs from prefix Classes B and C which occur with Tone Class 11 in 3s forms. As shown by the small amount of data presented, these prefix Classes do not include a lot of verbs with Tone Class 11

in 3s forms. Their tonal ablaut pattern is similar to all verb forms presented above in example (78) for prefix Class A.

(82) **Class B and C verb forms with Tone Class 11 (/M-H/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>fall</i>	COMPL	nkutíl ^y ó	11	nkutíl ^y ō	10
(<i>B_{post}</i>)	PROG	ntātíl ^y ó	11	ntātíl ^y ō	14
<i>go out</i>	COMPL	nkotō?ó	11	nkotō?ō	10
(<i>B_{post}</i>)	PROG	ntātō?ó	11	ntātó?ō	14
<i>sneeze</i>	COMPL	nkyājá	11	nkyājā	10
(<i>B_y</i>)	PROG	ntíkyājá	11	ntíkyājā	14
<i>enter it</i>	PROG	ntíkyātén	11	ntíkyātén	11
(<i>B_y</i>)					
<i>stay</i>	COMPL	nkyānú	11	nkyānū	10
(<i>B_y</i>)	PROG	ntíkyānú	11	ntíkyānū	14
	HAB	nkyānú	11	nkyānū	10
	POT	kyānú	11	kyānū	10
<i>be born</i>	COMPL	nkūlá	11	nkūlā	10
(<i>C_a</i>)					

Example (83) presents all the long vowel stems occurring with Tone Class 11. Long vowel stems occurring with Tone Class 11 in 3s complete occur with the same Tone Class in the progressive (because of the /M/ tone prefix *ntā-* the verb forms occur with a composed TS: [M-M-H]). Furthermore, the 2s and 3s progressive forms occur with Tone Class 14 when trimoraic and Tone Class 12 when dimoraic.

(83) Long vowel verb stems with Tone Class 11 (/M-H/) in 3s

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>let it loose</i>	COMPL	nkālāá	11	nkālāā	14
(A _u)	PROG	ntālāá	11	ntālāā	14
<i>squeeze it</i>	COMPL	nkasíín?	11	nkāsíīn?	14
(A _u)	PROG	ntāsíín?	11	ntāsíīn?	14
<i>sort it</i>	COMPL	nkasuwíí	11	nkāsūwíí	14
(A _u)	PROG	ntāsuwíí	11	ntāsūwíí	14
<i>give it</i>	COMPL	nkataáá	11	nkātāā	14
(A _u)	PROG	ntātāáá	11	ntātāā	14
<i>clean it</i>	COMPL	nkaniíí	11	nkānīí	14
(A _u)	PROG	ntānīíí	11	ntānīí	14
<i>fight</i>	COMPL	nkasūún	11	nkāsúūn	14
(A _c)	PROG	ntāsūún	11	ntāsúūn	14
<i>turn it in</i>	COMPL	nkwit ^y āá	11	nkwīt ^y āā	14
(A ₂)	PROG	ntiit ^y āá	11	ntīt ^y āā	14
	HAB	nt ^y āá	11	nt ^y āà	12
	POT	t ^y āá	11	t ^y āà	12
<i>escape</i>	COMPL	nkulāá	11	nkūlāā	14
(B _c)	PROG	ntālāá	11	ntālāā	14

5.4.3.1.9 Tone Class 12 person conjugation

Examples (84), (85), and (86) present the tonal ablaut patterns for 3s verb forms occurring with Tone Class 12 (/M-M-L/). As mentioned earlier, this Tone Class often marks progressive aspect of 3s completive forms occurring with Tone Class 1 and Tone Class 10. Because many of the verbs presented in the following examples are progressive forms, many of the corresponding 2s are composed TS's presenting a progressive mid tone prefix appended to a stem marked for 2s.

Example (84) shows that one possible pattern for 2s person marking

on 3s Tone Class 12 forms is Tone Class 6 (/L-M/). All of the 2s forms are composed TS's. The trimoraic forms present no collision of tone as there are enough moras to host all tonal elements: the mid-tone of the progressive prefix (on antepenultimate mora) and both tonal elements of Tone Class 6 (/L-M/) yielding: /M-L-M/. However, the dimoraic forms do present a collision of tones, resulting in the deletion of penultimate tonal element of TS (/L-M/) as stated in figure 5.3. The surface tonal pattern is /M-M/ which is composed of a mid-tone from progressive prefix appended to a stem marked for 2s with Tone Class 6 (/L-M/) where only the final tonal element (/M/) links to the stem.

(84) **Class A verb forms with Tone Class 12 (/M-M-L/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>pluck it</i> (A _c)	PROG	ntāsikwàn	12	ntāsikwān	6
<i>walk</i> (A _c)	PROG	ntātāʔàn	12	ntātāʔān	6
<i>catch it</i> (A _c)	PROG	ntāsīn ^y ì	12	ntāsīn ^y ī	6
<i>defecate</i> (A _c)	PROG	ntātīchòʔ	12	ntātīchōʔ	6
<i>wait for it</i> (A _u)	PROG	ntāwītà	12	ntāwītā	6
<i>speak</i> (B _c)	PROG	nkyākwiʔ	12	nkyākwiʔ	6
<i>bathe</i> (C2)	PROG	nkyātà	12	nkyātā	6
<i>suck it</i> (C2)	PROG	nkyātiʔ	12	nkyātīʔ	6
<i>eat it</i> (C2)	PROG	nkyākò	12	nkyākō	6
<i>touch it</i> (C2)	PROG	nkyālàʔ	12	nkyālāʔ	6
<i>poke it</i> (C2)	PROG	nt ^y ōjòʔ	12	nt ^y ōjōʔ	6
<i>die</i> (C _a)	PROG	ntījà	12	ntījā	6

Example (85) presents a set of 3s progressive forms which mark 2s with Tone Class 12 also. So both 3s and 2s are homophonous. This irregularity does not seem to be based on the prefix Class since it includes verbs from Subclasses which are also present in example (84) above, nor on the stem shape since it includes dimoraic as well as trimoraic stems.

(85) **Irregular progressive forms with tone Class 12 (/M-M-L/) in 2s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>see it</i> (A _c)	PROG	ntānā?àn	12	ntānā?àn	12
<i>do it</i> (A _u /C2)	PROG	nkyū?nì	12	nkyū?nì	12
<i>wet it</i> (B _c)	PROG	nkyūchà?	12	nkyūchà?	12
<i>hear it</i> (C2)	PROG	nkyūnà	12	nkyūnà	12
<i>kill it</i> (C2)	PROG	nkūjwì	12	nkūjwì	12
<i>get scared</i> (C2)	PROG	nkyūtsèn	12	nkyūtsèn	12
<i>smell it</i> (C2)	PROG	nkyūkwìn?	12	nkyūkwìn?	12

Example (86) groups all the long vowel stems occurring with Tone Class 12 in 3s. In this case also, the 3s form is homophonous with 2s

(86) **Long vowel verb stems with Tone Class 12 (/M-M-L/) in 3s**

Gloss	ASP	3s	Stem tone	2s	Stem tone
<i>transport it</i> (A _u)	PROG	ntātēèn	12	ntātēèn	12
<i>pull it out</i> (A _u)	PROG	ntāsōò	12	ntāsōò	12
<i>arrive there</i> (not base)	COMPL	nkūtyāà	12	nkūtyāà	12
<i>(not base)</i> (B _{post})	PROG	ntātyāà	12	ntātyāà	12
<i>arrive there</i> (base)	COMPL	nkūtyāàn	12	nkūtyāàn	12
<i>(base)</i> (B _{post})	PROG	ntātyāàn	12	ntātyāàn	12
<i>stand</i> (B _c)	PROG	ntātūùn	12	ntātūùn	12

Tone Class 12 presents two different tonal ablaut patterns for 2s:

3s: 12; 2s: 6

3s: 12; 2s: 12

5.4.3.1.10 Conclusion

As demonstrated by the data presented in this section, the tonal ablaut pattern from 3s to 2s is quite predictable based on the tonal Class of the 3s. Table 5.14 summarizes the patterns for all Tone Classes occurring on 3s verb forms and shows that aspect does not matter, what matters is the Tone Class of the 3s verb form. One exception to this generalization is for the tonal ablaut pattern for verb forms occurring with Tone Class 11. Indeed, the completive forms occur with Tone Class 10, and the progressive forms occur with Tone Class 14. Tone Class 12 is the only Class which presents 2 different patterns on short vowel stems for marking 2s.

Furthermore, stem shape matters as we have seen that long vowel stems whose corresponding 3s forms occur with Tone Class 1, 3, 13, 9, 11, and 12 occur in the 2s with Tone Class 12 or 15 depending on the moraic shape of the stem.

5.4.3.2 1s subject person marking on verbs

We have seen in the previous section that if one knows the Tone Class of the 3s form of a verb, one can pretty accurately predict the Tone Class

Stem tone in 3s	Stem tone in 2s	Long vowel Stem tone in 2s
1	6	12/15
3	6	12/15
13	6	12/15
4	11	11
8	11	---
9	11	12/15
10	12	12
11	10 COMPL; 14 PROG	14/12
12	6/12	12

Table 5.14: Tonal ablaut patterns for subject marking on verbs

for the corresponding 2s form.

However, this relationship is not maintained between the 3s and the 1s. A more accurate way of predicting the 1s tonal pattern for a particular verb across aspects is by considering the tonal pattern for 3s across aspects.

Before examining those patterns, a couple of phenomenon regarding 1s person marking on verbs ought to be mentioned. 1s is marked on verbs with final vowel nasalization with or without tonal ablaut, and which verbs are marked by both processes may seem to be random, although as will be demonstrated in this section, the prefix Class to a which a verb belongs is actually important for predicting tonal ablaut in 1s.

Examples (87) and (88) present irregular 1s verb forms. Example (87) shows a couple of verbs where the 1s is suppletive, and as a result the 1s segmental form cannot be derived simply by nasalizing the final vowel of stem.

(87) **Suppletive 1s verb forms**

Gloss	Root	Prefix Class	Aspect	1s form	Tone
<i>go there to base</i>	-yaa	B _y	COMPL	ngyaʔān	5
<i>go there not base</i>	-aa	B _{post}	COMPL	yāʔàn	12
			HAB	ntàʔǎn	9
			POT	tsàʔǎn	9

Example (88) shows segmentally irregular potential 1s forms that obey the regular nasalization rule but they also occur with a /u/ just before the root. Most of these verbs belong to Subclass A_c, and only a few belong to Suclases B_c, B_{post} and C2. The only *u-* prefix known is the causative *u-* encountered in Subclass A_u verbs. It is unclear why it would appear in these potential 1s forms.

(88) **Segmentally irregular 1s potential verb forms**

Gloss	Root	Prefix Class	1s form	Tone
<i>pluck it</i>	-sikwan	A _c	kusikwan	1
<i>thresh it</i>	-sūkwá?	A _c	kusukwan?	1
<i>massage it</i>	-jīkwín	A _c	kujikwin	1
<i>slap it</i>	-jīkwán?	A _c	kujikwan?	1
<i>swallow it</i>	-jīkwín?	A _c	kujikwin?	1
<i>ask for it</i>	-jīn ^y án	A _c	kujin ^y an	1
<i>whistle</i>	-jīwí	A _c	kujiwin	1
<i>laugh</i>	-sīt ^y í	A _c	kusit ^y in	1
<i>scream</i>	-sī ^y á	A _c	kusi ^y ?n ^y an	1
<i>fight</i>	-sūún	A _c	kusuun	1
<i>walk</i>	-ta?an	A _c	kutà?án	9
<i>defecate</i>	-ticho?	A _c	kutìchún?	9
<i>buy it</i>	-si?í	A _c	kusi?ín	9
<i>throw it away</i>	-skwaān'	A _c	kuskwàán	9
<i>marry</i>	-tē?én	A _c	kutè?én	9
<i>be born</i>	-ti?in	B _c	kuti?ín	9
<i>go out</i>	-tō?ó	B _{post}	kutù?ún	9
<i>lie down</i>	-sukwǎ	B _{post}	kusùkwǎn	9
<i>off the ground</i>				
<i>lay down</i>	-suti	B _{post}	kusùtín	9
<i>on the ground</i>				
<i>speak</i>	-akwi?	C2	kùkwín?	9
<i>see</i>	-tō?ō	A _c	kuna?ān	5

Now that all the segmentally irregular 1s verb forms have been discussed, we can turn to solely examining the most salient tonal ablaut patterns across aspects to demonstrate that the 3s aspect tonal ablaut pattern is crucial in predicting the 1s tone. In Table 5.15, the table headings **C**, **Pr**, **P** stand for Completive, Progressive, and Potential aspects. The data presented should be read as follows:

For verbs with 3s tonal pattern α across aspects, all forms belonging to Subclass C2 present a 11 11 9 tonal ablaut pattern for 1s. Verbs belonging to prefix classes A and B, may present a: 1 12 1; 1 9 9; or a 9 9 9 tonal ablaut pattern for 1s.

For verbs with 3s tonal pattern β across aspects, all forms present a 5 5 5 tonal ablaut pattern for 1s. All forms with this 1s tonal ablaut pattern belong to prefix Class B.

Verbs with 3s tonal pattern γ across aspects, present a 9 9 9 or a 12 12 9 tonal ablaut pattern. Prefix class is not a factor in determining which one of the two occurs on a particular verb.

Verbs with 3s tonal pattern δ across aspects, present a 9 9 9 or a 4 4 4 tonal ablaut pattern. Prefix class is not a factor in determining which one of the two occurs on a particular verb.

For verbs with 3s tonal pattern ϵ across aspects, all forms present a 5 5 5 or a 9 9 9 tonal ablaut pattern for 1s. All forms with this 1s tonal ablaut pattern belong to prefix Subclass A2.

For verbs with 3s tonal pattern ζ across aspects, Subclass A_u and Subclass A_c forms present a 5 5 5, and some Subclass A_u forms only present a 9 9 9 tonal ablaut pattern for 1s.

For verbs with 3s tonal pattern η across aspects, all forms present a 9 9 9 tonal ablaut pattern for 1s. All forms with this 1s tonal ablaut pattern belong to prefix Subclass A2.

Verbs with 3s tonal pattern θ across aspects, present a 1 5 1 pattern for Subclass A_u and A_c forms, or a 5 5 5 pattern for some A_u forms only. All Class B forms show a 9 9 9 tonal ablaut pattern for 1s.

For verbs with 3s tonal pattern κ across aspects, all forms present a 9 9 9 tonal ablaut pattern for 1s. Almost all forms with 3s tonal ablaut pattern κ belong to prefix Class A and in particular Subclass A2.

For verbs with 3s tonal pattern λ across aspects, all forms present a 9 9 9 tonal ablaut pattern for 1s. All forms with this 1s tonal ablaut pattern belong to prefix Subclass A_u .

For verbs with 3s tonal pattern μ across aspects, all forms present a 10 10 10 tonal ablaut pattern for 1s. All forms with this 1s tonal ablaut pattern belong to prefix Subclass A2.

For verbs with 3s tonal pattern ν across aspects, all forms present a 1 12 1 tonal ablaut pattern for 1s. All forms with this 1s tonal ablaut pattern belong to prefix Subclass C2.

For verbs with 3s tonal pattern ξ across aspects, all forms present a 9 9 9 tonal ablaut pattern for 1s. All forms with 1s tonal ablaut pattern belong to prefix Subclass A2.

Table 5.15 shows that by considering the 3s tonal ablaut patterns across aspects, the prediction for 1s tonal ablaut is narrowed down to a few options. For some 3s patterns, the prefix Class actually predicts exactly which 1s tonal ablaut pattern a form occurs with. This is an important

Ablaut Pattern	C 3s	Pr 3s	P 3s	C 1s	Pr 1s	P 1s	Prefix Class
α	1	12	1	11	11	9	C2
				1	12	1	A
				1	9	9	A, B
				9	9	9	A, B
β	3	13	3	5	5	5	B
γ	4	4	3	9	9	9	all Classes
				12	12	9	all Classes
δ	4	4	4	9	9	9	all Classes
				4	4	4	all Classes
ϵ	13	13	13	5	5	5	A2
				9	9	9	A2
ζ	13	13	3	5	5	5	A _u , A _c
				9	9	9	A _u
η	11	11	11	9	9	9	A2
θ	11	11	9	1	5	1	A _c , A _u
				5	5	5	A _u
				9	9	9	B
κ	8	8	3	9	9	9	Mainly A2, A _c , A _u , a few C
λ	8	12	3	9	9	9	A _u
μ	10	10	10	10	10	10	A2
ν	10	12	3	1	12	1	C2
ξ	9	9	9	9	9	9	A2

Table 5.15: 3s and 1s tonal ablaut patterns across aspects

discovery in Chatino studies because so far the prefix Classes and the tonal ablaut patterns have been considered independent to each other by previous studies (Campbell, 2011; Sullivant, 2011; Villard, 2009).

The examples below illustrate some of the patterns from table 5.15.

(89) Pattern α : 3s (1 12 1); 1s (11 11 9)

Gloss	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>eat it (C2)</i>							
3S	nkayako	1	nkyākò	12	nkyako	kako	1
1S	nkayākún	11	nkyākún	11	nkyākún	kàkún	9
<i>touch it (C2)</i>							
3S	nkayala?	1	nkyālà?	12	ntil'á?	kala?	1
1S	nkayālán?	11	nkyālán?	11	ntil'án?	kàlán?	9
<i>bathe (C2)</i>							
3S	nkayata	1	nkyātàn	12	ntuta	kata	1
1S	nkayātán	11	nkyātán	11	ntùtán	kàtán	9

(90) Pattern α : 3s (1 12 1); 1s (1 12 1)

Gloss	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>catch it (A_c)</i>							
3S	nkasin ^y i	1	ntāsin ^y i	12	ntixin ^y i	xin ^y i	1
1S	nkasin ^y i	1	ntāsin ^y i	12	ntixin ^y i	xin ^y i	1
<i>wait for it (A_u)</i>							
3S	nkiwita	1	ntāwità	12	ntiwita	kiwita	1
1S	nkiwitan	1	ntāwitàn	12	ntiwitan	kiwitan	1
<i>pluck it (A_c)</i>							
3S	nkasikwan	1	ntāsikwàn	12	ntixikwan	xikwan	1
1S	nkasikwan	1	ntāsikwàn	12	ntixikwan	kusikwan	1

(91) Pattern θ : 3s (11 11 9); 1s (1 5 1)

Gloss	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>thresh it (A_c)</i>							
3S	nkasükwá?	11	ntāsükwá?	11	ntixùkwá?	xùkwá?	9
1S	nkasukwan?	1	ntāsukwān?	5	ntixukwan?	kusukwan?	1
<i>peel it (A_{ii})</i>							
3S	nkatükwín?	11	ntätükwín?	11	ntutükwín?	cutükwín?	9
1S	nkatukwin?	1	ntätukwīn?	5	ntutukwīn?	cutukwīn?	1
<i>massage it (A_c)</i>							
3S	nkajīkwí	11	ntājīkwí	11	ntijīkwí	jīkwí	9
1S	nkajikwin	1	ntājikwīn	5	ntijikwīn	kujikwīn	1

(92) Pattern α : 3s (1 12 1); 1s (9 9 9)

Gloss	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>exist</i> (B _{post})							
3S	yu?wi	11	ntātū?wì	12	ntsu?wi	chù?wí	1
1S	yù?wín	9	ntātù?wín	9	ntsù?wín	chù?wín	9
<i>walk</i> (A _c)							
3S	nkata?an	1	ntātā?àn	12	nt ^y a?an	t ^y a?an	1
1S	nkata?án	9	ntātà?án	9	nt ^y à?án	kutà?án	9

(93) Pattern ζ: 3s (13 13 3); 1s (5 5 5)

Gloss	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>teach it (A_{ti})</i>							
3s	nkālórò	13	ntālórò	13	ntolorò	kolorò	3
1s	nkalu?ūn	5	ntālu?ūn	5	ntulu?ūn	kulu?ūn	5
<i>scrape it (A_{ti})</i>							
3s	nkāsúwèʔ	13	ntāsúwèʔ	13	ntusuwèʔ	kusuwèʔ	3
1s	nkasuwēnʔ	5	ntāsuwēnʔ	5	ntusuwēnʔ	kusuwēnʔ	5
<i>fart (A_c)</i>							
3s	nkājilʔà	13	ntājilʔà	13	ntijilʔà	jilʔà	3
1s	nkajilʔan	5	ntajilʔan	5	ntijilʔan	jilʔan	5
<i>lick it (A_c)</i>							
3s	nkāléré	13	ntāléré	13	ntilʔerè	ʔerè	3
1s	nkale?ēn	5	ntāle?ēn	5	ntilʔe?ēn	ʔe?ēn	5

(94) **Pattern ε: 3s (13 13 13); 1s (5 5 5)**

Gloss	COMPL	Tone	PROG	Tone	HAB	POT	Tone
<i>sew it (A2)</i>							
3S	nkwi ^w íkwà ⁿ	13	ntí ^w íkwà ⁿ	13	ntí ^w íkwà ⁿ	xíkwà ⁿ	13
1S	nkwi ^w íkwā	5	ntí ^w íkwā	5	ntí ^w íkwā	xíkwā	5
<i>untie it (A2)</i>							
3S	nkwi ^w xá ^t ín [?]	13	ntā ^s á ^t ín [?]	13	ntí ^w xá ^t ín [?]	xá ^t ín [?]	13
1S	nkwi ^w xatīn [?]	5	ntā ^s atīn [?]	5	ntí ^w xatīn [?]	xatīn [?]	5
<i>move it (A2)</i>							
3S	nkwi ^w xkín [?] à ⁿ	13	ntí ^w xkín [?] à ⁿ	13	ntí ^w xkín [?] à ⁿ	xkín [?] à ⁿ	13
1S	nkwi ^w xkin [?] ān	5	ntí ^w xkin [?] ān	5	ntí ^w xkin [?] ān	xkin [?] ān	5

(95) **Pattern δ : 3s (4 4 4); 1s (9 9 9)**

Gloss	COMPL 1s	Tone	PROG 1s	Tone	HAB 1s	POT 1s	Tone
<i>pick it up</i> (B_y)							
3s	nkyukwān'	4	ntīkyukwān'	4	nkyukwān'	nkyukwān'	4
1s	nkyùkwān	9	ntīkyùkwān	9	nkyùkwān	kyùkwān	9
<i>find it</i> (B_y)							
3s	nkyajā'	4	ntīkyajā'	4	nkyajā'	kyajā'	4
1s	nkyajān'	9	ntīkyajān'	9	nkyajān'	kyajān'	9

5.4.3.3 Plural subject marking on verbs

Plural person marking generally only consists of encliticization of plural clitics on the 3s verb form, although in some cases, it also involves a tonal change as well as encliticization.

Pronouns have independent and dependent forms. The plural dependent pronouns are derived from the independent pronouns which are unspecified for tone (tone Class 1) as shown in table 5.16:

	Independent pronouns	Dependent pronouns
1PLINCL	<i>nan nteẽ'</i>	<i>(tonal alternation), nan</i>
1PLEX	<i>wa nteẽ'</i>	<i>(tonal alternation), wa</i>
2PL	<i>nku?wan</i>	<i>(tonal alternation), wan</i>
3PL	<i>yukwi? ne?</i>	<i>ne?</i>

Table 5.16: Independent and dependent plural subject pronouns

All clitics appear to be unspecified for tone and form a separate tonal domain. As was demonstrated in chapter 4 the simplex word is the natural domain for the TS's. So phonologically, the enclitics form their own separate tonal domain, but morphologically the enclitics are still part of the simplex verb.

Because the plural clitics are unspecified for tone, their surface tonal pattern is affected by the tone of the verb stem.

As previously mentioned, the general rule for subject plural marking on verbs is that all the plural forms are based on the tone of 3s stem with an appended subject pronoun enclitic. However, some Tone Classes cannot

be bases for 1PLINCL, 1PLEX, and 2PL, and those are: Tone Class 1, 5, 9, 11, and 12.

As a result, if the 3s stem tone is Tone Class 11, 12 or 9, then the 1PLIN, 1PLEX, and 2PL plural forms are based on 2s stem tone, and the 3PL form is based on 3s stem tone.

If the 3s stem tone is Tone Class 1, then the 1PLIN, 1PLEX, and 2PL plural forms are formed with a Tone Class 5 stem, and the 3PL form is based on 3s stem tone.

Table 5.17 was already introduced in §5.2 but is presented here again for clarity and convenience. It presents an example of a complete verbal paradigm for the verb *-u-lukwǎ* 'to sweep it', Tone Class 8 (/LH/). For the completive, habitual and potential paradigms, the general plural marking rule applies: the plural forms are based on the tone of the 3s stem followed by the plural clitics. For the progressive paradigm, the 3s bears Tone Class 11 which marks 1PLIN, 1PLEX, and 2PL based on the tone of 2s stem which in this case is Tone Class 11 (and actually happens to be irregular and the same as 3s).

Table 5.18 illustrates the plural marking rules on verbs presenting examples of 3s stems occurring with different Tone Classes.

	COMPL	PROG	HAB	POT
1S	<i>nkalùkwǎn</i>	<i>ntālùkwǎn</i>	<i>ntulùkwǎn</i>	<i>kulùkwǎn</i>
2S	<i>nkalùkwá</i>	<i>ntālùkwá</i>	<i>ntulùkwā</i>	<i>kulùkwā</i>
3S	<i>nkalukwǎ</i>	<i>ntālùkwá</i>	<i>ntulukwà`</i>	<i>kulukwà`</i>
1PLINCL	<i>nkalukwǎ nan</i>	<i>ntālùkwá nan</i>	<i>ntulukwà` nan</i>	<i>kulukwà` nan</i>
1PLEX	<i>nkalukwǎ wa</i>	<i>ntālùkwá wa</i>	<i>ntulukwà` wa</i>	<i>kulukwà` wa</i>
2PL	<i>nkalukwǎ wan</i>	<i>ntālùkwá wan</i>	<i>ntulukwà` wan</i>	<i>kulukwà` wan</i>
3PL	<i>nkalukwǎ ne?</i>	<i>ntālùkwá ne?</i>	<i>ntulukwà` ne?</i>	<i>kulukwà` ne?</i>

Table 5.17: Example of a complete verbal paradigm for *u-lukwǎ* 'sweep it'

GLOSS	ASP	3S FORM	3PL STEM TONE	2S STEM TONE	2PL STEM TONE	2PL STEM TONE	2PL STEM TONE
<i>eat it</i>	COMPL	nkayako	1	6	5	5	5
<i>speak</i>	COMPL	nkayakwi?	1	6	5	5	5
<i>grab it</i>	COMPL	nkasin ^y i	1	6	5	5	5
<i>poke it</i>	COMPL	nkayojo?	1	6	5	5	5
<i>wait for it</i>	COMPL	nkiwita	1	6	5	5	5
<i>sweep it</i>	POT	kulukwà	3	6	3	3	3
<i>transport it</i>	POT	kuteèn	3	6	3	3	3
<i>pull it up</i>	COMPL	kosoò	3	6	3	3	3
<i>heat it up</i>	COMPL	nkwàtsùn	13	6	13	13	13
<i>remove it</i>	COMPL	nkáìóò	13	6	13	13	13
<i>spray it</i>	COMPL	nkāsánè	13	6	13	13	13
<i>move it</i>	COMPL	nkwxín ^y àn	13	6	13	13	13
<i>sell it</i>	COMPL	nkayujwi?	4	11	4	4	4
<i>buy it</i>	COMPL	nkasi?i	4	11	4	4	4
<i>be</i>	COMPL	nkwa	4	11	4	4	4
<i>ask for it</i>	HAB	ntjìn ^y án	9	10	10	10	10
<i>turn around</i>	COMPL	nkutil ^y o	10	12	10	10	10
<i>ask for it</i>	COMPL	nkajìn ^y án	11	10	10	10	10
<i>sweep it</i>	COMPL	nkalkwà	8	11	8	8	8
<i>receive it</i>	PROG	ntāsìn ^y i	12	6	6	6	6

Table 5.18: Subject plural marking on verbs

5.5 Conclusion

This chapter has shown that the complexity of the ZAC inflectional system emerges from many factors.

At the segmental level, determining a verb's prefix Class is partly based on which aspectual allomorph a verb takes in the 3s completive aspect. Based on this knowledge, to which of the 9 prefix Classes a verb belongs, gets narrowed down to only one option if it takes the completive aspect morpheme *nkwi-* or *nkay-*, to two options, it takes *nka-*, and to five options if it takes *nku-*. In order to narrow the choice further, one has to consider the phonological shape of the stem, as well as its valency and semantic characteristics. Furthermore, the constraint on vowel hiatus at the prefix-stem boundary adds some level of abstraction by obscuring the underlying segmental shape of the stem.

At the tonal level, complexities arises at various levels also: phonologically, how the Tone Classes made of TS's are associated to moras in stems with different moraic shapes, and how the progressive prefix bearing a mid tone gets combined to the stem's inherent tonal pattern and produces a composed TS. Inflectionally, the tonal pattern for aspectual inflection is generally independent from the segmental layer (prefix Classes). The irregularities encountered in the progressive forms creates even more conjugation subClasses within the major tonal conjugation Classes.

Data in this chapter demonstrated that the aspectual tonal paradigm

of a verb may be narrowed down to a few possible patterns by considering the 3s completive form as the base form to derive tonal ablaut across aspects. Furthermore, 3s and 2s tonal ablaut for person marking can be quite accurately predicted by considering the 3s as the base for deriving the 2s tonal pattern. However, it was shown that this relationship did not hold for predicting the corresponding 1s. Indeed, a more accurate way of predicting the 1s tonal pattern of a verb form can be achieved by considering the 3s tonal ablaut pattern across aspects, and in this case, the prefix Class and the 1s tonal patterns have shown to present some relationship to each other.

Although a tonal/segmental paradigm for a particular verb is not fully predictable, this chapter has demonstrated that the possibilities can be narrowed down in many cases. For example, a verb always shows the same tonal pattern in the habitual and the potential aspect. If a verb occurs with Tone Class 1 in the completive aspect, it will occur with Tone Class 12 in the progressive aspect and Tone Class 1 in the potential and habitual aspects. If a verb occurs with Tone Class 9 in the completive aspect, it occurs with the same Tone Class across aspects. If a verb occurs with Tone Class 11 in the completive it most likely occurs with Tone Class 11 in the progressive aspect, and Tone Class 9 in the potential and habitual aspects.

There are many more similar observations that can be made regarding the conjugation patterns in the language, which tend to lessen the *prima facie* overwhelming complexity of the system. One could assume that native speakers group verbs according to these general restrictions, but also

memorize a great number of forms.

Table 5.19 presents the same type of data shown in tables 5.10 and 5.12, but this time compares the most salient tonal ablaut patterns for person marking on verbs with the tonal ablaut patterns for inalienable nouns and predicative adjectives. 1s tone pattern is omitted for verbs as it is not predictable from 3s form. the triple dash (---) means that the syntactic category in question does not occur with that particular Tone Class.

This table demonstrates that if we consider the tonal ablaut patterns for all three syntactic categories only from 3s to 2s, they are almost always match each other. For example, a 3s verb, inalienable noun or predicative adjective occurring with Tone Class 4 or Tone Class 8 all mark 2s with Tone Class 11. A 3s verb, inalienable noun or predicative adjective occurring with Tone Class 9 or Tone Class 11 all mark 2s with Tone Class 10.

	3s	2s	1s
V	1	6	
IN	1	6	1
PA	1	5	1
V	---	---	---
IN	2	6	5
PA	2	5	5
V	4	11	
IN	4	11	9
PA	4	11	4
V	8	11	
IN	8	11	9
PA	8	11	8
V	9	10	
IN	---	---	--
PA	9	10	9
V	10	12	
IN	10	12	5
PA	10	12	10
V	11	10	
IN	11	10	1
PA	11	10	11
V	12	12	
IN	---	---	---
PA	12	12	12

Table 5.19: Verbal, nominal and adjectival tonal ablaut patterns for person marking

Chapter 6

The numerical system: an extended demonstration of tone in phrasal lexemes

The goal of this chapter is two-fold: first, document and preserve an ancient numerical system on the verge of disappearing as it has fallen out of use, and has been replaced by the Spanish numerical system instead; second, extend the demonstration of the tonal system to phrasal lexemes. The numerical system demonstrates compounding process and the formation of phrasal lexemes. Moreover, it further illustrates the sandhi system, but it also shows unexpected changes in tone and tone sandhi.

Like many other numerical systems in Mesoamerica, ZAC's system is vigesimal, i.e. based on the number 20. In fact, vigesimal is one of the features that define the Mesoamerican linguistic area (Campbell et al., 1986). Other numbers such as 10, 15 and 40 are secondary bases as they can be added to the numbers 1-9 or to number 20 to form higher numbers.

The first 10 numbers are monomorphemic and unspecified for tone. Higher numbers may be monomorphemic, and include 15, 20 and 40 only. All others are complex forms, compounds or phrases. As just mentioned, the compounds or the numerical phrases do not always follow the tonal sandhi

rules existing across words in the language (as described in chapter 4) , and these particular word formation processes often result in idiosyncratic tonal patterns.

The number system is not used very much by speakers anymore and has been replaced by the Spanish system. So when a speaker needs to count or utter a number (especially one above 15), they would usually code-switch to Spanish.

In this chapter the columns labelled 'Tone pronunciation' are pronunciation guides for tone where the diacritics illustrate the surface tonal patterns. There, the grave accent represents a surface low pitch, the acute accent represents a surface high pitch, the macron represents a surface mid pitch, the caret represents a surface low high pitch contour, and finally, the double acute accent represents a surface low super high pitch contour. The phonemic tones are marked directly on the example words.

6.1 Numbers 1 to 10

All numbers from 1 to 10 are unspecified for tone in ZAC, so their default pitch level is low.

Number	Tone pronunciation	Gloss
tsaka	tsàkà	1
tukwa	tùkwà	2
tsuna	tsùnà	3
jakwa	jàkwà	4
kaʔyo	kàʔyò	5
sukwa	sùkwà	6
kati	kàtì	7
sunuʔ	sùnùʔ	8
kaa	kàà	9
tii	tìì	10

6.2 Numbers 11-30

Numbers 11 to 14 are formed by combining the word *tii* 'ten' and the numbers 1 to 4 respectively. This compounding process results in three phonological changes: vowel syncope in first element of compound, laminalization of onset consonant of second element along with a tonal change. The vowel syncope in the form for number 10 *tii* results from the phonological restriction on long vowels in the language which only allows them word finally (§1.6). The laminalization of onset consonants in the forms for numbers 1 to 4 is explained by Campbell, E. and E. Cruz (2009) as resulting from the historic presence of a morpheme between the word *tii* and the numbers (1-4) (reconstructed as **li* for Zenzontepec Chatino). The latter is still present in ZAC only in *tijl'ākwā* 'fourteen'. The exact meaning or the tone of this morpheme **li* was not reconstructed by Campbell, E. and E. Cruz (2009). Its tone is also unclear for ZAC as it seems to affect the forms for numbers 1 to 4 differently: *tsaka* and *jakwa* (unspecified for tone) become

chākā and *jʰākwā* respectively, and *tukwa* and *tsuna* (also unspecified for tone) become *ʔùkwǎ* and *chùnǎ*. It is worth noting that these two numbers (2 and 3) had a high tone in the first syllable in proto-Chatino which was an unusual tonal pattern in the language (Campbell & Woodbury, 2010). So the forms for number 2 and 3 found in the numbers 12 and 13 in ZAC could be reflexes of those historic forms.

Number 15 *tiʔnʷun* could be quickly analyzed as being a compound involving the number 10 *tii* and the number 5 *kaʔyo* except that *tiʔnʷun* shows nasalization in its last mora which is lacking in the number 5 *kaʔyo*. For that reason, Campbell, E. and E. Cruz (2009) analyze it as monomorphemic. 15 serves as a base for the formation of numbers 16 to 19. *tiʔnʷun* is unspecified for tone in ZAC, and Campbell, E. and E. Cruz (2009) reconstruct the number 15 in proto-Chatino as toneless also.

Number 20 *kalà* (Tone Class 3 (/L (L)/)) is also monomorphemic, and serves as a base to form numbers 21 to 39. Campbell, E. and E. Cruz (2009) reconstruct the number 20 in proto-Chatino as toneless.

Starting at 21, the predicate *ntukwà`* combines the numerical elements to form subsequent numbers. *ntukwà`* is a stative form of the positional verb *sit*.

If we consider the tone pronunciation for the word *ntukwà`* in numbers 21-29, we can see that its surface tonal pattern changes from [ntùkwà] to [ntükwā] after *kalà*. The latter is a regular sandhi pattern between two Tone Class 3 words (see figure 4.36). But when we observe the tonal pat-

terns for the forms for numbers 1 through 9 following the word *ntukwà`* in numbers 21 through 29, the surface tonal patterns vary. The forms for the numbers 1, 4 and 8 in numbers 21, 24 and 28 present a [M-L] surface pattern which obeys regular sandhi rules between a /L (L)/ word and a unspecified word (see figure 4.36). Whereas, the forms for the numbers 2, 3, 6, 7 and 9 in 22, 23, 26, 27 and 29 show a [L-S] surface pattern. The forms *tùkwǎ* and *tsùnǎ* in the numbers 21 and 23 occur with the same tonal pattern as the laminalized forms in numbers 12 and 13 whose tone is affected by the historic **li* morpheme. Possibly, the forms for 6, 7 and 9 in numbers 26, 27 and 29 show the same tonal pattern as 21 and 23 by analogy.

Another notable tonal change is found in the form for 5 in number 25. It changes from *kaʔyo* (Tone Class 1, unspecified for tone) to *nkaʔyò`* (Tone Class 2 /L (LS)/). This nasalized form of the number 5 is only found as part of a complex number. It never occurs in isolation. Its tone is unusual because Tone Class 2 usually only occurs in nouns in the language.

A couple of phonological changes occur in the number 10 *tii* when it is combined to number 20 to form number 30. *tii* changes to *tʰĩ* so it suffers a laminalization of its onset consonant along with a change of Tone Class 1 to Tone Class 9 (/L-LS/). This laminalization of /t/ in 30 is similar to the laminalization process occurring in numbers 11, 12, 13 and 14 which results from the historic presence of the vowel /i/ from morpheme **li* between the form for 10 and forms for 1, 2, 3 and 4. To explain the laminalization of /t/ in 30, one would also have to posit the presence of this morpheme

historically in between the form for 20 and 10 for number 30 and above.

Number	Tone pronunciation	Gloss	Base
tichākā	tìchākā	11	10 (+1)
títʸùkwǎ	tìtʸùkwǎ	12	10 (+2)
tichùnǎ	tìchùnǎ	13	10 (+3)
tijlʸākṵā	tìjlʸākṵā	14	10 (+4)
tiʔnʸun	tìʔnʸùn	15	15
tiʔnʸun chākā	tìʔnʸùn chākā	16	15 (+1)
tiʔnʸun tʸùkwǎ	tìʔnʸùn tʸùkwǎ	17	15 (+2)
tiʔnʸun chùnǎ	tìʔnʸùn chùnǎ	18	15 (+3)
tiʔnʸun jlʸākṵā	tìʔnʸùn jlʸākṵā	19	15 (+4)
kalà	[kàlà]	20	20
kalà ntukwà tsākà	kàlà ntūkṵā tsākà	21	20 (+1)
kalà ntukwà tūkṵǎ	kàlà ntūkṵā tūkṵǎ	22	20 (+2)
kalà ntukwà tsùnǎ	kàlà ntūkṵā tsùnǎ	23	20 (+3)
kalà ntukwà jākṵà	kàlà ntūkṵā jākṵà	24	20 (+4)
kalà nkaʔyǒ	kàlà nkāʔyō	25	20 (+5)
kalà ntukwà sūkṵǎ	kàlà ntūkṵā sūkṵǎ	26	20 (+6)
kalà ntukwà kàtʼí	kàlà ntūkṵā kàtʼí	27	20 (+7)
kalà ntukwà sùnùʔ	kàlà ntūkṵā sùnùʔ	28	20 (+8)
kalà ntukwà káǎ	kàlà ntūkṵā káǎ	29	20 (+9)
kalà tʸí	kàlà tʸí	30	20 (+10)

6.3 Numbers 31-40

Numbers 31 through 39 are formed by adding the base 20 to 10 and then adding the numbers 1 to 9. The form for 15 in 35 changes from *tiʔnʷun* to *ntiʔnʷùn*, just like the word for 5 changed from *kaʔyo* to *nkaʔyö* in 25, where both nasalized versions change from being unspecified for tone (Tone Class 1) to Tone Class 2 (/L (LS)/).

The number 40 is monomorphemic and unspecified for tone. It is another secondary base (along with 10 and 15 in the system) as the numbers from 41-60 are formed by adding 40 to numbers 1 to 10.

Different speakers may form numbers above 35 differently. Some use the number 15 as a secondary base added to base 20 for numbers 36-39 and others use the secondary base 10 added to base 20 to form those numbers.

Number	Tone pronunciation	Gloss	Base
kalà tʸíí ntukwà tsākà	kàlà tʸíí ntúkwa tsākà	31	20 (+ 10) (+ 1)
kalà tʸíí ntukwà tükwá	kàlà tʸíí ntúkwa tükwá	32	20 (+ 10) (+ 2)
kalà tʸíí ntukwà tsùnǎ	kàlà tʸíí ntúkwa tsùnǎ	33	20 (+ 10) (+ 3)
kalà tʸíí ntukwà jākwa	kàlà tʸíí ntúkwa jākwa	34	20 (+ 10) (+ 4)
kalà ntiʔnʸùnʳ	kàlà ntiʔnʸūn	35	20 (+ 15)
kalà ntiʔnʸùnʳ ntukwà tsākà	kàlà ntiʔnʸūn ntúkwa tsākà	36	20 (+ 15) (+ 1)
kalà ntiʔnʸùnʳ ntukwà tükwá	kàlà ntiʔnʸūn ntúkwa tükwá	37	20 (+ 15) (+ 2)
kalà ntiʔnʸùnʳ ntukwà tsùnǎ	kàlà ntiʔnʸūn ntúkwa tsùnǎ	38	20 (+ 15) (+ 3)
kalà ntiʔnʸùnʳ ntukwà jākwa	kàlà ntiʔnʸūn ntúkwa jākwa	39	20 (+ 15) (+ 4)
OR			
kalà tʸíí ntukwà sükwá	kàlà tʸíí ntúkwa sükwá	36	20 (+ 10) (+ 6)
kalà tʸíí ntukwà kàtí	kàlà tʸíí ntúkwa kàtí	37	20 (+ 10) (+ 7)
kalà tʸíí ntukwà sùnùʔ	kàlà tʸíí ntúkwa sùnùʔ	38	20 (+ 10) (+ 8)
kalà tʸíí ntukwà káá	kàlà tʸíí ntúkwa káá	39	20 (+ 10) (+ 9)
tuʔwa	tùʔwà	40	40

6.4 Numbers from 41-60

The numbers 41 through 50 are formed by adding the numbers 1 to 10 to the base 40, and then numbers 51 to 59 are formed by adding the base 40 to 10 and then adding numbers 1 to 9. Number 60 is a phrase which literally means *3 twenties* (*3 veintenas* in Spa.). *yalǎ* 'one set of twenty' may be derived from *kalà* 'twenty' but their relationship is not transparent in synchronic terms (Campbell, E. & E. Cruz, 2009).

The same phonological changes described in previous numbers occur in numbers 41 to 60.

Again, different speakers may form numbers above 45 differently. Some use the number 15 as a secondary base added to base 40 for numbers 46-49, and others use the secondary base 10 added to base 40 to form those numbers.

Number	Tone pronunciation	Gloss	Base
tu?wa ntukwà tsākà	tù?wà ntùkwà tsākà	41	40 (+1)
tu?wa ntukwà tükwǎ	tù?wà ntùkwà tükwǎ	42	40 (+2)
tu?wa ntukwà tsùnǎ	tù?wà ntùkwà tsùnǎ	43	40 (+3)
tu?wa ntukwà jāk wà	tù?wà ntùkwà jāk wà	44	40 (+4)
tu?wa nka?yǒ	tù?wà nkà?yò	45	40 (+5)
tu?wa ntukwà sükwǎ	tù?wà ntùkwà sükwǎ	46	40 (+6)
tu?wa ntukwà kátí	tù?wà ntùkwà kátí	47	40 (+7)
tu?wa ntukwà sùnù?	tù?wà ntùkwà sùnù?	48	40 (+8)
tu?wa ntukwà kǎá	tù?wà ntùkwà kǎá	49	40 (+9)
tu?wa tʸíí	tù?wà tʸíí	50	40 (+10)

Number	Tone pronunciation	Gloss	Base
tu?wa tʻi? ntukwà tsākà	tù?wà tʻí? ntúk wà tsākà	51	40 (+10) (+1)
tu?wa tʻi? ntukwà tükwá	tù?wà tʻí? ntúk wà tük wá	52	40 (+10) (+2)
tu?wa tʻi? ntukwà tsùná	tù?wà tʻí? ntúk wà tsùn á	53	40 (+10) (+3)
tu?wa tʻi? ntukwà jāk wà	tù?wà tʻí? ntúk wà jāk wà	54	40 (+10) (+4)
tu?wa nti?nʻùnʻ	tù?wà nti?nʻ ùn	55	40 (+15)
tu?wa nti?nʻùnʻ ntukwà tsākà	tù?wà nti?nʻ ùn ntúk wà tsākà	56	40 (+15) (+1)
tu?wa nti?nʻùnʻ ntukwà tükwá	tù?wà nti?nʻ ùn ntúk wà tük wá	57	40 (+15) (+2)
tu?wa nti?nʻùnʻ ntukwà tsùná	tù?wà nti?nʻ ùn ntúk wà tsùn á	58	40 (+15) (+3)
tu?wa nti?nʻùnʻ ntukwà jāk wà	tù?wà nti?nʻ ùn ntúk wà jāk wà	59	40 (+15) (+4)
OR			
tu?wa tʻi? ntukwà sük wá	tù?wà tʻí? ntúk wà sük wá	56	40 (+10) (+6)
tu?wa tʻi? ntukwà kàtʻ	tù?wà tʻí? ntúk wà kàtʻ	57	40 (+10) (+7)
tu?wa tʻi? ntukwà sùnù?	tù?wà tʻí? ntúk wà sùn ù?	58	40 (+10) (+8)
tu?wa tʻi? ntukwà káá	tù?wà tʻí? ntúk wà káá	59	40 (+10) (+9)
tsuna yalá	tsùn á yál á	60	20 +20 +20

6.5 Numbers from 61-80

Starting number 61, the habitual form of predicate *ntsu?wi* 'live, exist' is used in the formation of subsequent higher numbers. All speakers start using *ntsu?wi* starting at number 60, but its usage versus the other predicate *ntukwà`* varies per speaker. Some may opt for always using *ntsu?wi* as the first predicate in the numerical phrase, or some may mix both *ntukwà`* and *ntsu?wi*, or others may use the latter for both predicates in all numbers after 60. The lack of use may be the reason why there is so much variation among speakers.

In this number sequence, the interesting tonal patterns to notice are found in numbers 62, 63 and 65. The forms corresponding to 2, 3, and 5, respectively *tukwa*, *tsuna*, *ka?yo* seem to be unspecified for tone because they undergo spreading from preceding final high tone in *yalǎ* which spreads through *ntu?wi* and as a result they surface as [túkwá], [tsúná], [ká?yó]; while the forms for number, 1, 4, 8, and 10 do not show Spreading from preceding word.

The number 80 is a phrase which literally means *4 twenties*.

Number	Tone pronunciation	Gloss	Base
tsuna yalä ntukwà tsākà	[tsùnà yälä ntúkwà tsākà]	61	20 + 20 + 20 (+1)
OR			
tsuna yalä ntsu?wi tsākà	tsùnà yälä ntsú?wí tsākà	61	20 + 20 + 20 (+1)
tsuna yalä ntsu?wi tukwá	tsùnà yälä ntsú?wí túkwá	62	20 + 20 + 20 (+2)
tsuna yalä ntsu?wi tsuna	tsùnà yälä ntsú?wí tsúná	63	20 + 20 + 20 (+3)
tsuna yalä ntsu?wi jā?wà	tsùnà yälä ntsú?wí jā?wà	64	20 + 20 + 20 (+4)
tsuna yalä ntsu?wi ka?yo	tsùnà yälä ntsú?wí ká?yó	65	20 + 20 + 20 (+5)
tsuna yalä ntukwà sùkwá	tsùnà yälä ntúkwà sùkwá	66	20 + 20 + 20 (+6)
tsuna yalä ntukwà kàtí	tsùnà yälä ntúkwà kàtí	67	20 + 20 + 20 (+7)
tsuna yalä ntukwà sùnù?	tsùnà yälä ntúkwà sùnù?	68	20 + 20 + 20 (+8)
OR			
tsuna yalä ntsu?wi sùnù?	tsùnà yälä ntsú?wí sùnù?	68	20 + 20 + 20 (+8)
tsuna yalä ntukwà kàá	tsùnà yälä ntúkwà kàá	69	20 + 20 + 20 (+9)
tsuna yalä ntsu?wi tíí	tsùnà yälä ntsú?wí tíí	70	20 + 20 + 20 (+10)

Number	Tone pronunciation	Gloss	Base
tsuna yalä ntsu?wi tĩ ntukwà` tsākà	tsùnà yalä ntsú?wí tĩ ntúkwà tsākà	71	20 + 20 + 20 (+ 10) (+ 1)
tsuna yalä ntsu?wi tĩ ntukwà` tükwá	tsùnà yalä ntsú?wí tĩ ntúkwà tükwá	72	20 + 20 + 20 (+ 10) (+ 2)
tsuna yalä ntsu?wi tĩ ntukwà` tsúná	tsùnà yalä ntsú?wí tĩ ntúkwà tsúná	73	20 + 20 + 20 (+ 10) (+ 3)
tsuna yalä ntsu?wi tĩ ntukwà` jã?wà	tsùnà yalä ntsú?wí tĩ ntúkwà jã?wà	74	20 + 20 + 20 (+ 10) (+ 4)
tsuna yalä ntsu?wi tĩ ntsu?wi kã?yo	tsùnà yalä ntsú?wí tĩ ntsú?wí kã?yó	75	20 + 20 + 20 (+ 10) (+ 5)
tsuna yalä ntsu?wi tĩ ntukwà` sükwá	tsùnà yalä ntsú?wí tĩ ntúkwà sükwá	76	20 + 20 + 20 (+ 10) (+ 6)
tsuna yalä ntsu?wi tĩ ntukwà` kãtĩ	tsùnà yalä ntsú?wí tĩ ntúkwà kãtĩ	77	20 + 20 + 20 (+ 10) (+ 7)
tsuna yalä ntsu?wi tĩ ntukwà` sũmù?	tsùnà yalä ntsú?wí tĩ ntúkwà sũmù?	78	20 + 20 + 20 (+ 10) (+ 8)
tsuna yalä ntsu?wi tĩ? ntukwà` kãá	tsùnà yalä ntsú?wí tĩ ntúkwà kãá	79	20 + 20 + 20 (+ 10) (+ 9)
jakwa yalä	jãkwà yalä	80	20 + 20 + 20 + 20

6.6 Numbers from 81-100

The numbers 81 to 89 are formed by adding 4 'set of twenty' to numbers 1 to 9. Numbers 90 to 99 are formed by adding 4 'set of twenty' to 10 and then adding numbers 1 to 9. Again, the use of *ntukwà`* versus *ntsu?wi* varies according to speaker.

Number 100 is a Spanish borrowing *syèntō`*. The chatino number system is virtually endless as all numbers above 100 would be formed using the same system as the one described in this chapter. So 121 is *tsaka syèntō`* " *ntukwà` kalà` ntukwà` tsākà*, and 500 is *ka?yo syèntō`*. The number 1000 is also a Spanish borrowing *mĩ`*, and 4000 is *jakwa mĩ`*.

Number	Tone pronunciation	Gloss	Base
jakwa yalä ntukwà tsākà	jàkwà yälä ntúkwà tsākà	81	20 + 20 + 20 + 20 (+1)
jakwa yalä ntukwà tükwá	jàkwà yälä ntúkwà tükwá	82	20 + 20 + 20 + 20 (+2)
jakwa yalä ntukwà tsúná	jàkwà yälä ntúkwà tsúná	83	20 + 20 + 20 + 20 (+3)
jakwa yalä ntsu?wi jākwa	jàkwà yälä ntsú?wí jākwa	84	20 + 20 + 20 + 20 (+4)
jakwa yalä ntsu?wi ka?yo	jàkwà yälä ntsú?wí ká?yó	85	20 + 20 + 20 + 20 (+5)
jakwa yalä ntsu?wi sukwa	jàkwà yälä ntsú?wí súkwá	86	20 + 20 + 20 + 20 (+6)
jakwa yalä ntsu?wi kati	jàkwà yälä ntsú?wí kátí	87	20 + 20 + 20 + 20 (+7)
jakwa yalä ntsu?wi sùnù?	jàkwà yälä ntsú?wí sùnù?	88	20 + 20 + 20 + 20 (+8)
jakwa yalä ntsu?wi káá	jàkwà yälä ntsú?wí káá	89	20 + 20 + 20 + 20 (+9)
jakwa yalä ntsu?wi tĩř	jàkwà yälä ntsú?wí tĩř	90	20 + 20 + 20 + 20 (+10)

Number	Tone pronunciation	Gloss	Base
jakwa yalä ntsu?wi tĩ ntukwà tsàkà	tsùnà yälä ntsú?wí tĩ ntúkùwà tsàkà	91	20 + 20 + 20 + 20 (+ 10) (+ 1)
jakwa yalä ntsu?wi tĩ ntukwà tükwá	tsùnà yälä ntsú?wí tĩ ntúkùwà tükwá	92	20 + 20 + 20 + 20 (+ 10) (+ 2)
jakwa yalä ntsu?wi tĩ ntukwà tsùná	tsùnà yälä ntsú?wí tĩ ntúkùwà tsùná	93	20 + 20 + 20 + 20 (+ 10) (+ 3)
jakwa yalä ntsu?wi tĩ ntukwà jākwa	tsùnà yälä ntsú?wí tĩ ntúkùwà jākùwà	94	20 + 20 + 20 + 20 (+ 10) (+ 4)
jakwa yalä ntsu?wi tĩ ntsu?wi ka?yo	tsùnà yälä ntsú?wí tĩ ntsú?wí ká?yó	95	20 + 20 + 20 + 20 (+ 10) (+ 5)
jakwa yalä ntsu?wi tĩ ntukwà sükwá	tsùnà yälä ntsú?wí tĩ ntúkùwà sükùwá	96	20 + 20 + 20 + 20 (+ 10) (+ 6)
jakwa yalä ntsu?wi tĩ ntukwà kätĩ	tsùnà yälä ntsú?wí tĩ ntúkùwà kätĩ	97	20 + 20 + 20 + 20 (+ 10) (+ 7)
jakwa yalä ntsu?wi tĩ ntukwà sùnù?	tsùnà yälä ntsú?wí tĩ ntúkùwà sùnù?	98	20 + 20 + 20 + 20 (+ 10) (+ 8)
jakwa yalä ntsu?wi tĩ ntukwà kää	tsùnà yälä ntsú?wí tĩ ntúkùwà kää	99	20 + 20 + 20 + 20 (+ 10) (+ 9)

100

tsàkà syèntõ

tsaka syèntõ

6.7 Conclusion

The data in this chapter has shown that various numerical phrases present some idiosyncratic tonal patterns that do not fit into the general sandhi rules of the language as described in chapter 4.

The numbers that seem to present the most variety in tonal patterns are the first 10 numbers. In isolation, they belong to Tone Class 1 (unspecified for tone), but when they are part of numerical phrases, their surface pattern vary:

The forms for the numbers 1, 4 and 8 in numbers 21, 24 and 28 present a [M-L] surface pattern which obeys the regular sandhi rules between a Tone Class 3 word (/L (L)/) *kalà`* 'twenty' and a Tone Class 1 word (unspecified for tone) (see figure 4.36).

However, the forms for the numbers 2, 3, 6, 7 and 9 in 22, 23, 26, 27 and 29 show a [L-S] surface pattern following the word *ntukwà`* (which belongs to Tone Class 3 (/L (L)/, just like the word *kalà`* 'twenty') instead of the expected [M-L].

Another notable tonal change is found in the form for 5 in number 25. It changes from *kaʔyo* (Tone Class 1, unspecified for tone) to *nkaʔyò`* (Tone Class 2 (/L (LS)/). This nasalized form of the number 5 is only found as part of a complex number. It never occurs in isolation. Its tone is unusual because Tone Class 2 usually only occurs in nouns in the language.

The number 10 *tii* (Tone Class 1, unspecified for tone) when it is

combined to number 20 to form number 30 changes to Tone Class 9 (/L-LS/) instead of showing an [M-L] tonal pattern as expected between a word belonging to Tone Class 3 (/L (L)/ followed by a word belonging to Tone Class 1.

Precisely because of these idiosyncratic patterns, it is important to document and record this system, as unfortunately it is on the verge of disappearing. Numerical systems in general are of interest for typological studies because they often reveal ancient processes in the language in question which may shed light on synchronic phenomena.

Appendix

Appendix 1

Abbreviations

Here is an alphabetically sorted list of the abbreviations used in this dissertation.

3	third-person
1PLEX	first person plural exclusive
1PLINCL	first-person plural inclusive
1S	first-person singular
2PL	second-person plural
2S	second-person singular
3PL	third-person plural
ASP	aspect
CAUS	causative
COMPL	Completive Aspect
DEM	demonstrative
DAT	demonstrative
HAB	Habitual Aspect
LAM	Laminalization
POT	Potential Aspect
PL	plural
POT	Potential Aspect
PROG	Progressive Aspect
S	singular
SUBJ	subject
TBU	Tonal Bearing Unit
TS	Tonal Sequence
ZAC	San Marcos Zacatepec Eastern Chatino

References

- AILLA. (n.d.). Retrieved 04/01/2015, from <http://www.ailla.utexas.org>
- Beam de Azcona, R. (2004). *A Coatlán-Loxicha Zapotec Grammar*. Unpublished doctoral dissertation, UC Berkeley, Berkeley, CA.
- Berthiaume, S. (2012). *A Phonological Grammar of Northern Pame* (Vol. SIL e-Books 37). SIL international, Dallas Texas.
- Boas, F. (1913). Notes on The Chatino Language. *American Anthropologist N.S.*, 15, 78-86.
- Brown, P. (2010). Questions and their responses in Tzeltal. *Journal of Pragmatics*, 42, 2627-2648.
- Brown, P., Sicoli, M. A., & LeGuen, O. (2010). Cross-speaker repetition in Tzeltal, Yucatec, and Zapotec conversation. Paper presented at ICCA 10: International Conference on Conversation Analysis session CA in Non-Mother Tongue Settings, Mannheim, Germany.
- Campbell, E. (2011). Zenzontepec Chatino Aspect Morphology and Zapotecan Verb Classes. *International Journal of American Linguistics*, 77(2), 219-246.
- Campbell, E. (2013). The Internal Diversification and Subgrouping of Chatino. *International Journal of American Linguistics*, 79(3), 395-420.

- Campbell, E. (2014). *The Phonology and Morphology of Zenzontepec Chatino*. Unpublished doctoral dissertation, University of Texas at Austin.
- Campbell, E., & Woodbury, A. C. (2010). The comparative tonology of Chatino: A prolegomenon. Paper presented at SSILA winter meeting, Baltimore, MD.
- Campbell, L., Terrence Kaufman, & Thomas C. Smith Stark. (1986). Meso-America as a linguistic area. *Language*, 62(3), 530-570.
- Campbell, E., & E. Cruz. (2009). El sistema numérico del proto-chatino. In *CILLA-IV-09*. University of Texas at Austin: Archive of the Indigenous Languages of Latin America - www.ailla.utexas.org.
- Cruz, E. (2011). *Phonology, tone, and the functions of tone in San Juan Quiahije Chatino*. Unpublished doctoral dissertation, University of Texas at Austin.
- Cruz, E., & Woodbury, A. C. (2014). Finding a way into a family of tone languages: The story and methods of the Chatino Language Documentation Project. *Language Documentation Conservation*, 8, pp.490-524.
- Cruz, H. (2014). *Persuasive speech of governmental authorities: a comprehensive analysis of poetic, rhetorical, and linguistic structure of traditional Chatino oratory*. Unpublished doctoral dissertation, University of Texas at Austin, Austin, Texas.
- Cruz, H., & Woodbury, A. C. (2006). La fonología y tonología comparativa del chatino: un informe de campo en Zacatepec. In *Las memorias del Congreso de Idiomas Indígenas de Latinoamérica-II*. Archive of the

Indigenous Languages of Latin America.

- DiCanio, T., Christian. (2008). *The Phonetics and Phonology of San Martín Itunyoso Trique*. Unpublished doctoral dissertation, University of California, Berkeley.
- Edmondson, T., & Bendor-Samuel, J. (1966). Tone patterns of Etung. *Studies in African Linguistics*, 5, 1-6.
- Egland, S. D. B., & Ramos, S. C. (1983). La inteligibilidad interdialectal en México: Resultados de algunos sondeos.
- ELAR. (n.d.). Retrieved 04/01/2015, from <http://www.elar-archive.org>
- Goldsmith, J. (1976). *Autosegmental Phonology*. Unpublished doctoral dissertation, MIT.
- Grinevald, C., & Bert, M. (2011). Speakers and communities. In P. K. Austin & J. Sallabank (Eds.), *The Cambridge Handbook of Endangered Languages* (p. 45-65). Cambridge University Press.
- Hernández Días Jorge. (1987). *El café amargo: Los procesos de diferenciación y cambio social entre los chatinos*. Oaxaca, Mexico: Universidad Autónoma Benito Juárez de Oaxaca, Instituto de Investigaciones Sociológicas.
- Hyman, L. (2011). Towards a canonical typology of prosodic systems. In *Annual Meeting of the Australian Linguistic Society, Canberra*.
- Kaufman, T. (1987). *Otomanguean tense/aspect/mood, voice, and nominalization markers. unpublished monograph*.

- Kaufman, T. (2006). Oto-manguean languages. In K. Brown (Ed.), *Encyclopedia of languages & linguistics* (Vol. 9, p. 118-124). Oxford: Elsevier.
- Lewis, M. P., Gary F. Simons, & Charles D. Fennig (Eds.). (2015). *Ethnologue: Languages of the world* (Eighteenth edition ed.). Dallas, Texas: SIL International.
- Macaulay, M., & Salmons, J. C. (1995). The Phonology of Glottalization in Mixtec. *International Journal of American Linguistics*, 61, 38-61.
- Macken, M., & Salmons, J. C. (1997). Prosodic templates in sound change. *Diachronica*, 14, 33-66.
- McCawley J. (1970). A note on Tiv Conjugation. *Studies in African Linguistics*, 1, 123-129.
- McIntosh, J. D. (2009). Los tonos del chatino de Santa Lucía Teotepec. In *CILLA-IV*. University of Texas at Austin: Archive of the Indigenous Languages of Latin America - www.ailla.utexas.org.
- McIntosh, J. D. (2015). *Aspects of Phonology and Morphology of Teotepec Eastern Chatino*. Unpublished doctoral dissertation, University of Texas at Ausitn, Austin, Texas.
- McIntosh, J. D., & Villard, S. (2011). Existencia, localización, posesión y estados de 'ser' en dos lenguas chatinas. In *CILLA-V*. University of Texas at Austin: Archive of the Indigenous Languages of Latin America - www.ailla.utexas.org.
- Nichols, J. (1986). Head-marking and dependent-marking grammar. *Language*, 62, 56- 119.

- Pierrehumbert, J., & Beckman, M. (1988). *Japanese tone structure* (Vol. 15). Cambridge, MA: MIT Press.
- Pride, K., & Pride, L. (2004). *Diccionario chatino de la zona alta : Panixtlahuaca, Oaxaca y otros pueblos*. México, D.F.: Instituto Lingüístico de Verano, A.C.
- Rasch, J. (2002). *The Basic Morpho-syntax of Yaitepec Chatino*. Unpublished doctoral dissertation, Rice University, Houston, TX.
- Sicoli, M. A. (2007). *Tono: A linguistic ethnography of tone and voice in a Zapotec region*. Unpublished doctoral dissertation, University of Michigan.
- Sicoli Mark A, & Kaufman Terrence. (2010). Zapotec and Chatino Survey Archive. *Max Planck Institute, Archive for Linguistic Resources*.
- Snider, k. (2014). On Establishing Underlying Tonal Contrast. *Language Documentation Conservation*, 8, 707-737.
- Sullivant, J. R. (2011). *Tataltepec Chatino Verb Classification and Aspect Morphology*. Unpublished master's thesis, University of Texas at Austin.
- Sullivant, J. R. (2015). *The phonology and Inflectional Morphology of Chá?knyá, Tataltepec de Valdés Chatino, a Zapotecan Language*. Unpublished doctoral dissertation, University of Texas at Austin, Austin, Texas.
- Sullivant, J. R. (under review). Reintroducing Teojomulco Chatino. *International Journal of American Linguistics*.

- Villard, S. (2007). Los tonos del chatino de San Marcos Zacatepec. In *Cilla-iii*. University of Texas at Austin: Archive of the Indigenous Languages of Latin America - www.ailla.utexas.org.
- Villard, S. (2008). *Grammatical Sketch of Zacatepec Chatino*. Unpublished master's thesis, University of Texas at Austin, Austin, Texas.
- Villard, S. (2009). Zacatepec Chatino verb classification and aspect morphology. In *CILLA-VI*. University of Texas at Austin: Archive of the Indigenous Languages of Latin America - www.ailla.utexas.org.
- Villard, S. (2012). La tonología verbal en el chatino oriental de Zacatepec. In *XII Encuentro Internacional de Lingüística en el Noreste*. Sonora, México.
- Villard, S. (2013). Los conceptos de propiedad en el chatino oriental de Zacatepec. In *Las memorias del congreso de idiomas indígenas de latinoamérica-vi*. University of Texas at Austin: Archive of the Indigenous Languages of Latin America - www.ailla.utexas.org.
- Villard, S., & Sullivant, J. R. (under review). Language documentation in two communities with high migration rates. In G. P. Báez, C. Rogers, & J. R. Labrada (Eds.), *Latin American Contexts for Language Documentation and Revitalization*. Berlin: de Gruyter Mouton.
- Villard, S., & Woodbury, A. C. (2012). The typology of tone in San Marcos Zacatepec Eastern Chatino.. (Presented at the Annual Meeting of the Society for the Study of the Indigenous Languages of the Americas, Portland, OR.)

Woodbury, A. C. (2009). *On Internal Classification of Chatino*. (UT Austin
Unpublished ms.)

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