

Tonal Association, Prominence and Prosodic Structure in South-eastern Nochixtlán Mixtec

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Declaration

I hereby declare that this thesis is my own original work and that I have not used any other sources acknowledged, nor any other sources, nor any other sources, nor any other sources of qualified

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Declaration

In memory of Dr. Kenneth C. Fife
Linguist, colleague and friend

I hereby declare that this thesis is my own composition, that the work is my own unless otherwise acknowledged, and that the work has not been submitted for any other degree or qualification.

Inga McKendry
August 2013

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Abstract

The researcher of most varieties of Mixtec (Oto-Manguean) is faced with a high level of surface alternations whereby the tones of some words vary according to their context. Early researchers, such as Kenneth L Pike, accounted for these differences by assigning morphemes to different classes according to the effect morphemes have on the following morpheme. However a much more satisfactory explanation can be achieved by positing the presence of floating tones which are the result of one of three processes: right-ward shift of underlying tones, loss of CV segments, or the delinking of Low tones.

The main focus of this thesis is to account for the tonal association patterns of South-eastern Nochixtlán Mixtec (MXY). As background we present a brief summary of the work of earlier researchers, including claims about the relationship between stress and High tone, (Chapters 2 and 3), and then in Chapter 4 we show how autosegmental phonology provides a more satisfactory account for these published data. In Chapter 5 we show that in spite of surface differences, when the surface tones of morphemes are compared across varieties, morphemes can be shown to belong to tonal categories which reflect a previous stage of Mixtec. Chapters 6 to 10 present unpublished data from MXY. In Chapter 6 we show that underlying tones of disyllabic morphemes usually align at the right edge of their sponsoring morpheme. We also demonstrate how tones are provided for the unspecified initial syllables. In this chapter we also present acoustic data to show that underlying Mid tones participate in phonological processes which default Mid tones do not. Chapter 7 presents more data to show MXY tonal association patterns, including the behaviour of floating High tones such as their tendency to align at the right edge of prosodic words. Chapter 8 describes the complex tonal association of floating High tones sponsored by four verbal prefixes. We show that the resulting surface forms depend not only on the underlying tones sponsored by the verb root, but the form of the verb stem with which it associates. In Chapter 9 we turn to examine whether there is any relationship between stressed syllables and High tone. We analyse acoustic data to show that initial syllables of roots show statistically significant increased duration. By examining the tonal association patterns, we conclude that in MXY, the association of High tones is governed by alignment rather than the locus of stress. Based on the findings of Chapter 9, in Chapter 10 we look at the locus of stress in two different contexts: one, stress found in compound words; and two, stress in verb roots which co-occur with prefixes. In all these contexts we see no predilection for High tones to associate with the stressed syllable. In this chapter we also look at contexts in which Low tone spreads. Chapter 11 pulls together the data presented in Chapters 6 to 10 and presents them against a theoretical background of the interaction between prosody and syntax.

CHAPTER 1 INTRODUCTION

1.1. OVERVIEW

One of the purposes of this thesis is to answer the questions: “Where do floating tones come from, and where do they go?” At first glance, it might be thought that the answer to these questions would be straightforward. However, in this thesis we show that for South-eastern Nochixtlán Mixtec (MXY), spoken in Oaxaca, Mexico, the answers would have to be, “It depends.”¹ As we will show in the latter part of the thesis, the tone bearing unit to which a floating High tone associates depends on a number of factors, including: the underlying tones of the morpheme to which it attaches; the origin of the High tone; and the prosodic structure of the phrase which contains the morpheme which sponsors the High tone and its host.

There are five areas of research which form the background to this thesis: one, the existing research done on other Mixtec varieties; two, analyses of tone systems of other languages; three, studies on the interfaces between phonology and syntax; four, research on prosodic domains; and five, research on intonation.

In this introductory chapter, we provide basic information about Mixtec in general and outline the conventions used throughout this thesis.

The rest of the thesis is structured as follows: Chapters 2 and 3 examine research already carried out in Mixtec – Chapter 2 gives a general overview, and Chapter 3 looks at tonal phonology in particular. Chapter 4 shows how autosegmental phonology provides insight into the analysis of Kenneth Pike. Chapter 5 presents data to substantiate the claim that there has been right-ward shift with regard to the association of tones. Based on this premise, it can be shown that Mixtec words form categories based on their underlying tones whose membership remains surprisingly constant between variants in spite of wide variation in surface forms. We compare the tone systems of twelve varieties of Mixtec in order to document the fact that even though the surface phenomena are very different, the underlying tones are the same. We also describe some of the factors which contribute to the surface differences.

¹ The primary data used in this thesis are the result of fieldwork carried out by the author since 1986 under the auspices of SIL International. The Ethnologue Code MXY refers to a group of closely related varieties spoken in the *municipios* of Santo Domingo Nuxaá, San Andrés Nuxiño and Santa Inés de Zaragoza, in the district of Nochixtlán, in the state of Oaxaca, Mexico.

After providing this background information, we then present previously unpublished data from MXY in Chapters 6-10. Chapter 6 looks at the underlying tone patterns of MXY nouns, showing how these tones are realised in quantifier phrases, especially looking at loci of the tonal association of floating High tones. Chapter 7 documents the tonal phenomena found on enclitics and their hosts, as well as describing some of the association conventions of noun phrases. Chapter 8 describes the very complex association patterns of the floating High tones sponsored by verbal prefixes. Chapter 9 looks at the acoustic correlates of stress in mono-morphemic nouns and verb roots. In this chapter we also examine the role of increased duration in focus constructions in MXY. In Chapter 10 we examine durational evidence to substantiate the difference between compounds and phrases, presenting evidence that it is only verb roots which are stressed and that verbal prefixes do not receive stress. We also show how evidence from tonal association patterns confirms the findings from durational evidence, in that compounds do not display the same tonal patterns as phrases. Chapter 11 provides some remarks on the theoretical issues raised by the data in Chapters 6-10, as well as a summary of the findings of this thesis.

A list of abbreviations which are used in glossing examples is given in Appendix A. The tags used by the Leipzig Glossing conventions are used as far as possible, but when a category found in Mixtec is not given in the list, we have formulated new tags. Appendix B provides a map of the Mixtec region, with the Ethnologue codes, rather than the town names. With this map is a list of Mixtec varieties identified by SIL International, alphabetized according to the Ethnologue code, for easy reference. Throughout the thesis, Mixtec varieties are referred to by using these codes rather than the town names. Appendix C gives the elicitation lists used in Chapters 6, 7, 9 and 10. Appendix D presents two MXY texts by Rodolfo N. Miguel-López, a native speaker of MXY Mixtec, showing the surface tone, the underlying tones, the morpheme glosses and a free translation. These texts demonstrate that the analysis presented in this thesis accounts for the surface facts in un-elicited data. Appendix E presents a brief analysis of the basic principles of tonal association in MXY within an Optimality Theory framework.

1.2. MIXTEC BACKGROUND

Before we start the review of previously published work on Mixtec, we first locate the place of Mixtec among the world's languages. The World Atlas of Language

Structures Online lists Mixtecan as one of the nine genera of the Oto-Manguean language family. Mixtec is part of the Mixtecan genus along with Cuicatec and Trique.² The term “Mixtec” is in many ways a misnomer as it gives the impression that Mixtec is a homogenous grouping. However, just how diversified the grouping is depends on one’s definition of the difference between a language and a dialect. The difficulty is evidenced by the fact that the Sixteenth Edition of the Ethnologue lists 52 Mixtec varieties (Lewis 2009), whereas the National Catalogue of Indigenous Languages in Mexico lists 84 varieties (INALI 2005). A comparison of these two listings indicate that the groupings show great disparity as to what counts as a variety. For example, where SIL lists only one language, INALI lists several, and in other cases where SIL lists several languages, INALI combines these into one grouping. Yet another point of view is stated in Caballero (2008), a member of the Mixtec Language Academy, *Ve’e Tu’un Savi*. He claims that Mixtec is “one language with many dialectal variants.” For his dictionary, he gathered data from 100 communities, although the dictionary includes data from only 63 of them.

Given this disparity, we will use the term “variety” rather than “language” to refer to the different speech communities cited in this thesis. However, it must be clearly stated that most of these varieties are mutually unintelligible, and the differences between them correspond more to the variation among the Romance languages rather than the differences between different varieties, say, of English. To refer to the varieties of Mixtec, we use the SIL Ethnologue codes. When the Ethnologue groupings cover more than one speech community, we give the name of the town along with the Ethnologue code. A list of these codes, plus a map of the Mixtec region, is given in Appendix B. Often the name given in the Ethnologue is the name of the *municipio* in which the variety is spoken (the state of Oaxaca is divided into 570 political entities called *municipios*). In some cases, a more general name is given, based on the geographical location, such as the district, when it is considered that the speech community extends across *municipio* boundaries. In other cases, the speech community is limited to a smaller division. In those cases, the name given is that of the largest community. In a few instances there is no Ethnologue code for a speech variety, and the town name is given. We use the term ‘Mixtec’ to refer to all these varieties as a whole.

The traditional territory for the Mixtec people is in the south of Mexico, in what are now the states of Oaxaca, Guerrero and Puebla. In the literature, there are often references to Highland, Lowland and Coastal Mixtec, but these terms define

²<http://wals.info/languoid/family/otomanguean>, accessed 2 July 2012

geographical groupings more than linguistic ones. There are some features which are only found in certain geographical areas, but most features which are pertinent to this thesis crisscross these traditional geographical boundaries. So when these terms are cited, we use them to help the reader identify in which geographical area a certain variety is to be found.

The mountainous territory in which most of the Mixtecs live lends itself to each village being somewhat isolated from its neighbours. Thus the manner of speech of each village tends to vary from that of adjacent varieties. The differences can be phonological, lexical and/or grammatical. Another factor is socio-linguistic, in that people tend to see their identity as being part of a specific community rather than the language family as a whole. Therefore the differences in speech tend to be part of what identifies a person as belonging to a given community.

However, having mentioned these differences between the varieties, it must also be said that the surface differences mask a high level of underlying commonality, although there are numerous sound changes. This is also seen in the tone systems where comparative evidence shows a remarkable degree of similarity between the underlying tones of the different varieties, as we demonstrate in Chapter 5.

Most Mixtec speech communities number less than 50,000 speakers. In some communities, Mixtec is being abandoned in favour of Spanish, a process which has been going on for well over a century. Some varieties have already been displaced by Spanish, and there is a wide range of displacement in other communities. The possibility of language death has attracted the attention of linguists to document varieties before they disappear. MXY is one such endangered variety in that most children are not learning Mixtec. This thesis serves to document some of the complexities of the tone system of this variety.

1.3. EXPLANATION OF TRANSCRIPTIONS

In this section, we give a brief explanation of the transcription conventions used throughout this thesis. First we note that data from published works which originally used Americanist symbols are presented in this thesis using the IPA equivalents. In the cases where the original data is written in a practical orthography, again the data is usually presented here using IPA symbols. Another departure from the original transcriptions is that nasalisation is presented here as a feature of the morpheme, not of the vowel.

In (1.1), we give data from the Mixtec variety spoken in San Miguel el Grande (MIG) to show the use of the IPA symbols. Note that in these examples tone is omitted.

1.1. IPA equivalents for sample Americanist transcriptions

Original transcription	IPA transcription used in this thesis
žuu	juu
tə	tɨ
čaa	tʃaa

The data in (1.2) give examples of nasalised morphemes (the transcription used in this thesis reflects our analysis of nasalisation as a feature of the morpheme rather than the vowel). The data in (1.2) come from Dyk and Stoudt (Dyk and Stoudt 1973). In the original form these data are written in practical orthography. Note that for each of the three phonemes /β/, /n/ and /j/ an oral and a nasal morpheme are given.

1.2. IPA equivalents for practical orthography

Original Transcription	IPA Transcription Used in this Thesis
a) mahan	βa [?] a ⁿ
b) vaha	βa [?] a
c) nahan	na [?] a ⁿ
d) ndaha	na [?] a
e) ñuu	juu ⁿ
f) yuu	juu

In (1.2a) we see that [m] is written in this thesis as its oral allophone /β/ and that the nasalisation is written as a morpheme-final superscript *n*. We see that the words for ‘raccoon’ and ‘good’ differ in that the former is a nasalised morpheme whereas the latter is oral. Another pair is given in (1.2c) and (1.2d), *na[?]aⁿ* ‘for a long time’ versus *na[?]a* ‘hand’. In (1.2e) and (1.2f) we write the fricative as /j/ although Pike reports that it is in free variation with [ʒ]. Note that [ñ] or [j̃] is analysed as the nasal allophone of /j/. By using these transcription conventions, the relationships between oral and nasal morphemes are made clear.

We now describe the conventions used in this thesis to indicate tone. As most Mixtec varieties display alternations between the surface and underlying tones, transcription conventions are used to make it easier for the reader.

First we look at an example from San Miguel el Grande (MIG), given in (1.3).

1.3. Sample tone transcription

Surface form	tʃī	kī ^ʔ i ⁿ	-nī ⁿ	híi ⁿ	sùtʃí	lúli	-ná ⁿ
Citation Form	tʃī	kī ^ʔ i ⁿ	-nī ⁿ	híi ^{n(H)}	sùtʃí ^(H)	lúli ^(H)	-ná ⁿ
	because	go	2HON	with	child	small	1HON
	<i>because you will go with my little child...</i>						

The first line of example (1.3) displays the surface tones as found in a Mixtec story. High is indicated by an acute accent, á; Mid by a macron, ā; and Low by a grave accent, à. The second line of the example gives the citation form as found in the San Miguel Dictionary manuscript by Evelyn G Pike. In this manuscript she indicates whether a morpheme perturbs the following morpheme or not. Note that in the citation form we have re-analysed the fact that a morpheme perturbs the following morpheme to higher as the presence of a floating High tone. These are indicated in parentheses. By using these citation forms we are not making any claims as to whether all the Mid tones are present underlyingly nor whether adjacent identical tones such as those found on *híiⁿ* ‘with’ represent one or two tones underlyingly.

When citing secondary data we usually use this format; that is, the first line of the example gives the surface tones found in a given context; the second line gives the citation forms; the third line the gloss; and the fourth line the free translation. This format has been chosen to avoid making claims about the underlying tones of varieties of Mixtec for which we lack primary data.

For South-eastern Nochixtlán Mixtec (MXY), the focus of this thesis, the transcription of tones is slightly different in that for this variety we do posit underlying tones. We give an example in (1.4).

1.4. Sample of MXY

S	nī ⁿ -	sèē ⁿ	-ǎá	kīī	k ^w is ^m	ikū
UR	ni ^{n(L)}	see ^{nM}	ǎa ^{HL}	kiti ^{MH}	k ^w isi ^{nHL}	iku ^{MH}
	PFV	buy	1HON	animal	white	yesterday

I bought a white animal yesterday.

We note that in the first line, we show the surface tone ‘S’ by means of conventional diacritics as we do for MIG. In the second row, ‘UR’, we indicate the underlying tones by superscript small upper case letters. The tones are usually written at the right edge of their sponsoring morpheme as in MXY underlying tones usually align at the right edge of their sponsoring morpheme. (We use the term ‘alignment’ in the sense that it is used within an Optimality Theory model such as by McCarthy and Prince (1993); the premise is that a designated edge of some prosodic or morphological category will coincide with the designated edge of some other prosodic or morphological category.) Tones sponsored by morphemes which do not associate with that morpheme are written in parentheses, for example *ni^{n(L)}*- ‘perfective’. This indicates that the Low tone sponsored by the verbal prefix does not associate with the prefix itself but is a floating tone. When a morpheme sponsors two tones such as is the case for *kiti^{MH}* ‘animal’ the second tone usually is a floating tone. However, in some cases pre-pausally, falling contours on one syllable are permitted. These tonal phenomena are described in Chapter 6.

1.4. TONAL ALTERNATIONS IN CONTEXT

In conclusion we present some data from the texts included in Appendix D, as a key aspect of this thesis is to document the relationship between the underlying tones and the surface alternations. These two texts provide the data which show not only the role of the underlying tones but also of prosodic boundaries in tonal association. In these data we also further explain the transcription conventions for MXY. In the data in (1.5), the first line represents the surface tones, and the second line the underlying tones. Tones in parentheses of morphemes with only one mora are floating tones. By comparing the underlying and surface tones, starting at the beginning of the phrase, we see that the tones sponsored by the words associate at their right edge. For example in the case of the word *tu²u^{dM}* ‘word’ which sponsors two tones, the second tone, in this case a Mid tone, is associated with the following word, *jaja^{dH}* ‘coyote’. However, the High tone sponsored by *jaja^{dH}* ‘coyote’ does

not associate with δuse^{nMH} ‘lazy’; the Low tone of $jaja^{nLH}$ ‘coyote’ spreads to both moras of δuse^{nMH} ‘lazy’.

1.5. Low tone spread

$\bar{i}i^n$	$t\bar{u}^?u^n$	$j\bar{a}j\bar{a}^n$	$\delta\bar{u}s\bar{e}^n$
ii^{nM}	$tu^?u^{nLM}$	$jaja^{nLH}$	δuse^{nMH}
one	word	coyote	lazy
<i>a story about a lazy coyote</i>			

We see a different pattern in (1.6). Again, the word preceding $jaja^{nLH}$ ‘coyote’ sponsors a Low Mid tone melody, so the Mid tone associates with the initial mora of $jaja^{nLH}$ ‘coyote’. However, even though $ju^?u^{MH}$ ‘mouth’ sponsors the same tones as δuse^{nMH} ‘lazy’, the Low tone of $jaja^{nLH}$ ‘coyote’ only associates with the initial mora of $ju^?u^{MH}$ ‘mouth’ and the floating High tone of $jaja^{nLH}$ ‘coyote’ associates with the second mora of $ju^?u^{MH}$ ‘mouth’.

1.6. No Low tone spread

$n\bar{i}^n-$	$s\bar{e}t\bar{u}^?a$	$j\bar{a}j\bar{a}^n$	$j\bar{u}^?u$	$t\bar{i}$
$ni^{n(L)}-$	$se^{(M)}-$	$tu^?a^{LM}$	$jaja^{nLH}$	$ju^?u^{MH}$
PFV	make	ready	coyote	mouth
<i>The coyote got its mouth ready</i>				

The question then is, why are the surface tones of δuse^{nMH} ‘lazy’ and $ju^?u^{MH}$ ‘mouth’ different, even though they sponsor the same tones and both follow the word $jaja^{nLH}$ ‘coyote’? In order to answer this question, we need to tease apart the various factors that impact the surface tone patterns, such as the underlying tones, as well as the prosodic phrase structure. In this thesis we look at these factors one by one, so that in the final chapter we can show how they are woven together to form a coherent whole which accounts for the mapping of underlying to surface tones.

CHAPTER 2 MIXTEC BASICS

This chapter presents a brief overview of linguistic research carried out on Mixtec phonology and syntax. We first give a short introduction to the published works of some of the key people who have been involved in research into different varieties of Mixtec research. Secondly, we present an overview of Mixtec segmental phonology; and finally, we give a brief description of Mixtec syntax. We leave the review of Mixtec tonal phonology to Chapter 3.

2.1. OVERVIEW OF PUBLISHED WORKS

Pre-colonial Mixtec codices used pictures rather than an alphabet to record Mixtec history. Some early colonial documents, such as maps, use both the pre-colonial style pictures and in addition have the Mixtec words written alongside. From the colonial period, there are two catechisms published in Mixtec, that of Hernández (Hernández, 1567) and the translation of Ripalda's catechism by González (Ripalda, 1755). The late 16th century also saw the publication of the *Vocabulario en Lengua Misteca* by Francisco de Alvarado and *Arte en Lengua Mixteca* by Antonio de los Reyes, both published in 1593. The *Vocabulario* gives a list of words and phrases in Spanish and their translation into Mixtec. In addition, hundreds of Mixtec documents, such as wills and other legal documents, were written in the colonial period (Terraciano 2008). However there seems to have been no published analysis of these texts. A thorough examination of these documents is outwith the scope of this thesis.

In spite of the proliferation of writing in Mixtec during the colonial period, there seems to have been no systematic research done on Mixtec until the mid-20th century. Linguistic research into Mixtec varieties began in the late 1930's and was first undertaken by Kenneth L Pike, under the auspices of the Summer Institute of Linguistics.¹

The focus of K Pike's research was the variety spoken in San Miguel el Grande (MIG). One of K Pike's SIL colleagues, Cornelia Mak, started out

¹ In order to distinguish the works of Kenneth L Pike from those of his wife, Evelyn G Pike, and those of his sister, Eunice V Pike, we use the initials of their first names as well as their surname as follows: K Pike, EG Pike and EV Pike. When Kenneth L Pike is the only author whose analysis is being discussed, we first identify him, and then refer to him as Pike.

researching MIG and then later also learned the varieties spoken in San Esteban Atatláhuca, (MIB) and Santo Tomás Ocotepec, (MIE). Mak's knowledge of more than one Mixtec variety enabled her to publish two papers comparing the tone systems, first of MIG and MIB (Mak 1953), and secondly a comparison of the tone systems of MIG, MIB and MIE, (Mak 1958). We look at these analyses in Chapter 3 on Mixtec tonal phonology and also in Chapter 5 on comparative Mixtec tone. Mak also provided some of the Mixtec data used by her SIL colleague Robert E Longacre for his PhD research into Proto-Mixtecan, (Longacre 1957). Mak co-authored a paper with Longacre (Mak and Longacre 1960) which slightly revises the analysis of Longacre (Longacre 1957) given that by this time, data from more varieties of Mixtec were available. These works are analysed in more detail in Chapter 5 on comparative Mixtec tone.

In addition to research carried out by members of SIL, interest in Mixtec has developed among other linguists, principally within Mexico and in the USA. One centre of Mixtec study has been the University of California at Berkley. As mother-tongue speakers of Mixtec have travelled to the USA seeking work, it has been possible for Mixtec varieties to be studied outwith their traditional geographical area. For example, in Macaulay's 'Grammar of Chalcatongo Mixtec' (Macaulay 1996), she states that she started studying Mixtec as part of a course at the University of California, Berkley. She did further research in Chalcatongo which resulted in her doctoral thesis 'Morphology and Cliticization in Chalcatongo Mixtec' (Macaulay 1987) as well as her published grammar of Chalcatongo Mixtec. In the *Ethnologue* (Lewis 2009) the variety spoken in Chalcatongo is included under the designation MIG.

2.2. INTRODUCTION TO MIXTEC PHONOLOGY

We now present a brief overview of published works on Mixtec phonology that shed light on the linguistic discussion which will be presented in the second part of this thesis. We give a review of different reconstructions of the Proto-Mixtec phonological inventory. We also examine four issues: nasalisation as a feature of the morpheme, the status of glottal stop in Mixtec, the status of long vowels, and what constitutes a word in Mixtec.

2.2.1. Proto-Mixtec consonants

In this section we compare previous reconstructions of Proto-Mixtec. There are four published sources for the study of the reconstruction of Proto-Mixtec segmental phonology: Longacre (1957), Mak and Longacre (1960), Josserand (1983), and Bradley and Josserand (1982). Of these four, only Longacre (1957) examines the tone systems in addition to the segmental phonology. A fifth work, Dürr (1987), reconstructs the tone system, but does not posit any changes to the segmental inventory. Note that when considering data from more than one Mixtec variety, we have chosen not to write tone on data in this chapter, so as not to preempt the comparative description of Mixtec tone which will be given in Chapter 5.

Longacre (1957) is a reconstruction of Proto-Mixtecan, which as described in Chapter 1, includes varieties of Trique, Cuicatec and Mixtec. His data sources of Mixtec are data from four varieties: San Miguel el Grande (MIG), San Esteban Atatláhuca (MIB), Jicaltepec (MIO), and Metlatónoc (MXV). MIG and MIB are close geographically (both are located in the district of Tlaxiaco) and so are considered Highland Mixtec. MIO is considered Coastal, and MXV is spoken in the state of Guerrero. Longacre posits processes by which Mixtec phonology developed from that of Proto-Mixtecan, giving a set of correspondences between Proto-Mixtecan phonemes and those found in present day varieties of Mixtec, Cuicatec and Trique.

Mak and Longacre (1960) is a revision of Longacre (1957). This paper uses data from 28 Mixtec towns, thus giving a much better coverage of the variation in the language group. They reconstruct the consonantal phonemes as shown in (2.1).

2.1. Mak and Longacre's (1960) Proto-Mixtec consonantal phonemes

t		k	k ^w	ʔ
β	θ	ʒ	h	
	ˀd			
m	n	ɲ		
l				

Note that Mak and Longacre reconstruct glottal stop as a consonant. This reconstruction is consistent with their analysis that vowel initial words such as ^ʔ*isu*

'deer' are considered to be CVCV, the initial glottal stop being considered as a consonant. Thus in their analysis of Mixtec, all syllables must have an onset.

Josserand (1983) uses a word list of 188 items from 122 towns. The analysis presented is a revision of the study undertaken by her and Bradley which was published as Bradley and Josserand (1982). Josserand (1983) reconstructs five 'central' consonantal units, *t, *ⁿd, *s *l and *n (she uses the term 'central' as equivalent to 'coronal'). She also reconstructs five non-alveolar consonants which she refers to as 'peripheral': *k, *k^w *h *w and *j.² For ease of comparison with Mak and Longacre (1960), in (2.2) we display this inventory as it is presented in Bradley and Josserand (1982), and not that of Josserand (1983).

2.2. Bradley and Josserand's (1982) Proto-Mixtec consonantal phonemes

k ^w	t	k
	ⁿ d	
	s	h
	n	
w	l	j

First we should note that Josserand considers *k^w as a labial phoneme. The differences between the reconstruction of Mak and Longacre and that of Josserand can be summarized as follows:

- There is a difference in the analysis of the status of glottal stop, which Josserand reconstructs as a feature of the vowel, while Mak and Longacre reconstruct it as a consonantal phoneme.
- The analyses also differ as to the number of nasal phonemes they reconstruct. Josserand reconstructs two semivowels, /*w/ and /*j/, rather than the fricative equivalents as do Mak and Longacre. The phoneme reconstructed by Mak and Longacre as /*θ/ is equivalent to Josserand's /*s/, in that where Mak and Longacre reconstruct /*θ/ Josserand reconstructs /*s/.

The differences in these reconstructions are indicative of issues in Mixtec comparative phonology which are covered later in this chapter. In Section 2.2.2 we

² Note that as has been explained in Chapter 1, we use IPA notation rather than what Josserand uses in her thesis.

show that nasalisation is better interpreted as a feature of the morpheme rather than that of the vowel. In Section 2.2.4 we discuss the status of glottal stop.

2.2.1.1. Proto-Mixtec plosives

In this section we look at the reconstructed voiceless plosives: *t, *k and *k^w. The data given in (2.3) are examples of words which have identical consonant and vowel segments in all the Mixtec varieties for which we have data.

2.3. Words with *t or *k

taka	‘nest’
kaa	‘metal’
koo	‘snake’
ko ^ʔ o	‘bowl’

When comparing data with the phoneme *k^w we see more variation. Data are presented in (2.4) where the words for ‘blame’, ‘comb’, ‘rich’ and ‘green’ are compared in four varieties of Mixtec. In some varieties, such as MXV, *k^w occurs as [β]. This change has usually taken place before front vowels, although as shown in (2.4d), there are instances in which the sequence [k^wi] does occur. In other varieties [k] is a reflex of *k^w, as shown in (2.4b) and (2.4c) for MIG, but in MXY, *k^w occurs as [k] only in the word for ‘comb’, as shown in (2.4b). The data from MXB is given for comparison, as in this variety *k^w occurs as [k^w] throughout.

2.4. Reflexes of *k^w

	MXV	MXY	MIG	MXB	
a)	k ^w atʃi	k ^w etʃi	k ^w atʃi	k ^w atʃi	‘blame’
b)	βika	kuka	kuka	k ^w ika	‘comb’
c)	βika	k ^w ika	kuka	k ^w ika	‘rich’
d)	k ^w ii	k ^w ii	k ^w ii	k ^w ii	‘green’

We now turn to data for which Josserand reconstructed *t. She claims that before front vowels *t has developed the reflexes [tʃ], [tʃ] and [ts]. On the other hand, in McKendry (2001), we presented data to substantiate the claim that palatalised consonants were part of the Proto-Mixtec consonantal inventory. We claim that [tʃ] and [ts] are reflexes of *tʃ rather than reflexes of *t as claimed by

Josserand. In (2.5), we give cognate sets, showing the developments of *tʰ. Josserand's cognate sets crucially lack data from XTT.

2.5. Reflexes of *tʰ

XTT	MIG	MXY	MXV	MJC	MIO	MIP	
tia	tʃaa	tec	tʰaa	(not cognate)	(not cognate)	(not cognate)	'man'
jutia	jutʃa	jute	itʰa	jutʰa	juta	jutsa	'river'
teju	teʔju	teʔju	tʰaʔju	tʰaʔju	taʔju	tsaʔju	'rotten'

The reflexes of *tʰ which are found in several different varieties are summarised in (2.6).

2.6. Reflexes of *tʰa

Developments of tʰa	Variety
*tʰa > ta	MIO
*tʰa > te	MXY
*tʰa > tʃa	MIG
*tʰa > tsa	MIP
*tʰa > tia	XTT
*tʰa remains tʰa	MXV, MJC

By positing *tʰ we account for the variation in surface forms which occurs in modern varieties of Mixtec. The reflexes of *tʰ shown in (2.6) are the results of common phonological processes. It would be difficult to see how these reflexes could have developed from *t. However, positing *tʰ succinctly allows for a more elegant explanation of all of the modern reflexes.

2.2.1.2. Proto-Mixtec fricatives

Mak and Longacre reconstruct four fricative phonemes. First we look at *β and *ʒ, which Josserand reconstructs as *w and *j respectively. As shown in (2.7), the phoneme *β is realised as [β] in most varieties and as [w] in one other variety found in the database used for this study (note that Josserand (1983) lists several towns in which her data have /w/ as a reflex of *w).

2.7. Words with word initial *β

MIG	MXY	MIL	MXB	XTA	MXT	
βeʔe	βeʔe	βeʔe	βeʔe	βeʔe		'house'
βiko	βiko	βiko	βiko	βiko	wiko	'cloud'
βihi ⁿ	βiʃi ⁿ	βiʃi ⁿ	βiʃi	βiʃi ⁿ	wiʃi	'cold'
	βaʃi	βeʃi	βaʃi	βaʃi	waa	'is coming'
βiʃi	βiði	βiði	βiði	βiʃi		'sweet'

The data in (2.8) below show that in some varieties, the syllable [βi] has been reduced to [u] word finally, or in some cases the /β/ has been lost but the [i] remains (this is the case for MXB).

2.8. Examples of the phonological development whereby /βi/ > u

MIG	MXY	MIL	MXB	XTA	
sau	ðaβi	ðau	ðai	saβi	'rain'
jau	jaβi	jau	jai	jaβi	'hole'

The proto-phoneme which Mak and Longacre reconstruct as *ʒ and which Josserand reconstructs as the semi-vowel *j is realised as [j] in some varieties and as [ʒ] in others. However, in this thesis we write this phoneme as /j/ regardless of its phonetic value. The data in (2.9) give Josserand's reconstruction, with examples from MIG (where this phoneme is realised as [ʒ]) and examples from MXY (where it is usually realised as [ʒ] in stressed syllables and as [j] elsewhere).

2.9. Occurrences of *j (Josserand 1983)

	MIG	MXY	
*juu	juu	juu	'stone'
*joko [?]	joko	joko	'corn tassel'
*taja	ta [?] ja	taja	'loose'

Now we turn to the two phonemes which both Mak and Longacre and Josserand reconstruct as fricatives. Both reconstruct *h, and either *θ (Mak and Longacre 1960) or *s (Josserand 1983). We choose to label this latter phoneme as *s since /s/ is found in many varieties of Mixtec whereas /θ/ is only found in one

variety in the database used for this study. In MXY and other geographically adjacent varieties *s is realised as /ð/. The proto-phoneme *h is realised as /s/ in MXY. Note that for MXY the phoneme /s/ has two allophones, [s] before mid and back vowels, and [ʃ] before front vowels. The initial consonant in the examples given in (2.10a-c) corresponds to *s and that in (2.10d-f) corresponds to *h.

2.10. Comparison of fricatives

	MIG	MXB	XTA	MXY	
a)	ʃe ^ʔ e	θe ^ʔ e	se ^ʔ e	ðe ^ʔ e	‘ring’
b)	suku ⁿ	θiko	suku ⁿ	ðuku ⁿ	‘high’
c)	saβu ⁿ		saβi ⁿ	ðaβi ⁿ	‘heron’
d)	ha ^ʔ a	sa ^ʔ a	ʃa ^ʔ a	[ʃe ^ʔ e]	‘foot’
e)	hika	ʃika	ʃika	[ʃika]	‘far’
f)	hio	ʃoo	ʃiyo	[ʃio]	‘clay griddle’

Another set of proto-phonemes reconstructed by Mak and Longacre are those which have complementary distribution in nasal and oral environments – *ⁿd, *m, *ⁿ and *ⁿj. Josserand omits *m and *ⁿj from the inventory. These phonemes are best discussed in connection with the analysis of nasalisation as a feature of the morpheme, as discussed in the following section. The remaining proto-phonemes reconstructed by Mak and Longacre are /l/ and /s/. The phoneme /l/ is of relatively low frequency in most varieties and does not seem to feature in the issues discussed in this thesis.

2.2.2. Nasalisation as a feature of the morpheme

We have already noted that Josserand reconstructs a different number of nasal phonemes from Mak and Longacre. This is due to the fact that in places where Mak and Longacre reconstruct *m or *ⁿj, Josserand reconstructs *w plus a nasal vowel, or *j plus a nasal vowel. (The following data are written with the IPA transcription.) The data in (2.11) give a comparison of the reconstructions of these phonemes.

2.11. Comparison of reconstructed *w and *j

	Mak and Longacre	Josserand	
a)	*tʲnĩ	*tʲjĩ	‘mouse/rat’
b)	*kʷaŋũ	*kʷejũ?	‘squirrel’
c)	*ŋũʔmã	*juʔwẽ	‘smoke’

In (2.11a) and (2.11b) we see that Mak and Longacre reconstruct [ɲ] followed by a nasalised vowel whereas Josserand reconstructs [j] followed by a nasal vowel. In (2.11c) we see that in Mak and Longacre, the initial consonant is reconstructed as [ɲ] followed by a nasalised vowel and the medial consonant as [m] followed by a nasalised vowel. On the other hand in (2.11c) Josserand reconstructs the initial consonant as [j] followed by an oral vowel and the medial consonant as [w] followed by a nasalised vowel.

Marlett (1992) posits that Mixtec morphemes are specified for the feature [+/- nasal]. This analysis is based on the fact that in many varieties of Mixtec [β], [n^d] and [j] only occur before oral vowels whereas [m], [n] and [ɲ] only occur before nasal vowels. In McKendry (2001), we presented further evidence to show that nasalisation is best considered as an autosegmental feature of the morpheme. Positing that the nasals are allophones of the oral consonants would remove *n from Josserand’s inventory of Proto-Mixtec consonants and *m, *n, and *ɲ from that of Mak and Longacre.

Since we consider that nasalisation is a feature of the morpheme (McKendry 2001), nasalisation is indicated morpheme-finally by a superscript [ʰ]. In (2.12) below, examples are given of MXY minimal pairs and the transcription that is used in this thesis (tone is omitted from these examples). Note that /j/ in nasal morphemes is phonetically [j̃].

2.12. Allophones of continuants in nasal morphemes in MXY

		Example	Transcription	Gloss
/β/[β]	[-nasal]	[βa [?] a]	/βa [?] a/	‘good’
[m]	[+nasal]	[mã [?] ã]	/βa [?] a ⁿ /	‘raccoon’
		[ðaβi]	/ðaβi/	‘rain’
		[ðãmi]	/ðaβi ⁿ /	‘heron’
/n/[ⁿ d]	[-nasal]	[ⁿ da [?] a]	/na [?] a/	‘hand’
[n]	[+nasal]	[nã [?] ã]	/na [?] a ⁿ /	‘know’
		[ka ⁿ da]	/kana/	‘move’
		[kãnã]	/kana ⁿ /	‘call’
/j/ [ʒ],[j]	[-nasal]	[ʒuʒu]	/juju/	‘dew’
[j]	[+nasal]	[jũjũ]	/juju ⁿ /	‘bee’

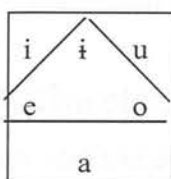
The analysis of nasalisation as an autosegmental feature of the morpheme is reflected in the ways in which we have chosen to represent nasalisation as shown in (2.12) above. Under this analysis, we also remove nasalised vowels from the segmental inventory of Mixtec, along with [m], [n] and [ɲ]. Note that we have chosen to write /n/ for the phoneme rather than the oral allophone [ⁿd] as we have for the others. This is to avoid confusion with the superscript [n] which indicates morpheme level nasalisation.³

2.2.3. Mixtec Vowels

We now turn to look at the reconstructions of Mixtec vowels. Modern day Mixtec varieties have either 5 or 6 vowels. Mak and Longacre (1960) reconstruct /*i/ /*a/ /*i/ /*u/ and /*o/. They are unsure whether there was an /*e/ or not. They also claim that nasalised vowels developed from the loss of syllable-final *m. In Josserand’s reconstruction, on the other hand, /*e/ is included, as shown in (2.13).

³ Superscript n also co-occurs with /k/ and /tʃ/ in words such as *taⁿki* ‘praying mantis’ and *ʔfisiⁿ* ‘sandal’. In these cases the following consonant is voiced. In addition, /k/, /k^w/ and /tʃ/ are voiced and pre-nasalised when they follow a nasalised prefix, for example *kũ-ⁿkata* ‘go-hang’, *kũ-ⁿk^weeⁿ* ‘go-buy’. However, the consonant cluster thus formed does not participate in morpheme level nasalisation; that is, the verb root remains oral or nasal as indicated in the lexicon.

2.13. Josserand's reconstruction of Proto-Mixtec vowels



Josserand, following Pike (1947) and Longacre (1957), divides the vowels into two groups. She claims that the outer triangle vowels *i, *a, and *u were more frequent in Proto-Mixtec. She also claims that each of these vowels had a special relationship with one of the inner triangle vowels and that the majority of phonological developments for vowels include partial or total merger between these pairs of inner and outer triangle vowels. She claims that the low frequency of [e] indicates loss rather than innovation.

However, we claim rather that [e] is most likely the result of the loss of palatalisation. This was shown in (2.6) above, where it was demonstrated that one of the reflexes of *t^ha is [te]. Another source of [e] is the loss of morpheme medial fricatives from words which have [a] in the initial syllable and [i] in the second syllable. The root of the verb *kasi* 'to eat' is one word in which this process occurs, as is shown in (2.14).

2.14. *a + *i > [e]

MXY MIG Yujia
kasi kee kai 'eat'

Caballero (2008) gives additional examples, although he does not say which towns are represented by each form. One of Caballero's cognate sets is given in (2.15).

2.15. Further example of *a + *i > [e]

βahi βafi βatfi βehi βai βee 'come'

Mak and Longacre claim that nasalised vowels developed from Proto-Mixtecan syllable final *m. Josserand, on the other hand, reconstructs both oral and nasal vowels. However, as was argued above in Section 2.2.2, nasalisation is better considered a feature of the morpheme. On this basis, we claim that it is only

necessary to reconstruct oral vowels for Proto-Mixtec and that nasalised vowels can best be interpreted as allophones in nasalised morphemes.

2.2.4. The status of glottal stop in Mixtec

Another difference between Longacre (1957) and Josserand (1983) is their treatment of glottal stop. Longacre reconstructs glottal stop as a Proto-Mixtec consonant, whereas Josserand considers the glottal stop to be a feature of the vowel.

To examine this issue, we look at data from MIG in which glottal stop occurs in three environments and compare the treatments provided in Longacre (1957) and in the works of K Pike. The three environments are: 1) intervocalically, either between identical vowels as in $\beta e^?e$ 'house' or non-identical vowels as in $ta^?u$ 'break'; 2) word-medially before a limited set of consonants, for example before /n/ as in $ka^?nu^n$ 'big'; or 3) word-initially, such as $^?iso$ 'rabbit'. However, word initial glottal stops only occur in technical writing by these researchers. In the MIG dictionary (Dyk and Stoudt 1973), there are no initial glottal stops.

In (2.16) we give data which contrasts $CV^?V$ and $CV^?CV$ words in MIG.

2.16. Words with medial glottal stops in MIG

$ko^?o$ 'bowl'

$ko^?jo$ 'horsetail' (type of plant)

If the glottal stop were to be considered a consonant, it would be the only coda consonant permitted in most varieties of Mixtec. Or if it were considered part of the second syllable, it would be the only consonant that can form a CC cluster word-medially. So on the basis of the economy of syllable types, we choose to consider it a feature of the vowel, so that $CV^?V$ words are considered to have the same word template as CVV words. Another reason for this analysis will be given in Chapter 3 where we see that CVV words with like vowels and $CV^?V$ words also with like vowels show similar tonal association patterns in certain environments.

In Pike's transcription of MIG, there are no vowel initial words; for example, the word for 'rabbit' appears as $^?is\partial$ and so this word is considered CVCV. However, in Chapter 4, we will show that word-initial glottal stops do not participate in phonological rules that word medial glottal stops before a consonant do. Given this disparity we consider that these initial glottal stops are not part of

the underlying structure of the word. (The association rules for floating high tones in MIG will also be discussed in Chapter 4.)

Macaulay and Salmons (1995) reject both these views of the glottal stop, as a consonant and as a feature of the vowel. Instead they consider glottal to be a feature of the root, so that lexical items are marked [+/- constricted glottis]. This feature then associates with the leftmost vowel in a two-syllable word. This analysis attempts to account for the fact that in most varieties of Mixtec, glottalisation is restricted to the coda of the initial syllable of roots. However, it does not account for varieties such as MIY, MEH and MZA in which there is word-final glottalisation. We show examples of final glottal stop in Chapter 5 on comparative Mixtec, where we show that final glottal stop corresponds to a floating High tone in some varieties. Therefore we consider that on the basis of economy of syllable types, it is best to consider glottal as a feature of the vowel.

2.2.5. The status of long vowels

In this section we look at words with long vowels, which is a common feature shared among Mixtec varieties. However the analysis of this phenomenon is subject to different interpretations. First, we re-examine K Pike's reasons for considering CVV to be two syllables in MIG. Secondly, we apply his analysis to other varieties of Mixtec.

K Pike (1948) notes that in words which are CVCV, referred to as a 'couplet', there are no occurrences of two tones on one vowel. He then argues that long vowels should be considered as a sequence of two short vowels, as long vowels can have two tones associated with them. In (2.17) we present data from MIG in which long vowels have two tones associated with them.

2.17. Surface tone patterns of CVV words from MIG

jū̀ù 'stone'
nò̀ō 'will remain'

However, the one-to-one correlation between the number of vowels and the number of tones sponsored by a morpheme does not hold true for all varieties of Mixtec. Contours are permitted on short vowels in other varieties. In some varieties both rising and falling contours are permitted, in others only falling. Some varieties only permit contours on short vowels pre-pause; others only have contours word

initial; and some have contours on either syllable of the couplet. In (2.18), we present the XTA word *kâniⁿ* ‘far’ which has a High-Low glide on the first syllable.

2.18. Contours in XTA on ‘far’



In XTA, contours can also occur word finally, as shown in (2.19).

2.19. Word-final contour in XTA on ‘the day after tomorrow’



So although Pike argued that CVV words should be considered disyllabic on the basis of the non-occurrence of contours on short vowels in MIG, this argument cannot be generalised to cover all Mixtec varieties.

By comparing words from different varieties, we show that some CVCV words have lost the medial consonant, resulting in words of the form CVV. In (2.20) we give examples of the word for ‘four’ in several different Mixtec varieties. Note that in some varieties it has the form CVCVⁿ and in others it is CVVⁿ.

2.20. A synchronic comparison of the word **kuβiⁿ* ‘four’

MIP	VMX	MXY	MIG	MXB	
kuβi ⁿ	hiβi ⁿ	kuu ⁿ	kuu ⁿ	koβi ⁿ	‘four’

We claim that in all varieties these words have two vowel positions and that in the case of the CVV form, the underlying vowel is linked to both positions. However we are still left with the question as to whether these two positions should be regarded as moras or syllables. This issue will be discussed in Chapter 4.

2.2.6. Mixtec words

We now turn to look at the issue of whether Mixtec permits multi-morphemic words. Or to put the question in terms of linguistic typology: where should Mixtec be placed on the isolating-polysynthetic continuum (where isolating languages are those in which words are mono-morphemic, and polysynthetic languages are those in which multi-morphemic words, often involving noun incorporation, are permitted)? As Whaley (1997) points out, there is no such thing as a completely isolating language in which all words are mono-morphemic. Rather what we are looking for are the general tendencies. As we will see, there have been different answers to the question as to what constitutes a word in Mixtec.

The question as to how to divide an utterance into words has been around ever since people started to write Mixtec using the Roman alphabet. In the 16th century works of both de Alvarado and de los Reyes, we find multi-morphemic ‘words’ such as that given in (2.21) from de los Reyes.⁴ Note that in (2.21), there are no mono-syllabic orthographic words. The morpheme divisions and glosses are given in (2.22).

2.21. Example of a ‘word’ from de los Reyes

yodzandahuiñahando ‘you are deceiving me’

2.22. Morpheme breaks

yo	dza	ndahui	ñaha	ndo
IPFV	CAUS	poor	OBJ	2
<i>You are deceiving me.</i>				

Note that the morpheme *ñaha* glossed as ‘object’ can refer to first, second or third person. The referent of this pronoun is only determined from the context.

De Alvarado also uses long words, for example (2.23) we give his word of ‘to kneel’. In (2.24), we give the morpheme glosses for the data given in (2.23).

⁴ When citing data from 16th century sources, we have retained the original transcriptions.

2.23. Example of a 'word' from de Alvarado

yocuiñesitendi 'I am kneeling'

2.24. Morpheme breaks

yo cuiñe site ndi

IPFV stand knee 1

I am kneeling.

On the one hand, the transcriptions in (2.21) and (2.23) could easily be dismissed as the work of non-linguists. Nevertheless, these two examples are illustrative of some of the problems in proposing phonological constituents in Mixtec: in (2.21) the object pronoun *ñā'a* 'object' occurs between the verb and the subject; should it be considered as a separate constituent or is it part of the verb phrase? In (2.24) the question is whether *cuiñe site* forms a compound verb with *ndi* '1st person' as the subject, or whether *site ndi* 'my knee' is actually the subject. The issue of compound verbs is well illustrated by a group of verbs which have *ini* 'inside' as the second component. De Alvarado lists *yotadzi inindi* as the gloss for 'think'. A few entries below, he has the phrase for 'think badly about someone' which is given in (2.25). Note that *tucu* which can mean 'again' or 'differently', occurs between *tadzi* and *ini*. Therefore it would seem best to consider that the subject is *ini ndi* 'my inside' as it is the verb *tadzi* which is modified by the adverb *tucu* and not the entire phrase.

2.25. Adverb occurring before *ini*'

yo tadzi tucu ini ndi

IPFV think different/ inside 1

again

I think badly about...

These examples from de los Reyes and de Alvarado illustrate that determining constituent boundaries is not an easy task. Centuries later K Pike also found that the placement of word boundaries in Mixtec is not a straightforward matter. He observed that any word that is pronounced in isolation must have at least two vowels (Pike 1949). In addition to 'words', there are many mono-syllabic

morphemes. In Pike's transcribed texts (Pike 1944, 1945a, 1945b, 1946, 1947) all mono-syllabic morphemes are written with a hyphen to indicate that phonologically they do not stand alone. Pike (1949) argues that the mono-syllabic morphemes should be considered clitics.

The main points of Pike's argument can be summarised as follows. He first looks at mono-syllabic pronouns which he classifies as postclitics rather than suffixes. He makes this claim on the basis that 1) they are cognate with free nouns, 2) the mono-syllabic form occurs in certain contexts and the disyllabic form in others, and 3) the mono-syllabic form not only co-occurs with verbs but also with nouns to mark the possessor. Secondly he examines the status of morphemes which mark aspectual or modal categories. He considers these to be proclitics rather than prefixes on the basis that 1) speakers will occasionally pause after ni^n 'perfective', but pronounce the morpheme as long; 2) other morphemes which are considered to be the shortened form of disyllabic words can occur between ni^n 'perfective' and the main verb. Thirdly he looks at items which consist of at least two morphemes which he identifies as phrases rather than compounds. These include items such as $tī-sāà$ 'bird', which also occurs as $sāà$. He claims that this is a phrase on the basis of comparison with other items which consist of two nouns and in which the initial noun is sometimes abbreviated, when it has the template CV_1V_1 or $CV_1^?V_1$, with identical vowels. An example is given in (2.26). Note that $jū^?ū$ 'mouth' has two identical vowels.

2.26. Loss of a vowel

$jū^?ū$ $nútfā$ or $jū-$ $nútfā$
 mouth water
margin of a river, or pond

Pike concludes that there are no compounds in Mixtec. The two main arguments on which he bases this analysis are: 1) he notes that many mono-syllabic morphemes have either a corresponding long form, or occur lengthened when the speaker is hesitating while thinking about what to say next; 2) he could find no defining criteria which could form the basis for identifying compounds in contrast to phrases.

Given the above analysis, Pike considers that verbs which are composed of more than one root should be treated as phrases rather than compounds. To illustrate, we look at data in MIG which includes ini^n 'inside'. Like the example

from de Alvarado given in (2.25) above, modifying adverbs occur between the verb root and *ini* as shown in (2.27). Dyk and Stoudt (Dyk and Stoudt 1973) list *ta-u²u iniⁿ* with the meaning ‘to make sad’. Note that the two modifiers *ʃaaⁿ* ‘very’ and *tuku* ‘again’ occur between *ta-u²u* and *iniⁿ*. We consider that the morpheme *ta-* indicates causative.

2.27. Placement of adverbs before *iniⁿ* ‘inside’

tá ũ²ù ʃāàⁿ túkū iniⁿ rì
 make sad very again inside I
I am again very sad.

Giegerich (2009) points out that one of the characteristics of a compound is that it can only be modified in its entirety. On this basis, *ta-u²u iniⁿ* clearly fails the test. So for MIG we concur with K Pike’s analysis that words such as *ta-u²u iniⁿ* should be considered a phrase.

The analysis that words in Mixtec are mono-morphemic recurs in Bradley (1970: 39), where he defines a word as “a grammatical form that is usually smaller than a phrase and sometimes larger than a single morpheme.”

In his research of MIO, Bradley also recognises the difficulty of defining a word. For him the most important phonological characteristic of a word is that it be possible for it to be bounded by pause. He gives the example of a sentence consisting of four phrases, given in (2.28). In this example, we cite the surface tonal forms as given by Bradley (1970).

2.28. Phrase boundaries in MIO

ta	tʃá	ní ⁿ	tʃá [?] á ⁿ	tà [?] à ⁿ	tùkù	nì ⁿ	rá	tʃá [?] nù ⁿ	núú ⁿ	kíʃi	rá	íkù	júú ⁿ
and	past	PFV	go	also	again	just	3M	old	place	came	3M	yesterday	?
and	has just gone also again					old man	place he came		day before		yesterday		
							(from)						

and the old man too has just gone again to the place from which he came the day before yesterday

Bradley claims that in each phrase every word is a single morpheme. He refers to mono-syllabic morphemes as ‘markers’ or dependent words. While recognising the phonological dependence of *ta* ‘and,’ he considers it a separate phrase which forms

a constituent with the whole clause which follows it. Bradley claims that mono-syllabic morphemes are not stressed and that stress falls on the penultimate syllable of words. So, for example, this implies that *ta[?]aⁿ* ‘also’ and *tuku* ‘again’ in the verb phrase carry stress, although Bradley does not explicitly say so.

Bradley uses the term ‘marker’ to describe any item which denotes the grammatical relationship of the neighbouring elements. He classifies markers according to the level at which they function: for example sentence level, such as *tá* ‘and’ or phrase level such as *ká* ‘additive’. He refers to word level markers as prefixes. In this he differs from K Pike (1949) in considering the mono-syllabic morphemes such as the animal classifier *tí* ‘animal’ as a derivational prefix when it co-occurs with the word *sù[?]βàⁿ* ‘tail’ to form *tísú[?]βàⁿ* ‘scorpion’. He also documents other morphemes which he considers to be derivational prefixes, such as *nù* ‘become’; for example, *nù* ‘become’ + *βá[?]á* ‘good’ is realised as *nùβá[?]á* ‘get well’. However, he refers to *ní^m* ‘perfective’ as a dependent word rather than an inflectional prefix as it may have silence before or after, but not both.

Both K Pike (1949) and Bradley (1970) use the occurrence of pause as a defining feature of a word. As they note pauses occurring between inflectional verbal morphemes and the verb root, they conclude that these morphemes are dependent words. However, Bradley (1970) does allow for nouns and verbs to have more than one morpheme. These bimorphemic words are the result of derivational processes, resulting in verbs which consist of a prefix plus usually a verb root, and also nouns which consist of a prefix plus a root. Inflectional morphemes are usually referred to as markers, although Alexander (1988) refers to the perfective marker as a prefix. Their analysis of mono-syllabic morphemes led Bradley and Hollenbach (1988) to conclude that Mixtec has short words, having one to four syllables.

We have seen how the way in which a word is defined affects the number of lexical classes which is posited for Mixtec varieties. This is reflected in the analyses of Mixtec syntax, to which we now turn in the next section.

2.3. BRIEF DESCRIPTION OF MIXTEC SYNTAX

The following description of Mixtec syntax is based on the syntax sketches found in the series edited by Bradley and Hollenbach (1988, 1990, 1991 and 1992). When citing data, we refer to the author of the sketch in question. We use ‘Bradley and Hollenbach’ to refer to the series in general. We also make use of the grammar of Atatláhuca (MIB) (Alexander 1980) and that of Yutatío (MXB) (Williams 2006),

both published by SIL, and the grammar of Chalcatongo Mixtec (Macaulay 1996). We limit ourselves to constructions that are crucial to the argumentation for prosodic boundaries which will be discussed in Chapters 10 and 11.

First we look at some word order patterns of Mixtec. The basic word order of Mixtec is Verb Subject Object. Examples of the basic word order are given in (2.29) to (2.31). These data are from Alexander (1988) for MIE.⁵

2.29. VSO sentence with a noun as the subject and a noun as the object

hí[?]i tʃílū nūtē
 IPFV drink cat water
The cat is drinking water.

In (2.29), we see that both the subject and object of the verb are nouns. There are no morphological markers to indicate which noun is the subject and which is the object. These different roles are differentiated by the relative order; that is, the subject comes first. Note that in these data the imperfective is marked by a floating High tone which associates with the initial mora of *hi[?]i* ‘drink’.

In (2.30), the subject is expressed as an enclitic pronoun, and the object as a noun.

2.30. VSO sentence with an enclitic as the subject and a noun as the object

há[?]á sáⁿ nūhà
 IPFV make 1HON hominy
I am making hominy.

In (2.31), both the subject and object are expressed as enclitics.

2.31. VSO sentence with enclitics for both the subject and the object

ǒē nìⁿ sk^wíkó ðè tì nùⁿ jú[?]ùⁿ
 and PFV throw 3MHON 3AN face fire
And he threw it into the fire.

⁵ Recall that the list of abbreviations used in this thesis is to be found in Appendix A.

2.3.1. Position of adverbs

Some adverbs such as *tuku* ‘again’ occur between the verb and the subject as is shown in (2.32). The data in this section are also from MIE (Alexander 1988).

2.32. Adverb between the verb and the subject

ǒē nⁿ- tìⁿ tūkū hè^ʔè tì
and PFV be stuck again foot 3AN
and its foot also got stuck

Temporal adverbs occur utterance finally or initially, as shown in (2.33) and (2.34).

2.33. Temporal adverb utterance final

ǰā^ʔāⁿ hà nⁿ- nⁿ- kì^hī ikū
woman COMP PFV PFV come yesterday
the woman who came yesterday

2.34. Temporal adverb utterance initial

ikū k^wā^ʔāⁿ ǒe méhìkò
yesterday is going 3HONM Mexico
Yesterday he went to Mexico.

2.3.2. Position of quantifiers

Quantifiers usually precede the noun they modify, as shown in (2.35) with data from MIE (Alexander 1988).

2.35. Quantifier plus noun ‘four men’

kùβìⁿ tēē
four men

2.3.3. Enclitics

All the analyses examined for this study refer to the phonologically bound pronominal markers as clitics. We choose to refer to them as enclitics as in MXY, the Mixtec variety which is the focus of this thesis, enclitics are differentiated from proclitics. We give examples of the uses of these enclitics using data from MIG. In (2.36), we see that the enclitic *-t̥* 3AN replaces the noun [?]*ʔisò* ‘rabbit’ in the second clause of the sentence, as the subject of the second clause.

2.36. Use of enclitic as subject

tē-	nì ⁿ -	kēē	[?] <i>ʔisò</i>	k ^w ā [?] ā ⁿ	-t̥	.
tē-	nì ⁿ -	kēē	[?] <i>ʔisò</i>	k ^w ā [?] ā ⁿ	-t̥ ^(H)	
and	PFV	depart	rabbit	go	3AN	

The rabbit left and went.

These enclitics also occur as the possessor following a noun as shown in (2.37) where the enclitic *-ðē* 3MHON indicates whose son we are talking about. Although not explicit in these data we know from the previous clause that the referent of *-ðē* 3 MHON is plural, referring to both parents of the little skunk.

2.37. Enclitic as the possessor

tē	h̄ ⁿ	t̥i [?] t̄ ⁿ	lúli	hà	kūū	sè [?] ē	-ðē
tē	h̄ ⁿ	t̥i [?] t̄ ⁿ ^(H)	lúli ^(H)	hà-	H-	kūū	sè [?] ē
and	one	skunk	small	COMP	IPFV	be	offspring 3MHON

...and a little skunk who was their child

2.3.4. Lexical classes

In the series edited by Bradley and Hollenbach, the various authors propose the following lexical classes for Mixtec varieties: verbs, nouns, pronouns, adverbs, quantifiers, prepositions, conjunctions, interjections and markers. (Note that the category called ‘markers’ in Bradley and Hollenbach is not composed of the same members as those found in Bradley (1970), due to the fact that Bradley considers conjunctions to be markers.) Adjectives are treated as stative verbs, although in the introduction to the series, Bradley and Hollenbach note that some of the contributors would have preferred to have ‘adjectives’ as a separate class (Bradley

and Hollenbach 1988). Adjectives are, however, treated as a separate class by Macaulay (1996). Macaulay also lists verbs, nouns, pronouns, prepositions, adverbs, numbers and conjunctions. She considers the word that marks plural to form a separate class. She describes verbal inflectional morphemes as prefixes. For example, in (2.38), we give an example from Macaulay (1996) of the use of what she calls the completive prefix. Note that in this thesis we refer to this prefix as ‘perfective’, abbreviated as PFV.

2.38. Use of verbal prefixes

niⁿ- tʃāà rí βē^ʔē ró
 PFV arrive 1 house 2
I arrived at your house.

2.4. PROPOSED ANALYSES

In this section we provide the basis for the analysis that will be used in the rest of this thesis. More data from the varieties covered in the syntax sketches and from other varieties would be needed to verify whether this is the best analysis for all the varieties. It is certainly possible that there are differences between Mixtec varieties, so that one analysis does not necessarily fit all the varieties. So rather than claim a pan-Mixtec analysis, we point to factors which help answer the three main issues on which the analyses under review differ, providing additional data from MXY to substantiate the claims we propose.

The differences in analyses centre around three issues: one, whether adjectives form a separate class; two, the status of mono-syllabic grammatical morphemes and other items classed by Bradley and Hollenbach as ‘markers’; three, whether there are compounds in Mixtec. Although Bradley and Hollenbach claim that in Mixtecan languages words tend to be short (one to four syllables) and that there is little morphology, we show that this is not the case for MXY. In this section we look briefly at the answers to these questions, although a more in-depth analysis of MXY verbal morphology is given in Chapter 8, and compounds are examined in Chapters 10 and 11.

2.4.1. Adjective or stative verb?

We begin by considering whether words in Mixtec which convey adjectival ideas are better analysed as adjectives or stative verbs. In this section we only consider content adjectives, since as we have noted above in Section 2.3.2, quantifiers form a separate class.

For at least some varieties of Mixtec, adjectives are best considered as a separate class as they co-occur with verbal morphemes which do not co-occur with verbs. For example, Macaulay (1996) points out that *nu-* ‘become’ only occurs with adjectives. So for Chalcatongo Mixtec, adjectives are considered to be a separate class and not stative verbs, as found in the Bradley and Hollenbach series.

For MXY, the variety which is the focus of this thesis, we follow Macaulay and consider that adjectives do form a separate class, although MXY adjectives have features that are different from adjectives in Indo-European languages.

An example of the use of adjectives is given in (2.39). Note that the noun phrase comprises *kiti*^{MH} ‘animal’ followed by *k^wisi*^{H^L} ‘white’.⁶

2.39. Adjectives in MXY

nī ⁿ -	sèē ⁿ	-ǎá	kītī	k ^w īsī ⁿ	īkū
ni ^{n(L)}	sec ^{nM}	ǎa ^{HL}	kiti ^{MH}	k ^w isi ^{nHL}	iku ^{MH}
PFV	buy	1HON	animal	white	yesterday

I bought a white animal yesterday.

Adjectives in MXY can also occur as the predicate of a sentence, as shown in (2.40) and (2.41).

2.40. Adjective as predicate

k ^w īsī ⁿ	kītī
k ^w isi ^{nHL}	kiti ^{MH}
white	animal

The animal is white.

⁶ Recall that for MXY the phoneme /s/ has two allophones: [s] before mid and back vowels, and [ʃ] before front vowels. So the phonetic transcription of ‘white’ is [k^wʃi^{nHL}].

2.41. Adjective as predicate

kō	ijō	βīī ⁿ	nū ⁿ -	k ^w ētjī
ko ^(M)	ijo ^{LM}	βii ^{nML}	nu ^{n(H)}	k ^w ētji ^{MH}
but	very	clever	3F	young
<i>but the young lady was very clever</i>				

We claim that in MXY adjectives do form a distinct class from verbs in that they do not co-occur with the causative prefix δa^H -. However, adjectives do occur with the causative prefixes $ka^{(M)}$ - or $se^{(M)}$ - (which come from the verb $ka\delta a^M$ ‘make’) and with $ku^{(M)}$ - ‘be’ and $nu^{(M)}$ - ‘become’. Verbs do not co-occur with these prefixes. This can be seen from examples of the prefix $ka^{(M)}$ -, which is the reduced form of $ka\delta a^M$ ‘do’ or ‘make’. The irrealis form is shown in (2.42).

2.42. Adjective plus the prefix $ka^{(M)}$ -

kā-	kā [?] nū ⁿ	-ǎé	βē [?] ē	-ǎē`
ka ^(M) -	ka [?] nu ^{nMH}	ǎe ^(L)	βe [?] e ^M	ǎe ^(L)
make	large	3MMS	house	3MMS
<i>He will enlarge his house.</i>				

The imperfective form is given in (2.43). Note that the High tone which marks the imperfective does not associate with the prefix $se^{(M)}$ - but with the initial syllable of $ka^?nu^n$ and then spreads to associate with the second syllable as well. We assume that it is the floating tone of $ka^?nu^n$ which is associated with $\delta e^{(L)}$.

2.43. Imperfective of the verb ‘enlarge’

sē-	ká [?] nú ⁿ	-ǎé	βē [?] ē	-ǎē`	
H	se ^(M)	ka [?] nu ^{nMH}	ǎe ^(L)	βe [?] e ^M	ǎe ^(L)
IPFV	make	large	3MMS	house	3MMS
<i>He is enlarging his house.</i>					

The prefix $ku^{(M)}$ -, a shortened form of kuu^M ‘to be’, also co-occurs with adjectives. In (2.44) we see a similar tonal association pattern to that which we saw in (2.43). We consider that the floating High tone of the imperfective associates with the initial syllable of $jati^{iM}$ ‘near’ and also spreads to the other syllables. As we will see in Chapter 6, nouns which have a Mid High underlying tone pattern

never have a High Mid surface pattern on the noun, hence the High tone spreads to both syllables of *lána*^{MH}.

2.44. Imperfective of 'come close'

	kū-	játí ⁿ	láná
H	ku ^(M)	jati ^{nM}	lána ^{MH}
IPFV	be	near	children

The children are coming close.

In light of these restrictions on the co-occurrence of certain prefixes only with verbs and others with adjectives, we conclude that for MXY, adjectives do form a separate class.

2.4.2. Proclitics or prefixes?

In this section we look at mono-syllabic morphemes which indicate aspectual and modal categories. In Section 2.4.3 we look at nouns which comprise a mono-syllabic morpheme and a root.

In order to determine how to classify these morphemes, we use the criteria presented in Zwicky and Pullum (1983), summarised in (2.45).

2.45. Differences between clitics and affixes

- 1) Clitics can co-occur with a number of different lexical classes; affixes are much more selective.
- 2) It is more likely that there be arbitrary gaps in combinations of affixes than combinations of clitics.
- 3) Morphological idiosyncrasies are more characteristic of affixed words than clitic groups.
- 4) Semantic idiosyncrasies are more characteristic of affixed words than clitic groups.
- 5) Syntactic rules can affect affixed words, but not clitic groups.
- 6) Clitics can attach to material already containing clitics, but affixes cannot.

We now examine verbal morphemes in the light of these six criteria. First we note that these morphemes only occur with verbs, and most of them only co-occur with certain forms of the verb root or stem. For example, the causative prefix co-

occurs with the irrealis form which for some verbs has an initial /k/. In (2.46), we give the irrealis, the imperfective and the causative irrealis of the MXY verb *kasi*^{MH} ‘eat’. Note that the verb root in the imperfective causative form has an initial /k/.

2.46. Comparison of MXY verb forms

Irrealis		Imperfective			Imperfective Causative				
<i>kāsī</i>	<i>lānā</i>		<i>sēsī</i>	<i>láná</i>		<i>ǎā</i>	<i>kásí</i>	<i>láná</i>	<i>kítí</i>
<i>kasi</i> ^{MH}	<i>lana</i> ^{MH}	H	<i>sesi</i> ^(H)	<i>lana</i> ^{MH}	H	<i>ǎa</i> ^(H)	<i>kasi</i> ^{MH}	<i>lana</i> ^{MH}	<i>kiti</i> ^{MH}
eat	child	IPFV	eat	child	IPFV	CAUS	eat	child	animal
<i>The child will eat.</i>		<i>The child is eating.</i>			<i>The child is feeding the animals.</i>				

We also observe that certain combinations of these morphemes do not occur; for example, the subjunctive and perfective do not co-occur. We also conclude that there is a fixed order in which these morphemes occur; for example, the causative is closest to the verb root.

We also see that syntactic rules affect the verb root and the verbal morphemes; that is, they behave as a unit, and no one part can be moved to another part of the sentence. Criterion 6 does not seem to be relevant to Mixtec; verbs can co-occur with these verbal markers and the pronominal enclitics. So based on these criteria, we concur with Macaulay’s analysis that these morphemes are prefixes. Further evidence from MXY for their classification as prefixes is given in Chapter 10.

2.4.3. Compounds or phrases?

In this section we look at two separate syntactic constructions that K Pike (1949) considers phrases. First we look at nouns which are composed of a mono-syllabic morpheme plus a disyllabic morpheme; and then we look at items which are composed of two roots.

In order to identify constituents in a systematic way we use the criteria presented in Payne (2007). These are given in (2.47).

2.47. Tests for syntactic constituent structures

- 1) Movement – heads and their dependents can move to other positions in the sentence.
- 2) Substitution – constituents can be replaced by pro-forms.
- 3) Interposition – modifiers can more easily be inserted between constituents than inside another constituent.
- 4) Coordination – only units of the same category can normally be coordinated.
- 5) Ellipsis – the portions that can be omitted are indicative of constituent structure.

Payne refers to (2.47-1) and (2.47-2) as major tests, and the other three as secondary. We use these tests along with those listed in (2.45) to distinguish between enclitics and affixes in order to determine how best to analyse for MXY the kinds of nouns which Pike refers to as phrases and which Bradley and Hollenbach consider to be derived nouns.

First we look at the animal classifier which in MXY is $tʃ\tilde{\chi}^H$ -. This is most likely derived from the second syllable – that is, the unstressed syllable – of the noun *kitt*^{MH} ‘animal’. In many other varieties of Mixtec the cognate classifier is *tí*- or *tí*-. In MXY, there are many instances of where [tʃ] corresponds to [ti-] or [ti-] ‘animal classifier’ in other varieties. Although the origin of the CV segments is clear, it is difficult to determine what, if any tones are sponsored by the animal classifier prefix. The analysis that best fits the data to hand is that it sponsors a floating High tone. In (2.48), we give some examples from MXY of words which comprise this prefix and a root. Note that in each case, the meaning of the root is transparent, although the meaning of the whole is not the same as the meaning of the two parts. In each case the surface tone of the derived noun is given, as well as the tones of the root.

2.48. Nouns with the animal classifier in MXY

- a) $tʃiβikó$ ‘swallow’ (bird) $tʃi^{(H)}$ + $βi^Lko^H$
‘cloud’
- b) $tʃikàtʃi^{(H)}$ ‘sheep’ $tʃi^{(H)}$ + $ka^Ltʃi^H$
‘cotton’
- c) $tʃikūtū$ ‘cattle’ $tʃi^{(H)}$ + $kutu^M$
‘plough’

Looking at the data in (2.48) in the light of the criteria given in (2.45) above, we see that the animal classifier $tʃi^{(H)}$ - co-occurs with nouns in (2.48a) and 2.48b), but with a verb in (2.48c). This might lead us to conclude that these morphemes would be better classified as proclitics. However, as the meaning of the whole is not the same as the combined meaning of the two parts, we consider $tʃi^{(H)}$ - to be a prefix, as semantic idiosyncrasies is one of the defining criteria of affixes listed in (2.45).

Another group of nouns which comprise a prefix and a root are many nouns which denote spherical objects. The prefix in this case is $tʃi^{(L)}$ - which denotes a round object. Note that the only difference between this prefix and the animal prefix is tone. The Low tone sponsored by the round object prefix associates with the first mora of the root. Examples are given in (2.49). In these data the meaning of the root is not known.

2.49. Nouns denoting spherical objects in MXY

- a) $tʃi^{(L)}$ - $nika^{HL}$ ‘pine cone’
- b) $tʃi^{(L)}$ - $te^?e^{HL}$ ‘barrel cactus’
- c) $tʃi^{(L)}$ - $nana^{nMH}$ ‘tomato’

Another classifier prefix in MXY is $nu^{(H)}$ -, which appears to be a shortened form of $jutu^{nMH}$ ‘tree’; again the second syllable is used to form a prefix. Many words which indicate trees and some bushes have this prefix as their initial

morpheme. A few examples are given in (2.50). The surface tones are given, as the meaning of the root – and therefore the tones which it sponsors – is not transparent in all cases. Note that these words end in either a High tone or a High-Low glide. As we will demonstrate in Chapter 6 and Chapter 11, floating High tones often associate as far to the right as possible. Given that this is the case, it is likely that these final High tones are sponsored by the prefix.

2.50. Nouns with the tree classifier in MXY

- a) nūⁿ- jūsé ‘pitch pine’
- b) nūⁿ- tāβî ‘seep willow’
- c) nūⁿ- jāďá ‘silver leaf oak’

These three groups of nouns show characteristics of compounds: when they are moved from their canonical position, both parts move together; numerals precede the entire word; and modifiers occur after both parts. So we consider that these nouns comprise a prefix plus a root.

We now turn to consider nouns which comprise two roots. These nouns have either 3 or 4 syllables. Those with 3 syllables are those whose initial roots are CVV when these roots occur in isolation. However, these roots occur as CV when they are the first element in a compound. On the other hand, CVV roots which are the second element in the compound remain CVV. This phenomenon is further described in Chapter 4. Examples of compounds are given in (2.51).

2.51. Trisyllabic nouns in MXY comprising root + root

- a) nākāā (from na^ʔa^{MH} ‘hand’ + kaa^{LM} ‘metal’) ‘key’
- b) βē^ʔkāà (from βe^ʔe^M ‘house’ + kaa^{LM} ‘metal’) ‘jail’
- c) nājó^ʔō (from na^ʔa^{MH} ‘hand’ + jo^ʔo^{LM} ‘root’) ‘corn fodder’

We consider the words in (2.51) to be compounds not phrases, on the basis of three criteria: 1) the meaning of the whole is not the same as the meaning of the two parts; 2) the words act syntactically as a unit (that is, we cannot modify part of them, nor can we move part of them to a different location in the sentence); and 3) the tonal phenomena of these words are not the same as those found on noun plus

noun where they comprise a phrase or a sequence of two phrases. The tonal phenomena will be discussed in Chapter 10.

To further illustrate compounds in MXY, we now turn to look at verbs which are composed of two roots. A good example of compounds are words which have *-iniⁿ* ‘inside’ as one of their components. As was shown in (2.27) above, repeated below as (2.52) for convenience, in MIG these verbs are clearly phrasal in that adverbs can modify the verb.

2.52. Occurrence of adverbs before *iniⁿ*

tá ũ²ù ʃāàⁿ túkū ìníⁿ rì
 make sad very again inside 1
I am again very sad.

Although many varieties follow this order, in other varieties such as MIZ, MIL and MXY, *tuku^M* ‘again’ follows *iniⁿ*. An example from MXY is given in (2.53) with the verb ‘to reconsider’. Note that the fact that *tuku* comes after *-iniⁿ* suggests that *kaniⁿ-iniⁿ* is a constituent, as one of the tests given in (2.47) is that modifiers tend to occur between constituents rather than within them.

2.53. Occurrence of adverb after *iniⁿ*

nīⁿ- nàⁿ- kānīⁿ -īnīⁿ tükū lānā
 PFV REPET tell inside again child
The child reconsidered again....

Note that the repetitive form of *kaniⁿ-iniⁿ* ‘think’ means to ‘repent’, or ‘reconsider’. Thus we have in these data evidence to consider the repetitive marker as a prefix, since the meaning of the whole is not transparent. More evidence for compounds will be given in Chapter 10 where we consider the tonal phenomena associated with compounds and other syntactic features that distinguish compounds from phrases.

K Pike (1949) points out the relationship between long forms and short forms of some clitics, and the fact that mono-syllabic morphemes can be lengthened before a pause. However he also says that any word that is pronounced in isolation has to have at least two vowels, so it is possible that this lengthening is no more than a phonetic feature to make a mono-syllabic morpheme pronounced in isolation

meet the minimum word criterion. Similarly the dependence on the occurrence of an audible pause as a defining factor does not seem very rigorous. Other criteria are needed. We suggest that such criteria would include evidence from tonal association which shows prosodic constituents, and evidence that tone sandhi conventions differ within certain groupings from those found across groupings.

In Chapter 3 we will show that Mak (1953, 1958) posits the notion of 'special grammatical sequences' to account for differences in tonal association in differing syntactic contexts. One of these is verbal prefixes and the verb root. An in-depth examination of the differences between prosodic words and phrases in MXY is given in Chapter 10.

2.5. CONCLUDING REMARKS

The analysis of verbal morphemes as prefixes rather than proclitics, and the analysis of sequences of two roots as compounds rather than phrases are both significant in the analysis of what kind of language Mixtec is. If we follow the traditional view as espoused by Bradley and Hollenbach (1988) that the maximum number of syllables in a word is four, and that words are mono-morphemic, then Mixtec is an isolating language, similar to Chinese, in which each word is a separate morpheme. However, as we have argued in this chapter, there are good reasons to claim that MXY does have prefixes and that MXY does have compounds. This analysis then moves MXY from the isolating end of the continuum to somewhere closer to the synthetic end along with other languages that permit multi-morphemic words. In subsequent chapters we present further data to substantiate these claims.

CHAPTER 3

REVIEW OF MIXTEC TONE ANALYSES

This chapter contains three main sections. The first section looks at the contribution of Kenneth L Pike and Cornelia Mak to the understanding of Mixtec tone. This section also includes the re-analyses of their data by Goldsmith and Tranel. The second section looks at the contribution of L Pankratz and Eunice V Pike to the understanding of stress and tone in Mixtec. We also describe de Lacy's reanalysis of their analysis of Ayutla tone. In the last section we outline theoretical issues which arise from the other two sections.

3.1. K PIKE'S ANALYSIS OF MIG TONE

We start our review of Mixtec tone analysis with a short description of the work of Kenneth L Pike. One very important feature of MIG documented by Pike is that the surface tones of some morphemes are not constant; that is, the surface tones found on some morphemes are determined by the context in which they are found. He refers to this process as '*perturbation*'. To account for these differences Pike classified morphemes according to the effect they have on the following morpheme.

3.1.1. Tones of nouns

For MIG, Pike identified three tone levels: High Mid and Low. Each vowel can have only one tone associated with it; that is, in MIG there are no contour tones on single vowels. Many words have one pattern in isolation and other patterns in other contexts. Pike claimed that the basic tones of a morpheme were the ones from which the other tone patterns could be predicted.

Pike identified eight tone patterns which occur on disyllabic words. There are no Low Low words attested. Examples are given in (3.1). Note that the tone of the first syllable is given in the first column, and the tone of the second syllable is given in the top row.

3.1. Tone patterns of morphemes in MIG

	Low	Mid	High
Low		β̀̀̀nī ⁿ ‘puddle’	s̀̀̀tǽí ‘child’
Mid	k̀̀̀ò ‘snake’ k̀̀̀tù ‘nose’	β̀̀̀é [?] ē ‘house’	k̀̀̀tǽí ‘pig’
High	β̀̀̀á [?] ù ‘coyote’	ǰ̀̀̀í [?] ī ⁿ ‘steam bath’	s̀̀̀áná ⁿ ‘turkey’

The tones of the words given in the shaded cells may change in certain contexts. Pike considers these tone patterns to be unstable. In (3.2), we present the surface alternations, that is the perturbed forms, which Pike documents for these tone patterns. In these cases he considers that in the perturbed form, one tone has been substituted for another. We observe that in the data in (3.2), it is usually the initial tone which has been replaced by a High tone. The exception to this is the perturbed form of the word *k̀̀̀tù* ‘nose’; this word occurs in certain contexts as [k̀̀̀tù] in which the final Low has been replaced by High.

3.2. Perturbed forms

Isolation form	Perturbed form	
M M β̀̀̀é [?] ē	H M β̀̀̀é [?] ē	‘house’
M L k̀̀̀ò	H L k̀̀̀ó	‘snake’
M L k̀̀̀tù	M H k̀̀̀tù	‘nose’
L H s̀̀̀tǽí	H H s̀̀̀tǽí	‘child’
L M β̀̀̀̀nī ⁿ	H M β̀̀̀̀nī ⁿ	‘puddle’

Although all the examples in the list above are nouns, in Section 3.1.2 below we show that the same changes occur in verb forms, too.

To account for the changes presented in (3.2) above, Pike (1948) classifies words which effect no change on the following morpheme as class (a). Morphemes

which perturb the following word are assigned to class (b). Pike notes that no words with High Low or Mid High or Low Mid belong to class (b). Words with the tone patterns High High, High Mid, Mid Mid, Mid Low or Low High may belong to either class (a) or class (b). Words with these tone patterns belong to class (a), if the tones on Mid Mid, Mid Low, Low High and Low Mid remain unchanged when they follow words with these patterns. If on the other hand, words with the tone patterns Mid Mid, Mid Low, Low High and Low Mid are changed following words with the tone patterns High High, High Mid, Mid Mid, Mid Low or Low High, the words with the tone pattern listed in this latter grouping are considered to belong to class (b).

Pike accounts for the different resultant tone patterns on words which are Mid Low in isolation by claiming that the segmental shape of the morpheme determines the surface pattern. He lists three groups of Mid Low words which become High Low following a class (b) morpheme:

- 1) CVV words with identical vowels, whether they be oral or nasal
- 2) Words which are CV²V with identical vowels, whether they be oral or nasal
- 3) Words which are CV²CV.

For example, *jṑ̀* ‘moon’ is realised as *jó̀̀* when it follows a class (b) morpheme.

On the other hand, words with the following segmental shape become Mid High after a class (b) morpheme:

1. words which are (C)VCV¹
2. words which are CVV (either with oral or nasal vowels) where the vowels are not identical.

For example, *sūt̀̀* ‘priest’ is realised as *sūt̀́* after a class (b) morpheme, and *jā̀̀* ‘hole’ is realised as *jā̀́* when it is preceded by a class (b) morpheme.

Pike also points out that not all words which have a final High tone belong to class (b). In addition to words which are Mid High, all of which belong to class (a), there are some Low High or High High words which also belong to class (a). An example of a Mid High word which belongs to class (a) is given in 3.3. In this and the following examples, the first row gives the surface tones, the second row gives

¹K Pike considered glottal stop to be a consonant. He included the initial glottal stop in his transcription of words which we consider to be VCV.

the citation forms of the words, the third row the morpheme gloss, and the fourth row the free translation. ²

3.3. Mid High word which has no effect on the following morpheme

tāká sùtǎí
 tāká sùtǎí^(H)
 all children
all the children

In 3.4, we show that *jááⁿ* ‘crazy’ has no effect on the word *ɲɪ̀n^(H)* ‘head’.

3.4. High High word which has no effect on the following morpheme

nā ⁿ sù	n ⁿ -	nūū	jáá ⁿ	ɲɪ̀n ⁿ	-rò
nā ⁿ sù ^(H)	n ⁿ -	nūū	jáá ⁿ	ɲɪ̀n ^(H)	-ró ^(H)
INTEROG	PFV	become	crazy	head	2

Have you gone crazy?

However there are morphemes with final High tones which cause the following word to be perturbed, as is shown in (3.5). Note that following the word *hííⁿ* ‘with’, the word *sùtǎí* ‘child’ is realised as *sútǎí*.

3.5. Final High tone word which perturbs the following morpheme

tǎí	kíí ⁿ	-ní ⁿ	híí ⁿ	sú ⁿ tǎí	lú ⁿ lí	-ná ⁿ
tǎí	kíí ⁿ	-ní ⁿ	híí ^(H)	sù ^(H) tǎí ^(H)	lú ^(H) lí ^(H)	-ná ⁿ
because	go	2HON	with	child	small	1HON

because you will go with my little child...

To account for these differing effects, Pike assigns these morphemes to different tone classes: *tāká* ‘all’ is analysed as a class (a) morpheme and *hííⁿ* ‘with’ as a class (b) morpheme.

Pike uses the term ‘*arbitrary tone sandhi*’ for data in which the segments of words are the same but their effect on the following words is different. He gives the

² The citation forms in the second line come from a dictionary manuscript by E G Pike which includes information as to which class a morpheme belongs.

data in (3.6) as an example. Note that the pronoun *-ǎe* ‘3MHON’ has a Mid tone in (3.6a) and a High tone in (3.6b).

3.6. Words identical in segmental form which effect different changes

<p>a) <i>kēē</i> <i>-ǎē</i> go away 3MHON <i>he will go away</i></p>		<p>b) <i>kēē</i> <i>-ǎé</i> eat 3MHON <i>he will eat</i></p>
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Although both forms in (3.6) are verb plus enclitic, there are also pairs of nouns which have the same consonantal and vowel segments and the same surface tones, but one noun belongs to class (a) and the other to class (b). One example of such a pair is the third person enclitic which refers to animals, given in Pike (1945a); following *jū̀ùⁿ* ‘crawl’ this enclitic is realised as *t̃*, but following *jū̀ùⁿ* ‘town’ it is realised as *t̃̃*. In later works, Pike (1948) accounts for these differences by assigning words such as *jū̀ùⁿ* ‘crawl’ to class (a) and *jū̀ùⁿ* ‘town’ to class (b).

3.1.2. Tones of MIG Verbs

The data in the previous section were mainly nouns. We now turn to look at the tonal changes which mark different verbal forms. Pike documents the fact that for some MIG verbs, in addition to tonal changes, there is also a change in the initial consonant of the imperfective stem, as illustrated by the data in (3.7).³

3.7. Comparison of irrealis and imperfective verb forms

	Irrealis	Imperfective		Irrealis tones	Imperfective tones
a.	<i>kānīⁿ</i>	<i>hānīⁿ</i>	‘hit’	M M	H M
b.	<i>kānāⁿ</i>	<i>kānāⁿ</i>	‘call’	M M	H M
c.	<i>kāʔāⁿ</i>	<i>káʔāⁿ</i>	‘talk’	M L	H L
d.	<i>kìkū</i>	<i>kíkū</i>	‘sew’	L M	H M
e.	<i>ʃíkó</i>	<i>ʃíkó</i>	‘sell’	L H	H H

³ We use the terms irrealis for the form Pike refers to as ‘potential’ and imperfective for what Pike refers to as ‘continuative’.

In (3.7a) and (3.7b) we give two verbs which in the irrealis have Mid tones. The verb *kānī*⁷ ‘hit’ undergoes a segmental change which results in the initial consonant being /h/ in the imperfective. However, we see that the tonal changes for the two verbs in (3.7a) and (3.7b) are identical whether or not there are additional segmental changes; that is, both verbs are realised as High Mid in the imperfective. Pike notes that the tonal changes between the irrealis and the imperfective are the same as the changes which occur after a class (b) word. He states (1948:82):

“Some features of this tonemic change are very peculiar. The perturbation acts like the (b) effect of a preceding word, except that no preceding word is present. ... The implication of this fact is that the zero word or “ghost word” has lost all its consonants and vowels, but retains its position in the sentence and retains its tonomechanical ability as a member of the (b) subclass to perturb things which follow it.”

This insight of Pike's is a remarkable way to account for what would now be termed a floating High tone. In de Alvarado (1593), imperfective verb forms have an initial prefix *íyo*.⁴ Hollenbach (2001) claims that the imperfective prefix had a High tone which has remained despite the loss of the segments.

This brief summary shows the basic principles of Pike's analysis of Mixtec, namely that morphemes are divided into two classes: class (a) has no effect on the following morpheme, whereas those which belong to class (b) perturb the following morpheme to higher.

3.2. THE CONTRIBUTION OF CORNELIA MAK

The research and analysis carried out by K Pike form the basis for further work on other Mixtec varieties. In this section, we examine the contribution of Cornelia Mak to the study of Mixtec tone as found in three of her published papers: the first paper (Mak 1950) provides additional insights into the tone system of MIG; in the second paper (Mak 1953) she examines the similarities and differences between the tone systems of MIG and San Esteban Atatláhuca (MIB); in her third paper (Mak 1958) she adds data from Santo Tomás Ocotepec (MIE). In these papers Mak documents two important facts: one, it is possible for two tones to be associated with one vowel; and two, in some varieties the syntactic relationship between two morphemes

⁴ In the case of data from de Alvarado (1593) and de los Reyes (1593) we have retained the original transcriptions.

seems to have an effect on the tonal association. This latter topic is further developed in Mak (1953 and 1958).

We first look at the paper in which Mak documents the contexts in MIG in which Mid Mid verbs are perturbed to Low Mid. In Mak (1950) she shows how some Mid Mid verbs are perturbed to Low Mid following what she calls ‘go auxiliaries’, which are reduced forms of the verb ‘go’ which is $kī^{?}ī^n$ in the irrealis. On the left hand side of (3.8), we give the citation forms of the morphemes which make up the phrase which occurs on the right. Note that $kī^{?}ī^n$ ‘go’ has been reduced to $kī-$, and that there is a Low tone on the initial syllable of $kō^{?}ō$ ‘drink’.

3.8. Mid Mid verbs perturbed to Low Mid in MIG

$kī^{?}ī^n$	$kō^{?}ō$	$-ná^n$	$nūtfā$	→	$kī-$	$kō^{?}ō$	$-ná^n$	$nūtfā$
will go	drink	1	water					

I am going to go and drink some water.

However, when the second verb belongs to class (b), that is those which perturb the following morpheme to higher, the tones of the verbs are not changed from Mid Mid to Low Mid, as is shown in (3.9). Note that the tone on the enclitic is perturbed to High.

3.9. No change on Mid Mid verbs

$kī^{?}ī^n$	$kā^{?}nī^n$	$-ǒē$	$ɲnīkì$	→	$kì-$	$kā^{?}nī^n$	$-ǒé$	$ɲnīkì$
will go	will kill	3MHON	ox					

He will go and kill the ox.

The data in (3.8) and (3.9) are easily understood in the terms of autosegmental phonology. We posit that the reduced form of the verb $kī^{?}ī^n$ ‘go’ has a floating Low tone which associates with the initial mora of the main verb in (3.8). However, in (3.9), for some reason, the floating Low sponsored by the reduced form of $kī^{?}ī^n$ ‘go’ is prevented from associating with the main verb and so associates with the auxiliary.

The verb *kii* ‘come’ also has a reduced form *ki-*; however as it does not have a Low tone there are no changes in the tone pattern following it.

In her 1950 paper, Mak introduces the idea of ‘close-knit’ constructions which is developed further in the other papers reviewed here. Although, following Pike’s analysis, she still classifies these forms as phrases and not compounds or inflected forms, she does note that not all phrases are created equal as the tonal phenomena vary.

Although MIG has three tone levels, Mak (1953) documents that MIB has four levels and does allow contours on single syllables. Mak notes that the next to lowest tone level, Lowered-Mid, indicated by dieresis in this thesis, only occurs following High tones, and that some words vary between Low Mid and Low Lowered-Mid. In (3.10) we give the possible tone patterns found on MIB words in isolation.

3.10. Tone patterns of MIB words in isolation

	Low	Lowered-Mid	Mid	High
Low		tèë or tèē ‘man’	sò [?] ō ‘ear’	tʃùú ⁿ ‘turkey hen’
Lowered-Mid				
Mid	k ^w ē [?] è ‘much’		βē [?] ē ‘house’	nūhí ‘chicken’
High	βílì ‘toy’	βítʃì ‘fan’	lúsū ‘pet dog’	né [?] é ‘blue’

In (3.10), we see that in isolation the occurrence of Lowered-Mid is limited to High Lowered-Mid patterns and that Low Mid words can optionally occur as Low Lowered-Mid. Lowered-Mid also occurs as the surface tone of some words following words that cause the following word to be lowered; Mak refers to this as class (c). An example of this process is given in (3.11), in which the initial tone of the word *nīβì* ‘egg’ is lowered from Mid to Lowered-Mid following *fⁿgā* ‘another’, which is one of the morphemes which Mak demonstrates causes this lowering process.

3.11. Mid lowered to Lowered-Mid

fⁿgā nīβì
 fⁿgā nīβì
 another egg

In MIB, contours on single syllables seem to only occur when the tones of a word have been perturbed, for example as shown in (3.12). On the left-hand side we see that both the words for ‘hand’ and ‘maguety’ have Mid tones; however on the right-hand side, we see that *nāʔā* ‘hand’ has been reduced to *nā*, and there is a Mid-High glide on the initial syllable of *jāβū* ‘maguety’.

3.12. Surface tones of ‘branch of maguety’

nāʔā *jāβū* → *nājāβū*
 hand maguety branch of maguety

The third variety which Mak (1958) documents is that of MIE. In this variety there are nine different surface patterns on mono-morphemic words; that is, they have words which in isolation are Low Low, which are not documented for MIG, as shown in (3.1) above. The patterns found in MIE are given in (3.13).

3.13. Surface tone patterns found in MIE

	Low	Mid	High
Low	<i>nùnìⁿ</i> ‘corn’	<i>tèē</i> ‘man’	<i>sùtʃí</i> ‘child’
Mid	<i>ītè</i> ‘grass’	<i>βēʔē</i> ‘house’	<i>jūʔú</i> ‘mouth’
High	<i>kájì</i> ‘street’ (from Spanish <i>calle</i>)	<i>stóʔlō</i> ‘cockerel’	<i>káníⁿ</i> ‘long’

MIE also permits two tones on a single vowel, although this seems to be limited to certain verbal forms. In (3.14), we give the irrealis and the imperfective of the verb *tòō* ‘drip’. Note that in the imperfective there is a High-Low glide on the initial syllable of the verb root.

3.14. Comparison of the irrealis and imperfective forms in MIE

Irrealis		Imperfective	
tòō	nūtē	tòō	nūtē
will drip	water	is dripping	water

Glides also occur in the perfective form of some verbs, as illustrated by the verb *tāβà* ‘take out’ given in (3.15). There are two forms of the perfective, one with *nìⁿ* ‘perfective’ and one without. However, in both cases there is a Low-Mid glide on the first syllable of the verb root and the reduced form of *nìⁿ* ‘perfective’, which is /nⁿ/, prefixes the verb.

3.15. Comparison of the irrealis and perfective forms in MIE

Irrealis		Perfective		Perfective		
tāβà	ǎè	n ⁿ -tāβà	ǎè	or	nì ⁿ - n ⁿ -tāβà	ǎè
will take out	3M	took out	3M		PFV took out	3M

Although there are examples of contours on single syllables, Mak maintains that CVV words are disyllabic in spite of the fact that it was the lack of contours on single vowels in MIG which led K Pike to posit that CVV words are disyllabic.

For both MIB and MIE, Mak posits three classes of morphemes: class (a) that does not perturb the following morpheme; class (b) that perturbs the following word to higher; and class (c) those that perturb the following morpheme to lower. Mak posits that class (c) words historically had a Low tone word final. Mak notes that in MIG perturbation occurs no matter what the syntactic relationship is between the two morphemes. However, in MIB she notes two different kinds of perturbation: that which occurs generally, and that which only occurs in ‘special sequences’. She notes that in MIE perturbation only occurs in special sequences. Mak (1953) lists the following as special sequences for MIB:

- 1) a head noun plus another noun acting as a descriptive modifier
or plus a non-enclitic possessor
or, optionally and very rarely, plus an adjective
- 2) a locational or introductory noun plus a dependent clause
- 3) a head verb plus a noun modifier
- 4) certain verb auxiliaries plus a main verb.

Mak points out that in certain specific sequences of morphemes these special patterns are optional whereas in others they are obligatory. She also notes that for MIE the tonal phenomena of verb auxiliary plus verb is somewhat different from the other sequences.

We now give examples of these different types of perturbation. Mak notes that in MIB, morphemes which are class (b) always perturb the following morphemes, regardless of the syntactic relationship, assuming that the second morpheme in the sequence does not have a High tone associated with the initial syllable. In (3.16), we give an example of perturbation in MIB.

3.16. Occurrences of glides in MIB

hìníⁿ (c) níⁿ (b) sà²áⁿ → hìníⁿ ní⁻ⁿ sà²ä¹
 know 2HON 1HON
You know me

We see that the verb *hìní* ‘know’ is class (c). As a result of perturbation, the enclitic *níⁿ* 2HON has the surface form Lowered-Mid Mid glide in the surface form. The enclitic is classed as class (b). The result is that in the surface form the initial syllable of *sà²áⁿ* 1HON is perturbed to High, and there is a Lowered-Mid High tone glide on the second syllable.⁵

Mak also gives examples of perturbation in special sequences. In (3.17), we see that in the underlying form there are no High tones. However, in the surface form there is a Mid-High glide on the initial syllable of *jūūⁿ* ‘town’ and a Low tone has replaced the final Mid tone.

3.17. Mid Mid word perturbed in a special sequence in MIB

ītʃī jūūⁿ → ītʃī jū¹ūⁿ
 towards town

She notes two verbal auxiliaries *nāⁿ* ‘subjunctive’ and *βāāⁿ* ‘negative’ which cause rising contours on the initial syllable of the verb as shown in (3.18).

⁵ Mak (1953) points out that in fast speech glides are often lost.

3.18. Subjunctive of the verb 'come' in MIB

$nā^n \quad kīhī \quad -ī \quad \rightarrow \quad nā^n \quad kī'hī \quad -ī$
 SBJV come 3
Let him come.

Note that in the surface form there is a Mid-High glide on the initial syllable of *kīhī* 'come. Mak classifies *nā^n* as a class (a) morpheme in its basic form and points out that this perturbation to higher only occurs in special sequences.

In MIE there is only perturbation in special sequences. In this variety the surface phenomena are different for verbal auxiliaries plus verb root. It is often the case that the surface tones of the verb are other than their underlying tones. In (3.19), we give the data from Mak (1958) to show the different surface tone patterns on verbs.

3.19. Comparison of MIE verb forms

	Irrealis	Imperfective or following <i>nā^n</i> subjunctive or <i>s-</i> causative	Perfective <i>nì^n</i>	Prohibitive <i>βàà^n</i>
a)	M H	H H	L-M H	L H
b)	M M	H M	L-M M	L H
c)	M L	H L	L-M L	H L
d)	L H	H-L H or H H	L H	H-L H
e)	L M	H-L M or H M	L M	H-L M
f)	L L	H L	L L	H L

Note that in (3.19) all the verb forms, regardless of their form in the irrealis, have an initial High tone, suggesting that the imperfective, subjunctive and causative markers sponsor floating High tones. In the case of the perfective, all the verb forms have a Low tone on the initial syllable. Most of the prohibitive forms have an initial High, so this suggests that the prohibitive marker has a floating High tone. In Chapter 10, we present a similar analysis for MXY verbs. We claim that the MXY form similar to that in (3.19a) is a result of the Low tone of the prohibitive marker spreading to the initial syllable of the verb, and the MXY form similar to that found

in (3.19b) is the result of the Low tone of the prohibitive marker spreading to the initial syllable of the verb and the floating High tone associating with the second syllable.

Mak notes that verbs with medial glottal stops do not develop the glides in the imperfective. However, both the perfective and the prohibitive have glides regardless of the presence or absence of glottal stop.

Given that these special sequences occur in verb forms, the question arises as to whether these really are phrases as suggested by K Pike (1949) and Mak, or whether these ‘verbal auxiliaries’ would be better considered as prefixes. In Chapter 8 we show that for MXY verbal morphemes cognate with these are best considered as prefixes.

3.3. RE-ANALYSES OF K PIKE’S ANALYSIS

We now look at Mixtec tonal phonology through the lens of modern linguistic theory. One major contribution was made by Goldsmith (1990). The concept that tones are independent of the vowels is the key to the understanding of autosegmental phonology. Goldsmith (1990, pp 20-26) uses data from MIG to illustrate the concept of floating tones. He claims that Pike’s class (b) morphemes have a “suffixal High tone which is underlyingly unassociated, but which associates rightward to the following word.” For example, Pike classifies *kēē* ‘will go away’ as a class (a) morpheme and *kēē* ‘will eat’ as a class (b) morpheme. Goldsmith claims that the difference in behaviour between *kēē* ‘will eat’ and *kēē* ‘will go away’ is that the former has a floating High tone whereas the latter does not. Thus in (3.20a), Goldsmith (1990) attributes the presence of a High tone on the first syllable of *sùtʃí* ‘child’ in certain contexts to the association of the floating High tone sponsored by *kēē* ‘eat’ associated with it. In isolation *sùtʃí* ‘child’ has a Low tone on the initial syllable and High on the second.

3.20. Evidence for floating High tones (Goldsmith, 1990)

a)	<i>kēē</i>	<i>sùtʃí</i>	b)	<i>kēē</i>	<i>sùtʃí</i>
	<i>kēē</i> ^(H)	<i>sùtʃí</i>		<i>kēē</i>	<i>sùtʃí</i>
	eat	child		go out	child
	<i>the child will eat</i>			<i>the child will go away</i>	

Note that in (3.20a) the floating High tone replaces the Low tone associated with the initial syllable *sùtʃí* ‘child’ even though this morpheme already has a High tone associated with it. These examples (consistent with other data to be presented in this chapter) show that the Obligatory Contour Principle does not apply to MIG in that floating High tones associate with morphemes which already have a High tone associated with them.⁶

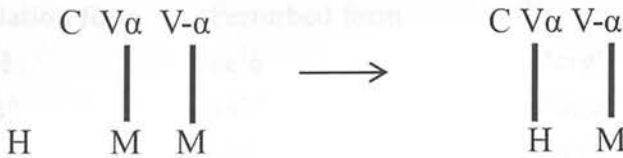
Having established the presence of floating High tones, Goldsmith addresses the issue of Mid Mid words which are realised as either High Mid or High High following a word with a floating High tone. Note that it is only CVV words with identical vowels which can optionally occur as High High.

3.21. Surface tones on Mid Mid



Other words, including CVV words with non-identical vowels, become High Mid as shown in (3.22).

3.22. Surface tone



In both (3.21) and (3.22), Goldsmith assumes the presence of Mid tones in the underlying form. Either both Mid tones are deleted as in (3.21), or only the initial one, as demonstrated in (3.22).

A more difficult issue to solve within the framework of autosegmental phonology is that a floating High tone associates at the right edge of some Mid Low

⁶ The restriction on adjacent identical segments was first posited by Leben (1973) and further developed by Goldsmith (1979) who used the term Obligatory Contour Principle. Odden (1986) shows that the OCP in its strictest form does not apply universally as there are languages which distinguish between single and multiple identical tones associated with a sequence of vowels.

words rather than at the left edge. The issue here is that it is generally assumed that association lines may not cross. K Pike (1948) describes how morphemes which are Mid Low, CVCV, and CVV (with non-identical vowels) become Mid High when a floating High tone associates with them. In (3.23), we give examples of words of this type. (Note that words which are VCV are also included, due to Pike's treatment of the initial phonetic glottal stop as a consonant.)

3.23. Comparison of MIG Mid Low words which perturb to Mid High

Isolation form	Perturbed form	
īsù	īsú	'deer'
jāù	jāú	'hole'
kūtù	kútú	'nose'
sūtù	sútú	'priest'
īsò	īsó	'rabbit'

On the other hand, words which are CVV with identical vowels are realised as High Low when a floating High tone associates with them; examples are given in (3.24). (Note that under our analysis, this class includes those morphemes which have a glottal stop word medially.)

3.24. Comparison of MIG Mid Low words which perturb to High Low

Isolation form	Perturbed form	
nē [?] è	né [?] è	'cry'
nū ⁿ	nú ⁿ	'face'
kī [?] ī ⁿ	kí [?] ī ⁿ	'go'
kā [?] ā ⁿ	ká [?] ā ⁿ	'say'
kōò	kóó	'snake'

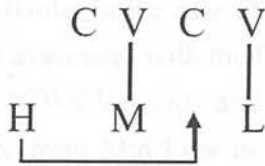
In (3.25), we give the tonal association patterns for Mid Low words which have the surface form Mid High when they follow a word with a floating High tone.

3.25. Association of a floating High tone with a Mid Low CVCV word



The theoretical issue is how to obtain the pattern given in (3.25) without having association lines cross as this option is ruled out by autosegmental phonology. By positing the metathesis of Mid and High, Goldsmith's analysis (1990) avoids crossed association lines as shown in (3.26).

3.26. Floating High metathesis (Goldsmith, 1990)



Once the floating High has metathesised, then it replaces the Low tone associated with the second vowel, as shown in (3.27).

3.27. Association of High tone after metathesis



Positing that the Mid and High tone metathesise has the obvious advantage of providing a strategy to avoid the crossing of association lines. Macaulay (1996) follows Goldsmith for her analysis of MIG (Chalcatongo).

Another solution of this non-linear association of floating High tones is found in Tranel (1995) who argues that there are no underlying Mid tones in MIG. In this hypothesis, he is following others, for example Stevick (1969) and Hyman (2001), who point out that there is often one less level underlyingly than there is on the surface.⁷ For MIG, Tranel (1995) posits that there are only High and Low tones underlyingly. We now look at his analysis in more detail.

The data found in Tranel (1995 and 2012) are taken from the papers published by Pike on MIG. Tranel addresses two issues: one is the association of floating High tones, and the other is the status of the Mid tone. First we look at his proposals for the association of floating High tones. Tranel observes that for the most part,

⁷ In Chapter 6 Section 6.6.2, the issue of having fewer tones specified underlyingly than there are on the surface is discussed with reference to MXY.

floating High tones associate with the initial TBU of the following morpheme. To account for the fact that some Mid Low morphemes are realised as Mid High when a floating High tone associates with them, he proposes that there are no Mid tones underlyingly and that floating High tones show a preference to associate with a TBU which is specified for tone. Thus by positing that words such as *sutù* ‘priest’ have a toneless initial syllable, it follows that the floating High tone will associate with the second syllable. In the case of words which are in his analysis toneless, the floating High tone associates with the first toneless TBU. In order to account for the fact that it is only (C)VCV words and CVV words with non-identical vowels that undergo the change from Mid Low to Mid High, he points out that there are no Mid High words in MIG which are CVV with identical vowels or CV²V. He posits that in MIG there is a constraint against having a Mid High tone pattern across two moras that are linked with the same vowel underlyingly.

Tranel’s claim that there are no Mid tones underlyingly presents an interesting theoretical issue. It has been claimed that there is a universal association convention which links floating tones with free vowels. However, in MIG there are many cases where floating tones do not associate with vowels which according to Tranel have no tones. He uses the word *βinⁿ* ‘puddle’ to illustrate his point. As he is assuming that there are no Mid tones underlyingly, then this word only has a Low tone in its underlying specification.

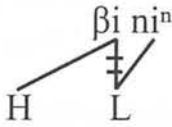
3.28. Tranel’s underlying form for *βinⁿ* ‘puddle’

$$\begin{array}{c} \beta i \text{ ni}^n \\ | \\ L \end{array}$$

Under Tranel’s analysis, when this word occurs in isolation, a Mid tone would be inserted by default to provide a tone for the second TBU, as the spread of one Low tone to two adjacent TBUs is not a permitted sequence in MIG.

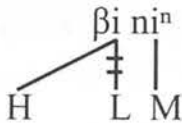
Tranel (2012) shows that, given the Universal Association Convention, we would expect that when a floating High tone associates with the initial syllable, the Low tone which is delinked would associate with the second TBU, as shown in (3.29). However in MIG this does not occur.

3.29. *Non-attested association pattern



In MIG when a floating High tone associates with words which are Low Mid in isolation, the resultant surface form is High Mid, as shown in (3.30). That is, a Mid tone is inserted rather than the delinked Low tone being associated with the second TBU.

3.30. Actual association of a floating High tone for the word 'puddle'



Tranel's analysis that there are no Mid tones in the underlying form is based on the theoretical supposition that tone systems often have one fewer level in the underlying form than the number of levels which are found in the surface form, as found for example in Stevick (1969). Further discussion of the contribution of autosegmental phonology to the understanding of MIG tone is given in Chapter 4.

Hollenbach (2003) takes a different approach from Tranel to provide an analysis for the apparent skipping of syllables. She has the advantage of having studied XTM Mixtec in detail and having done comparative work in a number of Mixtec varieties. She points out that when Spanish words have been borrowed into Mixtec, the accented syllable was perceived as having a High tone. For example, in MIE, words with penultimate stress in Spanish have the tone pattern High Low. Thus the stressed syllable in Spanish corresponds to a High toned syllable. Examples from Mak (1958) are given in (3.31).

3.31. Spanish loan words in MIE

	Spanish	Gloss
láðò	'la.do	'side'
káʒì	'ca.lle	'street'
márkù	'mar.co	'frame'

However, in XTM, Spanish loan words have a High tone on the syllable following the one which corresponds to the stressed syllable in Spanish. Examples are given in (3.32).

3.32. Evidence from Spanish loan words for tone shift in XTM

	Spanish	Gloss
mēsá	'me.sa	'table'
lāpí	'lá.piz	'pencil'
vārātú	ba.'ra.to	'inexpensive'
prēsīdēndé	pre.si.'den.te	'president'

Hollenbach points out that for the varieties of Mixtec included in her study, the varieties in which the High tone has shifted from the accented syllable are also the varieties in which Mid Low words of the form (C)VCV and CV α V- α words become Mid High when a floating High tone associates with them.

Hollenbach (2003) points out that XTM, San Pedro Molinos and MIG pattern together in that Mid Low becomes Mid High, whereas in MIB and MIE it does not. She also notes that in XTM, San Pedro Molinos and MIG, the High toned syllable of Spanish loans is the syllable following the accented syllable of Spanish. However, other data show that the surface tones of these three varieties are not always the same. Consider the data in (3.33).

3.33. Comparison of tone patterns

	MIG	XTM	San Pedro Molinos	
a)	ūnì ⁿ	ūnì ⁿ	ùnì ⁿ	'three'
b)	īsò	īsò	īsò	'rabbit'
c)	stāà ^(H)	ʃītà ^(H)	stàà ^(H)	'tortilla'
d)	kūù ^{n(H)}	kūù ^{n(H)} /kùú ⁿ	kùù ^{n(H)}	'four'
e)	kṛī ^(H)	kīī ^(H) /kīī ^(H)	kīī ^(H)	'animal'

Note that in (3.33a) and (3.33b), for MIG and XTM, both 'three' and 'rabbit' are Mid Low, whereas for San Pedro Molinos, 'three' in (3.33a) is Low Low and 'rabbit' in (3.33b) is Mid Low. San Pedro Molinos has Low Low with a floating High in (3.33c), whereas in MIG the words for both 'tortilla' and 'four' are realised as Mid Low with a floating High. Hollenbach (2003) documents that in some

contexts the word for ‘four’ has the tonal pattern of Low High and in others it is Mid Low with a floating High.

This variation in tonal patterns in XTM is also seen in (3.33e), where the word ‘animal’ is Mid High in isolation, but when it is followed by another morpheme, the High tone associates with that morpheme rather than with the second syllable of *kiti*.

These data from XTM show that in this variety there is a preference for not having a High tone on the second syllable, but if there is no syllable with which the High tone can associate, then it associates with its sponsoring morpheme. A similar phenomenon is found in MXV and will be discussed in Chapter 5.

From these data we observe that the Mid Low in words in MIG and XTM in (3.33a), (3.33c), and (3.33d) correspond to words with Low tone on both TBU’s in other varieties. Whether it is appropriate to infer that these initial Mid tones do not exist in the underlying form would require further analysis.

3.4. TONE AND STRESS

We now examine the reported relationship between tone and stress in Mixtec. First we look at the paper by Pankratz and EV Pike (1967), and secondly we look at the role this paper plays in the work of de Lacy (2002a and 2000b).

3.4.1. Tone and stress in Ayutla Mixtec

For Ayutla Mixtec (MIY), Pankratz and EV Pike (1967) claim that word stress is predictable on the basis of the tone, stress being attracted to higher toned syllables. In environments where there is no High followed by a Mid or a Low tone or Mid followed by a Low tone, word stress falls on the initial syllable of the couplet, that is the bisyllabic word template common in Mixtec.

Pankratz and EV Pike document that a phonological word may be two to six syllables in length. An example of a six syllable phonological word is given in (3.34). Note that the word stress falls on the initial syllable of the couplet; that is, the verb root *kàni*ⁿ ‘hit’. In these data there are no Mid or High tones, so stress is realised on the initial syllable of the couplet although it has a Low tone associated with it.

3.34. Observed stress in MIY

nìⁿ- 'kàniⁿ kà rà rì²
PFV hit again he it
He hit it (the animal) again.

In other environments, Pankratz and EV Pike (1967) claim that stress is realised on High tones when they are followed by a lower tone, or on Mid tones when followed by Low. This can be seen from the examples in (3.35).

3.35. High tone and stress in MIY

a) 'kʷá.tʃí	'ʃí.nì ⁿ ?		b) lá'ʃá	rà
small	hat		orange	3M
<i>the hats are small</i>			<i>his orange</i>	

In (3.35a) stress is claimed to occur on the initial syllable of 'small' which is produced with a High tone on both syllables. In the case of 'hat', again the first syllable is perceived as stressed. In (3.35b), on the other hand, it is the second syllable of 'orange' that is perceived as being stressed; that is, the syllable before the Low tone.

Word stress is also reported on syllables which follow the couplet but not on pre-couplet syllables. In (3.36), we give an example of stress falling on *-ká* 'more' and in (3.37) we see that stress does not occur on the syllable preceding the couplet.

3.36. Stress on a suffix

sàtà 'ká rà
buy more he
He will buy more.

Note that in (3.36), stress is reported on the High toned syllable, even though it is not part of a couplet. However, in the cases where there is a syllable preceding the couplet that forms a compound with the couplet, Pankratz and EV Pike (1967) report that the stress does not fall on that syllable, even when it is associated with a High tone, as shown in (3.37).

3.37. No stress on prefixes which occur before the noun

'kòò tí kà 'tʃí?
 neg-be ? cotton
There are no blankets.

In (3.37), we see that the morpheme *tí* plus the word *kà'tʃí?* 'cotton' form the compound word 'blanket'. In this case stress is reported on the High toned final syllable of *kà'tʃí?* 'cotton' and not on the prefix. In the case of the verb 'not be' the stress is reported on the initial vowel.

Pankratz and EV Pike report two processes which only occur on unstressed vowels. In (3.38), we see that unstressed vowels of VCV or VCV² words are optionally devoiced when preceding a voiceless stop. This process is more likely to occur phrase medially, as is the case in these data.

3.38. Optional devoicing of vowels

jàtá? + 'íkà? → jàtá í'káà?
 old basket or jàtá í'káà?

Note that in the surface form, the final vowel of *'íkà?* 'basket' has been lengthened, and that the first /a/ has a High tone. Also the word stress is reported to have moved to the first /a/.

Another process is the optional deletion of unstressed vowels following [s] or [ʃ]. This results in a word with only one syllable. An example is given in (3.39).

3.39. Optional deletion of an unstressed vowel

'k^wéí sá'náⁿ rà or 'k^wéí 'snáⁿ rà
 horse ? 3m
his horse

One major draw-back with all these data is that there are no acoustic measurements to demonstrate what the correlates of stress are. Pankratz and EV Pike (1967) report that stressed syllables show increased duration, but there are no measurements to verify this impressionistic claim. A question raised by their

analysis is whether they were hearing stress in Mixtec where it would be heard in English. Fry (1958) shows that in English a syllable with a higher F0 is perceived as stressed in preference to a lower one. We see that where the participants perceived stress in Fry's experiment for English – that is, on the higher syllable – is precisely where Pankratz and EV Pike found stress in MIY.

3.5. DE LACY'S RE-ANALYSIS

The interaction between tone and stress posited by Pankratz and Pike is used by de Lacy (2002a and 2002b) to provide evidence for the idea that the heads of prosodic feet prefer High tones, and that non-heads prefer tones other than High.

First we look at de Lacy's analysis in more detail. De Lacy (2002) uses the word 'stress' in the sense of 'metrical strength', that is, the abstract prominence relationship between syllables. Within this framework, de Lacy claims that there are two kinds of stress: 'metrical stress,' where the main stress is attracted to some edge of the prosodic word, and 'prominence driven stress,' in which certain properties such as High sonority nuclei can override the attraction of stress to one of the edges.⁸ De Lacy also claims that tone can influence the placement of stress; he calls this 'tone driven stress' for languages in which it is claimed that stress is attracted to syllables with higher tones. He posits that High tones are intrinsically more prominent than Mid or Low tones, as shown in (3.40).

3.40. Tonal prominence scale from de Lacy

$$H > M > L$$

Based on this prominence scale, de Lacy goes on to propose that there is a preference for the head of a foot to have a higher tone than the non-head. This leads him to claim that universally it is less desirable for the head of a foot to have a Low tone than it is for it to have a Mid tone. He gives the ranking of constraints as in (3.41).

⁸ We return to this issue in Chapter 10 where we show that tonal association makes no reference to the foot structure of MXY.

3.41. Relationship between tone and position in a foot

- a) *Hd/L > *Hd/M
- b) *Non-Hd/H > Non-Hd M

The ranking given in (3.41a) claims that it is worse for the head of a foot to be associated with a Low tone than a Mid tone. Implied is that the best option is for the head of a foot to have a High tone associated with it. In (3.41b) it is stated that the worst option is for a High tone to be associated with the syllable that isn't the head of a foot. It is better that it be associated with a Mid tone.

De Lacy applies these principles to the data presented by Pankratz and EV Pike (1967) within the framework of Optimality Theory. De Lacy points out that prosodic words in MIY contain a single trochaic foot, that is, a left-headed foot preferably aligned at the left edge of the word. However, he claims that it is more important for the head of the foot to have a High tone than for it to be at the left edge. Thus in de Lacy's analysis, he constructs feet across morpheme boundaries so that the stressed syllable is at the left edge of a foot, as shown in (3.42), taken from de Lacy (2002b).

3.42. Proposed foot structure for 'he is small'

/lúlúrà	*NON-HD/H	FTBIN	ALL-FEET LEFT
a. ('lúlú)rà	*!		
b. ('lu)lúrà		*!	
c. lú('lúrà)			*

In (3.42), de Lacy claims that option (a) is rejected because the second syllable of the foot, that is the non-head, is associated with a High tone. Option (b) is also ruled out as there is a preference for binary feet where possible. However, the attested parsed form, option (c), has a High tone on the syllable which is the head and a Low tone on the syllable which is not the head, which according to de Lacy is the optimal tonal association as shown in 3.41 above.

In order to account for data in which the stress falls on High tone enclitics, de Lacy also claims that MIY prefers to have a degenerate mono-syllabic foot over a disyllabic foot in which the head is not associated with a High tone as shown by the data given in (0).

3.43. Proposed foot structure for 'his tobacco'.

/kūnú ⁿ rá	*HD/M	FTBIN	ALL FEET LEFT
a. (kūnú ⁿ)rá	*!		
☞ b. kūnú ⁿ (rá)		*	**

In (0), option (a) is rejected because the head of the foot has a Mid tone, even though there is a binary foot aligned at the left edge, while option (b) is accepted because the head of the foot, even though it is a degenerate foot, has a High tone.

3.6. CONCLUDING REMARKS

A number of theoretical issues have been raised in this chapter which will be further developed in relation to MXY Mixtec.

First we draw the reader's attention to Mak's observations that for some varieties the syntactic relationship plays a role in tone perturbation, in that perturbation only occurs under certain syntactic conditions. This observation implies that K Pike's claim that there are no compounds or units below the word level needs to be re-examined to see if the syntactic relationships documented by Mak would be better considered as phonological words, rather than phrases. In Chapter 10 we look at ways of differentiating phrases and compounds in MXY.

Secondly, further analysis is needed to assess the status of Mid tones. We have seen that in MIG some Mid Low words correspond to Low Low words in other varieties. In Chapter 5 we present more data to show that for MIG it seems that some tone patterns are aligned at the right edge. However, further investigation would be needed to show whether it is indeed only the initial Mid tones that are absent, and Mid tones that form the second element of a tone melody, such as Low Mid, are in fact present in the underlying form. Research into other varieties has shown that Mid tone is absent in the underlying form. For example, Daly and Hyman (2007) present conclusive evidence to show that in MIL there are no Mid tones in the underlying form. However, in Chapter 6 we show that this analysis cannot be extended to all Mixtec varieties. In MXY we find a contrast between underlying Mid tones and those which are inserted as default, in that the underlying Mid tones participate in phonological processes which the default tones do not.

Thirdly, given that Pankratz and EV Pike (1967) report stress in MIY in the same tonal contexts in which stress is perceived in English, we wonder whether acoustic data would corroborate the placement of stress that they report for MIY. In Chapter 9 we show that there is no relationship between tone and stress in MXY. In MXY High tones can be shown to be attracted to the right edge of a phonological word, whereas stress occurs on the initial syllable of roots, that is, the left edge.

The structure of CVY words is a question that arises from the fact that CVY words are considered to have one or two syllables, and that is the question about which we consider the words in the present chapter. We have heard what Pankratz and Pike (1967) say about the structure of CVY words, but what phonological processes have given rise to the structure of CVY words? We will look at this question in Chapter 10.

4.1 THE STRUCTURE OF CVY WORDS: ONE SYLLABLE OR TWO?

In this chapter we will consider the structure of CVY words in the context of the structure of CVY words in English. We will look at the structure of CVY words in English and see how it compares with the structure of CVY words in MXY. We will also look at the structure of CVY words in other languages. The structure of CVY words is a question that arises from the fact that CVY words are considered to have one or two syllables, and that is the question about which we consider the words in the present chapter. We have heard what Pankratz and Pike (1967) say about the structure of CVY words, but what phonological processes have given rise to the structure of CVY words? We will look at this question in Chapter 10.

It does not seem to me that the structure of CVY words in English is particularly interesting. The structure of CVY words in MXY is more interesting. The structure of CVY words in other languages is also interesting. The structure of CVY words is a question that arises from the fact that CVY words are considered to have one or two syllables, and that is the question about which we consider the words in the present chapter. We have heard what Pankratz and Pike (1967) say about the structure of CVY words, but what phonological processes have given rise to the structure of CVY words? We will look at this question in Chapter 10.

CHAPTER 4

REANALYSIS OF MIXTEC TONE

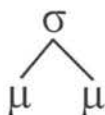
In this chapter we continue the discussion begun in Chapter 3 of previously published analyses of Mixtec varieties. We now look at various phenomena within the framework of autosegmental phonology to answer three questions. One, should CVV words be considered to have one or two syllables, and how does the answer to this question affect whether we consider the mora or the syllable to be the tone bearing unit? Two, what evidence is there for floating tones in Mixtec, and what phonological processes have given rise to floating tones? Three, is there evidence in MIG for tone spread, and within what domains?

4.1. CVV WORDS – ONE SYLLABLE OR TWO?

Before looking at an alternative analysis to K Pike's analysis of the tone system of MIG, we first revisit the status of CVV words. Then with that analysis as our basis, we go on to discuss whether the syllable or the mora should be considered as the tone bearing unit in Mixtec. The discussion centres around one basic issue: whether long vowels should be considered as one heavy syllable, or as two light ones. This issue is not new to the discussion of Mixtec phonology. As we have shown above in Chapter 2, K Pike (1948) considers CVV words as being disyllabic. However, as has been shown, although there are no contours on single vowels in MIG, contours do occur in other varieties.

In theoretical discussions, the concept of the mora has been used to differentiate between light and heavy syllables. Heavy syllables are considered to be bimoraic while light syllables have just one mora. Under this view a CVV syllable consists of one vowel associated with two moras as shown in (4.1). This contrasts with the figure in (4.2) which shows a light syllable.

4.1. Heavy syllable

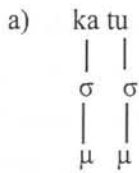


4.2. Light syllable

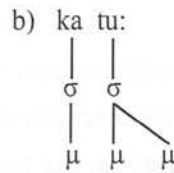


Following Hyman (2003) and Hayes (1995), we analyse CVV words as one heavy syllable, rather than two light ones. For MIG, this implies that the contrast between *katu* ‘clap’ and *katuu* ‘is lying down’ is not the number of syllables each word has, but the number of moras.¹ This contrast is illustrated in (4.3) (tone is omitted).

4.3. Contrast between light and heavy syllables



clap



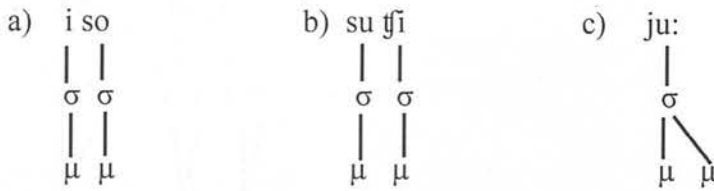
is lying down

Note that both words are disyllabic. However, *katu* ‘clap’ consists of two light syllables whereas *katuu* ‘is lying down’ consists of one light and one heavy syllable.

Under Pike’s (Pike 1948) analysis, a word must have at least two vowels, which he interprets as two syllables, one per syllable. The observation can be put in other terms; that is, in MIG there is a minimum word constraint: a word must be at least bimoraic. We therefore conclude that mono-morphemic words in MIG have one of three basic templates, as shown in (4.4) (again tones are omitted).

¹ To make it easier to show tone on the surface forms of words, we write CV: words as CVV, when tone is indicated.

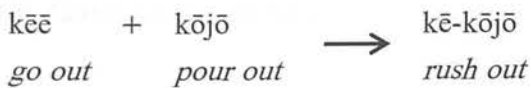
4.4. Word templates in MIG



In (4.4a), we see that the word *iso* ‘rabbit’ is disyllabic (the initial syllable consisting of only a vowel, as we consider that the initial glottal reported by Pike is not present in the underlying representation). In (4.4b) the word *sutfi* ‘child’ is also disyllabic, both syllables being CV. However, we claim that the word *ju:* ‘stone’ shown in (4.4c) is mono-syllabic, comprising one heavy syllable. We claim that words like *ju²u* ‘mouth’ are also mono-syllabic, the glottal stop being considered a feature of the vowel, not a consonant.²

The analysis of CVV words as mono-syllabic provides a way to explain a phenomenon described by Pike (1949) whereby CV: words are reduced to CV when they occur as the first element of what we analyse as a compound. We claim that this process is to avoid stress on adjacent syllables. This approach is based on analysis by Longacre (1957) and Alexander (1980), as well as our own research that in Mixtec the initial syllable of a disyllabic word is stressed. Now consider the data from MIG in 4.5 in which *kēē* ‘go out’ is reduced to *kē-* in the surface form of *kē-kōjō*.

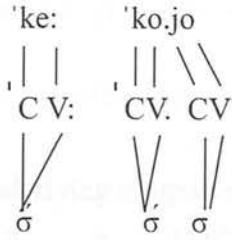
4.5. CVV reduced to CV



One way to account for the reduction of *kēē* ‘go out’ to *kē* is to posit that heavy syllables are stressed, thus in the data in (4.5) we have adjacent stressed syllables as shown in (4.6).

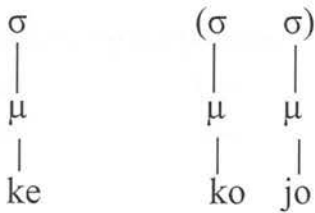
² Tranel (2012) refers to CVV words in MIG as a single long syllable with two moras, but to CV²V words as disyllabic.

4.6. *Prohibited adjacent stressed syllables



Thus, by reducing *kēē* to *kē* we have a light syllable, which does not receive stress unless it is part of a trochaic foot. We claim that the foot structure for *kē-kōjō* is as shown in (4.7). Note that the light syllable of *kē* 'go out' is not parsed, and so does not receive stress.

4.7. Foot structure for *kē-kōjō*



In proposing that heavy syllables in MIG carry stress, we follow Kager (1999) which discusses quantity sensitive stress systems. We claim that in MIG (and, as shown in Chapter 10, in MXY), stress on adjacent syllables is not permitted, so CV: is reduced to CV. The clash avoidance rule is given in (4.8).

4.8. Clash avoidance rule

$$'CV: + 'CV. CV \rightarrow CV. 'CVCV$$

Note that in (4.8), the stress falls on the initial syllable of the second root. We claim that the foot structure in MIG is built from right to left and does not span morpheme boundaries. This approach accounts for the fact that in words of more than two syllables, it is the penultimate syllable which is stressed, regardless of which tone is associated with it (Alexander, 1980). In the surface form in (4.9), we give data from MIB (Alexander 1980). Alexander shows that the stress of the compound word falls

on the initial syllable of the second element which in this case is *juṅuⁿ* ‘tree’, that is, the penultimate syllable of the compound. (Tone is omitted from this example.)

4.9. Loss of the second vowel of CVⁿV word

Underlying morphemes		Surface form
na ⁿ a	+ juṅu ⁿ	na. ¹ ju.ṅu ⁿ
<i>hand</i>	<i>tree</i>	<i>branch</i>

Stress is also reported on the initial syllable for the verb root, when this occurs with prefixes as shown in (4.10), again with data from MIB (Alexander, 1980).

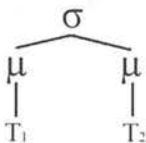
4.10. Stress on the initial syllable of the root

Underlying morphemes		Surface form
na ⁿ	+ kiku	na. ⁿ . ¹ kiku
REPET	<i>sew</i>	<i>mend</i>

The prosodic structure of compounds is presented in more detail in Chapter 10 with data from MXY.

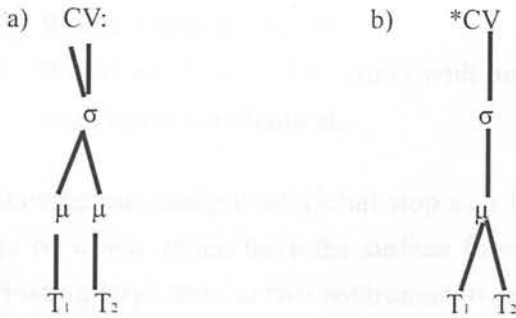
We now turn to look at the implications for tone association of considering CV: as a heavy syllable. For languages where it is argued that the mora is the tone bearing unit (e.g., Kenstowicz 1994), heavy and light syllables are further differentiated in that two tones are associated with heavy syllables, one per mora, whereas in the case of a light syllable only one tone is associated. These associations are given in (4.11) and (4.12).

4.11. Association of tones to moras for a heavy syllable



As MIG does not permit contours on light syllables, but only on heavy syllables, this analysis seems to account well for the data, as shown in (4.12).

4.12. No contours on light syllables



In (4.12a) we see the association of tones to moras for a heavy syllable. That is, there are two tones, each associated with one mora, which comprise the heavy syllable. In (4.12b), on the other hand, we show a light syllable, comprising one mora. If we analyse CV: as mono-syllabic, but bimoraic, then for MIG only one tone is permitted per mora.

Treating CV: words as mono-syllabic provides a way to account for the seemingly arbitrary surface phenomenon whereby some Mid Low words have the surface tones Mid High after a word with a floating High tone and others are High Low. As was shown in Chapter 3 (Section 3.1.1), Pike lists three groups of Mid Low words which become High Low following a class (b) morpheme (repeated here as (4.13) for convenience).

4.13. Mid Low words which are realised as High Low

- 1) CVV words with identical vowels, whether oral or nasal
- 2) Words which are CV²V with identical vowels, whether oral or nasal
- 3) Words which are CV²CV

On the other hand, words with the following segmental shape become Mid High after a class (b) morpheme (again repeated for convenience, in (4.14)).

4.14. Mid Low words which are realised as Mid High

1. Words which are (C)VCV³
2. Words which are CVV, either with oral or nasal vowels, and in which the vowels are not identical.

Following our analysis of glottal stop as a feature of the vowel, we can reduce the types of words which have the surface form High Low following a morpheme with a floating High tone to two environments, as shown in (4.15).

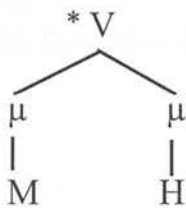
4.15. Structure of Mid Low words which are realised as High Low

- 1) CV²CV words
- 2) CV: words with identical vowels whether they be oral or nasal

By comparing (4.14) and (4.15) we can now see the contrast between the two environments. There are two important differences: one, the presence word medially of a glottalised vowel followed by a consonant; two, whether the vowels in CVV words are identical or not.

Tranel (2012) notes that there are no CVV words with identical vowels which have a Mid High tone pattern. Tranel posits that there is a prohibition of one vowel position being linked to two moras and to the tone pattern Mid High. This prohibited pattern is given in (4.16).

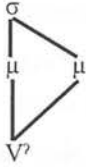
4.16. Prohibited Mid High association pattern



Tranel considered CV²V words to be disyllabic (Tranel 2012). We posit that these words are mono-syllabic but bimoraic, as shown in (4.17).

³ Pike considered glottal stop to be a consonant. He included the initial glottal stop in his transcription of words which we consider to be VCV.

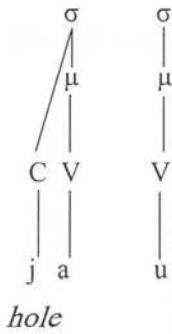
4.17. Structure of CV'V



Thus we claim that when Mid Low words have one specified vowel position which is linked to two moras, then the surface form is High Low following a morpheme with a floating High tone.

However, when the vowels are not identical, then we claim that these words are disyllabic, as shown in (4.18) with the word *jā̀ù* 'hole'.

4.18. Disyllabic structure of words with unlike vowels



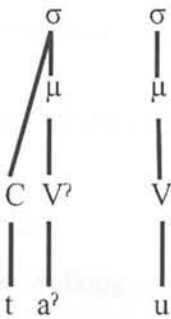
We claim that CVCV words have the same underlying structure as illustrated in (4.19) for the word *sūtù* 'priest'.

4.19. Disyllabic structure of CVCV words



Thus we claim that most Mid Low disyllabic words are realised as Mid High following a morpheme with a floating High tone. The exceptions to this claim are words whose medial vowel is glottalised. These words have the surface tone High Low. Pike (1948) only mentions words which are CV²CV with identical vowels, although this rule also applies to words such as *kū²niⁿ* ‘tie’, which has the imperfective form *hū²niⁿ*; that is, the floating High tone which marks the imperfective associates with the initial syllable, not with the second, as we might expect for a disyllabic word. Pike’s (1948) description of the surface tone on Mid Low words following a floating High tone does not include CV²V words which have unlike vowels. Tranel (2012) gives an example from Pike (1945) in which a word of this type is realised as High Low. We consider that these words are also disyllabic; that is, they have a similar underlying structure to words which are CV²CV. This structure is given in (4.20) for the word *ta²u* ‘break’.

4.20. Syllable structure for words with a glottal stop



The analysis in (4.20) is in keeping with the fact that many CVV words in MIG which have unlike vowels are of the form CVCV in other varieties. Recall that in Chapter 2 we documented examples of where *βi* syllables became /u/. The cognate word for ‘break’ in MXY is *ta²βi* ‘break’.

Goldsmith (1990) accounts for the difference in the tonal association patterns of words which are CV²CV and CVCV by positing that the glottal stop occupies a position on the tonal tier in MIG. This analysis certainly provides a way of accounting for the facts as presented by K Pike (1948). However, glottal stop does not participate in tone association phenomena in all varieties of Mixtec. For example, in MXY, the tonal association patterns for CV²CV and CVCV are the same; that is the word medial glottal stop does not form a barrier which prevents floating High tones associating with the second mora of the word.

4.2. FLOATING TONES

Having determined that the mora is the tone bearing unit, we first look at the evidence for floating tones, and then look at the phonological processes which have given rise to them.

4.2.1. Evidence for floating tones

As was detailed in Chapter 3, analyses such as those of K Pike and Mak divide morphemes into classes according to the effect they have on the following word. This analysis is followed by others such as Alexander. For example, for MIB, Alexander (1980) makes a three-way division as to whether the effect on the perturbed word is higher or lower than the tones of the surface form in isolation. In (4.21) through (4.25) we give examples of each of these three classes.

In (4.21) and (4.22), we see that the output tones are the same as the input ones; that is, the tones of the second element of the phrase do not change in the data given in the right-hand side of the diagram, so *kīnìⁿ* remains Mid Low throughout in (4.21) and *ńíjǐⁿ* remains High High in (4.22).

4.21. Words which effect no change on the following morpheme in MIB

híkā + *kīnìⁿ* → *híkā kīnìⁿ*

is walking pig

The pig is walking.

4.22. Words which effect no change on the following morpheme in MIB

ń̄ⁿ + *ńíjǐⁿ* → *ń̄ⁿ ńíjǐⁿ*

one rat

a rat

We now turn to words which cause the initial syllable of the following word to be High. In (4.23), the word *jú²ú* 'to be afraid' is classed as a class (b) morpheme; that is, it causes the tone of the initial syllable of following morphemes to be raised to High. Note that in the output form the tones on *kīnìⁿ* 'pig' are now High Low, not Mid Low as they were in the input form.

4.23. Initial syllable of the following word raised in MIB

jú²ú + k̄n̄n̄ⁿ → jú²ú k̄n̄n̄ⁿ
 is afraid pig

The pig is afraid.

Before looking at the third class of morphemes, those which cause the tones of the initial syllable of the following morpheme to be lowered, the reader is reminded of the fact that MIB tone has four phonetic levels; that is, there is a level which is phonetically between Mid and Low. In (4.24), we see that in the output the tone of the initial syllable of *k̄n̄n̄ⁿ* ‘pig’ is now Lowered-Mid; that is, the tone that is phonetically between Mid and Low (Lowered-Mid is indicated by a dieresis.)⁴

4.24. Lowering of the initial syllable of the following word

híníⁿ + k̄n̄n̄ⁿ → híníⁿ k̄n̄n̄ⁿ
 knows pig

The pig knows.

In (4.25), we give another example in which the output contains a Lowered-Mid tone. In this case the word *n̄j̄j̄ⁿ* ‘rat’ has changed from High High to Lowered-Mid High.

4.25. Lowering of the initial syllable of the following word

f̄ⁿgā + n̄j̄j̄ⁿ → f̄ⁿgā n̄j̄j̄ⁿ
 another rat

another rat

Alexander (1980) and others assign morphemes to classes based on what happens to morphemes which follow them. This classification is based on careful

⁴ An acoustic analysis of the F0 of the four tone levels in MIB would show if the differences between Lowered-Mid and Mid or Low are significant.

descriptive work and yields a way for accounting for the surface alternations. However, autosegmental phonology provides a much more satisfying way to account for the alternations by claiming that perturbation is often the result of the association of a floating tone.

As was shown in Chapter 3, Goldsmith (1990) was the first to suggest that the differences in MIG class (a) and class (b) morphemes can be accounted for by positing that class (b) morphemes have a floating High tone. However neither he nor Tranel (1995b) compare Mixtec data which would enable them to posit a historical source for these floating tones.

4.2.2. Processes which result in floating tones

In this section we present data to show three phonological processes which result in floating tones. First we present evidence to show that in some varieties of Mixtec there has been right-ward tone shift of the underlying tones; that is the first tone of a tone melody, instead of associating with the initial mora of a bimoraic word, associates with the second mora. Secondly we show how in some varieties floating High tones delink Low tones, resulting in a floating Low tone. Thirdly we show how the loss of segments has resulted in floating tones. In Chapter 5 we present additional data to substantiate the claim that there has been tone shift in some Mixtec varieties.

We now look at data which exemplifies tone shift which results in a floating tone. Useful insight is gained from Clements and Ford (1979), whose paper on Kikuyu shows that floating tones are the result of right-ward tone shift. In some cases these floating tones form word-final contours, and in others they cause downstep. We claim that a similar process has taken place in some Mixtec varieties.

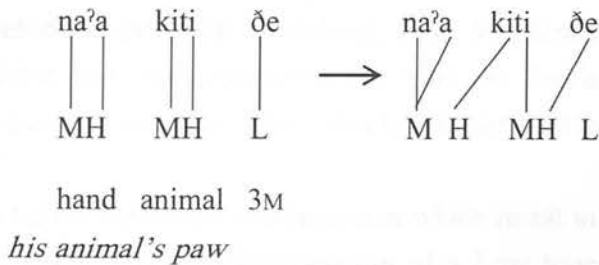
In (4.26) we compare MIG class (b) morphemes (that is, those morphemes which perturb the following word to a higher tone), with the same lexical items in XTM. Note that in XTM these items have the tone pattern Mid High. Data from XTM are from Hollenbach (2001) and Hollenbach (2005).

4.26. Comparison of MIG and XTM tones

MIG	XTM	
nā [?] ā	nā [?] á	‘hand’
kī [?] tī	kītí	‘animal’

Here we see that in XTM, the High tone of the Mid High tone pattern associates at the right edge of the word. However, when XTM Mid High words occur other than phrase finally, the High tone sponsored by these items associates with the following morpheme, as shown in (4.27).

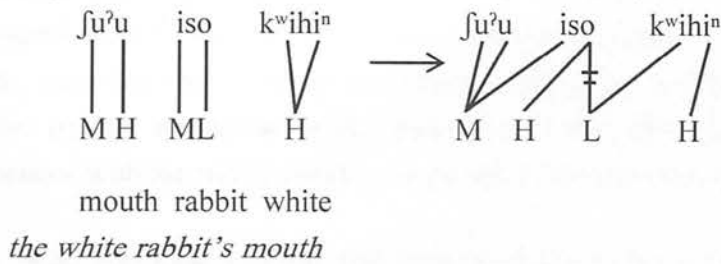
4.27. Association of final High tone in XTM



On the left-hand side of the figure in (4.27) we have the input segments and tones for the phrase ‘his animal’s front paw (lit. hand)’. Note that in this diagram it is assumed that all the underlying tones are linked in the underlying form. As was shown in (4.26), in isolation, both nā[?]á ‘hand’ and kītí ‘animal’ are Mid High, but in (4.27) a Mid tone is associated with both syllables of ‘hand’, and the surface tones of ‘animal’ are High Mid. Hollenbach (2001) accounts for this surface pattern by claiming that the High tone sponsored by nā[?]á ‘hand’ is now associated with the first syllable of kītí ‘animal’ and the High tone of ‘animal’ is now associated with the enclitic, replacing the Low tone.

The data in (4.27) also instantiate another process which results in a floating tone. Hollenbach (2001) claims that the Low tone which is sponsored by the enclitic ǝe is not deleted, but is left unassociated, as indicated in the diagram. She provides evidence of this delinking process, for example, as shown in the data in (4.28). Note that the Low tone of ǐsò ‘rabbit’ is delinked and associates with the following morpheme k^wihíⁿ ‘white’.

4.28. Low tone disassociated by a floating High tone



In these data we see that the High tone of *fu²u* 'mouth' associates at the right edge of *iso* 'rabbit'. The Low tone sponsored by *iso* 'rabbit' is delinked and associates with the initial syllable of *kʷihiⁿ* 'white'. We assume that the Mid tone of 'mouth' provides the tone for the first syllable of 'rabbit' and that the initial Mid tone of the tone melody of *iso* 'rabbit' is deleted. If the Mid tone sponsored by *iso* 'rabbit' were not deleted, then the association line from the floating High tone of *fu²u* 'mouth' would cross the association line which links the Mid tone to the initial syllable of *iso* 'rabbit'.

So far we have seen two processes which result in floating tones: the right-ward shift of tones, and the disassociation of a Low tone when it is displaced by the association of a High tone.

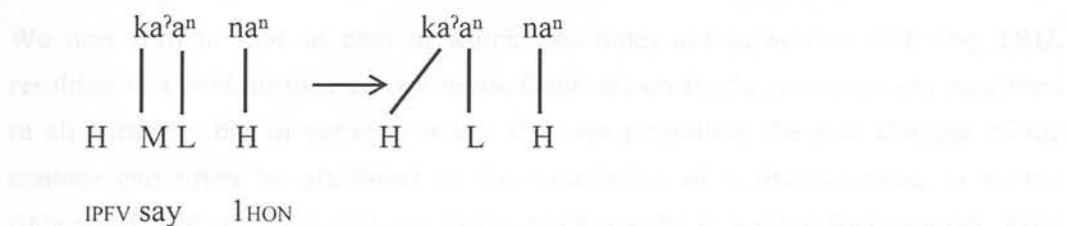
We now look at a third process which results in floating tones, that is the loss of segments. The imperfective prefix provides an example of the process whereby CV segments are lost, but the tones remain as floating tones. In most varieties the difference between the irrealis and the imperfective forms of verbs is the presence of a High tone in the imperfective. Hollenbach (2001) posits that this floating High tone is all that remains of a verbal morpheme which up to colonial times had CV segments. It appears in a 16th century dictionary as *yo*, shown in (4.29) in data from de Alvarado (1593) (in this case we retain de Alvarado's transcription).

4.29. Evidence for the imperfective prefix

yo- sasi ndi
IPFV eat I
I am eating

The association of the floating High tone of the imperfective prefix is often the only difference between the irrealis and the imperfective form. In (4.30) we give examples from MIG. On the left-hand side of the figure we give the underlying tones, assuming that the tones are linked underlyingly and that the initial Mid tone of the irrealis is present in the underlying form. The High tone of the prefix associates with the initial syllable, as shown in the right-hand side of the figure.

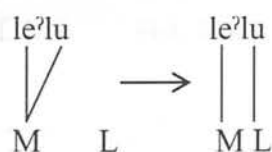
4.30. Association of the High tone which marks imperfective



I am saying.

It is not only verbal prefixes which have lost segmental material. In some varieties there are enclitics which are indicated by tone. One example is MIX (Ibach & EV Pike, 1978), where the first person enclitic is a Low tone. In (4.31) we see that the Low tone of the enclitic associates with the final tone of the noun *le²lu* 'lamb', and so the Mid tone associated with this morpheme does not spread to both syllables.

4.31. Association of the 1st person enclitic in MIX



lamb 1

my lamb

In summary, floating tones in Mixtec can be shown to come from three sources:

- The result of tone shift to the right, by which the FIRST tone of a tone melody is associated at the RIGHT edge of the sponsoring morpheme, and then the second tone becomes a floating tone to the right.

- In some varieties, when a floating High tone associates with a TBU which has a Low tone associated with it, the floating High tone delinks the Low tone. As a result, the Low tone becomes a floating Low tone.
- The loss of the vowel of a prefix or enclitic or, in some cases, the loss of the entire segmental material of the prefix or enclitic.

4.2.3. Contours

We now turn to look at data in which two tones are associated with one TBU, resulting in a contour tone on one mora. Contours on single moras are not permitted in all varieties, but in varieties where they are permitted, the first element of the contour can often be attributed to the association of a floating tone, or to the right-ward shift of the underlying tones, which results in a word final contour. First we look at contours which are the result of the association of a floating tone; secondly we look at contours which are the result of right-ward shift.

To illustrate contours formed by the association of floating tones we first look at data from MIE. In this variety, verb roots which have an initial Low tone in the irrealis have a High-Low glide on the initial syllable in the imperfective. The data in (4.32) is taken from Alexander (1988).

4.32. Comparison of verbal forms Low tone initial roots in MIE

Irrealis	Imperfective
L H	H-L H
L M	H-L M

Contours can also occur word finally. For example, in MIX the first person enclitic is a Low tone, without any segmental material. This floating Low tone associates with a word which has a High tone associated at the right edge, as shown in (4.33). Note that the Low tone sponsored by the enclitic forms a High-Low contour with the High tone associated at the right edge of the word *nùúⁿ* 'face'.

4.33. Contour formed by the association of the tone of the first person enclitic



These data instantiate a phenomenon found in some Mixtec varieties; that is, that two tones may associate with one mora. Under the analysis that CV: words are one heavy syllable, but bimoraic, then nuu^n 'face' is one heavy syllable comprising two moras. The data in (4.33) shows that in MIX, two tones are permitted to associate with one mora.

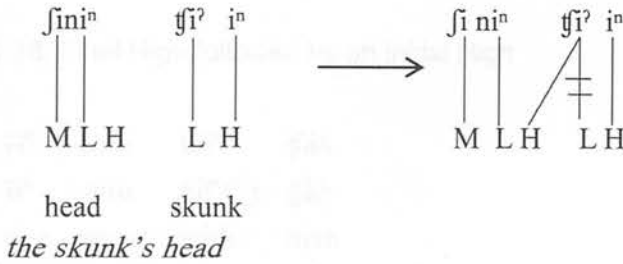
4.3. FLOATING HIGH TONES IN MIG

Having looked at some general features of floating tones in Mixtec varieties, we now look at data from MIG in order to propose an alternative analysis based on autosegmental theory. First we look at data from MIG data which show that all class (b) morphemes have a floating High tone, including those which have a final High tone. We also present evidence to show that in MIG, final High tones do not spread across word boundaries, although there is evidence that the final tone of a word will spread to the following enclitic.

One of the problems that is faced when attempting to re-analyse MIG data is that in most of the published material there is no indication of whether a morpheme belongs to class (a) or class (b). K Pike published two texts in which he indicated whether morphemes belonged to class (a) or class (b): (Pike, 1944; Pike, 1948). Pike's other published texts had aims other than documenting the tone perturbation (e.g., Pike (1945a) documents tone puns in MIG). In work done by others on MIG, such as the collection of MIG texts by Dyk (1959) and in the MIG Dictionary (Dyk and Stoudt, 1973), there is no indication as to whether a morpheme belongs to class (a) or class (b). Dyk (1959) gives the surface tones in the texts and supplies a word list for the morphemes found in the texts. Therefore in many cases the class of a

We now turn to look at words which are Low High in isolation. When words of this pattern follow a word which sponsors a floating High tone, the floating High tone deletes the Low tone. An example of this process is given in (4.35).

4.35. Association of a floating High with a Low High word

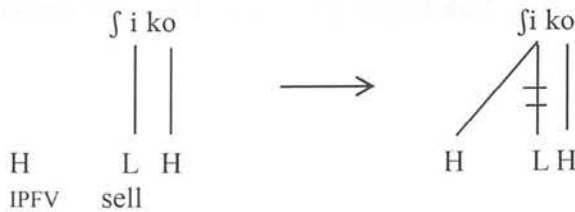


Again we give as the underlying tones those found on the items in isolation, reporting any floating tones. Note that in the surface form, the floating High tone of *fɪni*^(H) ‘head’ deletes the Low tone associated with the initial syllable of *ʃi*^(H) ‘skunk’, even though there already is a High tone associated with this word.

The association of the High tone prefix which marks the imperfective results in the same surface tone alternations on verb roots as those which occur when a floating High tone associates with a noun. For example, the irrealis of the verb ‘sell’ is *ʃikó*, with the tonal pattern Low High. The imperfective has a High High tone pattern. The figure in (4.37) shows how the floating High tone prefix deletes the Low tone of the verb root, giving the resultant tone pattern High High.

4.36.

4.37. Imperfective of *ʃikó* ‘sell’



The morphemes which sponsor a floating High tone presented so far have either Low or Mid associated with the final syllable. Positing a floating High tone in these cases accounts for the presence of a High tone in the surface form of the following

word. Note that the presence of this underlying floating High tone is not apparent in the surface form of its sponsoring morpheme when pronounced in isolation.

We now look at words which have a final High tone. In (4.38), we have a phrase in which there is a sequence of three surface High tones. Recall that the second line of glossed data contains the citation forms.

4.38. Final High followed by an initial High

ḥḥ ⁿ	sūtù	híí ⁿ	tʃáā
ḥḥ ⁿ	sūtù	híí ^{n(H)}	tʃāā
one	priest	with	man

(the story of) a priest and (some) men

From these data we could assume that the High tone of *hííⁿ* ‘with’ is also linked to the initial syllable of *tʃāā* ‘man’. However, Pike’s analysis of MIG tone suggests that the solution is not as straightforward as it might appear. Pike states that not all words which end in a High tone perturb the following word to higher.

Our own analysis of MIG data leads us to posit that Pike’s class (b) morphemes which have a final High tone also have a floating High tone. Evidence for this claim is found in two sets of data. First we compare the tone patterns on adjectives which are derived from nouns and the root noun. Then we compare the tones of the irrealis with the imperfective.

In (4.39), we see that if the noun belongs to class (a) then the derived adjective does too; that is, neither the noun nor the adjective has a floating High tone. Likewise, if the noun belongs to class (b) (that is, has a floating High tone), then the derived adjective also has a floating High tone.⁵

⁵ I have only found two exceptions to this generalization: *tʃāā* ‘man’ and *tʃāā^(H)* ‘masculine’ for which the adjectival form sponsors a floating High although the nominal form does not. The other exception is *nāβāⁿ* ‘soap’ and *nāβā^{n(H)}* ‘soapy’. Again the nominal form does not have a floating High tone but the adjectival form does.

4.39. Nouns and their related adjectival form

	Noun	Class	Adjective	Class
a)	βíkò 'cloud'	a	βíkó 'cloudy'	a
b)	kàā 'metal'	a	káá 'metallic'	a
c)	ʈāʔβà ⁿ 'lung'	b	ʈáʔβá ⁿ 'spongy'	b
d)	ījū ⁿ 'thorn'	b	íjú ⁿ 'thorny'	b
e)	jìtí ⁿ 'sand'	b	jítí ⁿ 'sandy'	b

In (4.39a) and (4.39b) there are examples of nouns which in MIG do not have floating tones. The corresponding adjectives do not have floating tones either, and so they do not cause perturbation to higher of the following word. We also see that each of the adjectives has a High tone on both syllables. However, the presence of a final High tone does not imply that the following word is perturbed. We posit that floating tones are part of the specification for each item in the lexicon. This feature is not deleted by the association of the High tone that marks the adjectival form, even though in most cases the other tones associated with the noun are deleted.

When we compare the irrealis and the imperfective forms of verbs, we see that if the irrealis has a floating High tone then the imperfective does, too. Conversely, if the irrealis does not have a floating High tone, the imperfective likewise does not perturb the following word even if it has a High tone word final. Examples are given in (4.40).

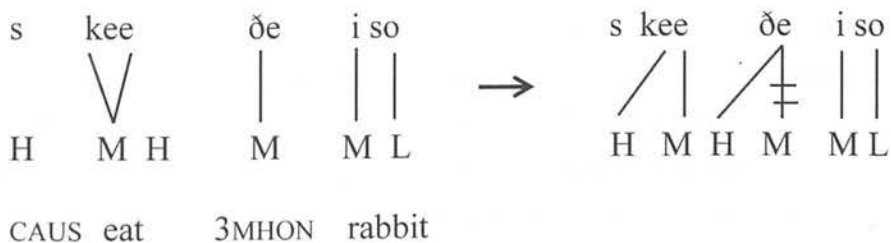
4.40. Irrealis and imperfective verb forms

	Irrealis class	Imperfective class		
a)	kā [?] nù ⁿ	a	há [?] nù	a 'break'
b)	kājù	a	kājú	a 'burn'
c)	kìkū	a	kíkū	a 'sew'
d)	kā [?] nī ⁿ	b	há [?] nī ⁿ	b 'kill'
e)	tʃō [?] ò	b	tʃó [?] ò	b 'cook'
f)	k ^w íkó	b	híkó	b 'revolve'
g)	nātà	b	nātá	b 'break'

Again we posit that the floating High tones are part of the specification for verb roots in the lexicon. As we saw for nouns, these floating High tones are retained, even when other High tones associate with the roots. We also posit that the segmental changes that mark the imperfective are independent of the tonal tier. It should also be noted that in the case of verbs which have a Mid Low pattern in isolation and (C)VCV or CVV with unlike vowels, the floating High tone aligns at the right edge of the verb root.

Another source of floating High tones in MIG is the causative marker *s-*. In some varieties of Mixtec this prefix is *sá-*. It is very likely that this prefix is derived from *sá[?]á* 'do'. In (4.41), we see that the floating High tone sponsored by the causative prefix associates with the initial TBU of *kēē* 'eat'. The floating High tone sponsored by the verb root associates with the enclitic *ǎe* 3MHON.

4.41. Floating High tone sponsored by the causative prefix



He will feed the rabbit.

In (4.41), the High tone sponsored by the causative prefix, like other floating High tones, associates at the right edge of morphemes which are Mid Low in isolation and have the CV template (C)VCV or words which are CVV where the vowels are not identical. The verb *kʰtʰ* ‘boil’ is Mid Low in the irrealis. However, when it co-occurs with the causative prefix *s^(H)-* it is realised as *skʰtʰ* in the irrealis form. Note that it is this form that co-occurs with the perfective prefix *nɪⁿ-*.

4.42. Right alignment of the floating High tone

tē	nɪ ⁿ -	skʰtʰ	-ðē	nũtʃā	
tē	nɪ ⁿ	s ^(H) -	kʰtʰ	ðē	nũtʃā
and	PFV	caus	boil	3MHON	water

He boiled the water.

In this section we have seen data in which it can be demonstrated that floating High tones may be the result of the loss of segments. In some cases both the consonant and vowel are lost (for example in the case of the imperfective prefix), and in others only the vowel (for example in the case of the causative prefix). So we can say that K Pike’s “ghost” morpheme is a floating High tone. We have also presented data to show that some morphemes have a floating High tone, although there does not seem to have been any loss of segments. These facts show how the comparative study of Mixtec varieties can provide useful data which elucidate phenomena which otherwise would appear to be arbitrary.

4.4. DOMAINS IN WHICH TONES SPREAD IN MIG

In this section we examine evidence which shows in which domains tones may spread. First we look at the tones of the enclitics, showing that the final tone of a morpheme in certain tonal contexts spreads to the enclitic. Secondly, we demonstrate that tones associated with verbal prefixes do not spread to the verb root or stem. This restriction does not apply to verbal prefixes which only are specified for tone without any segmental material. Finally we show that in a very limited number of cases, one tone may associate with both TBUs which belong to a disyllabic morpheme.

4.4.1. MIG enclitics

We first turn to look at the surface tonal phenomena exhibited by the enclitics of MIG. We see that by positing that the final tone of the host morpheme is also linked to the enclitic, we can account for what otherwise looks like very arbitrary tone sandhi.

K Pike (1948) describes in great detail the tonal phenomena exhibited by MIG enclitics. He claims that these enclitics are reduced forms of related disyllabic morphemes. In some cases these morphemes are free pronouns, such as *nááⁿ* 1HON; in other cases they are disyllabic nouns such as *sùtʃí* ‘child’. He divides the enclitics into three groups based on the surface tone which he posits for each enclitic. In (4.43) we give the disyllabic morpheme including the surface tones which Pike posits, with the additional information as to whether these morphemes have a floating High tone or not.

4.43. Pike's analysis of tones of enclitics

Disyllabic morpheme		Corresponding enclitic	
Group 1			
a)	<i>nááⁿ</i> ‘I’ HON	- <i>náⁿ</i>	1HON
b)	<i>nííⁿ</i> ‘you’ HON	- <i>níⁿ</i>	2HON
Group 2			
c)	<i>tʃǎǎ</i> ‘man’	- <i>ǎǎ</i>	3MHON
d)	<i>sùtʃí^(H)</i> ‘child’	- <i>í</i>	3G
e)	<i>jǎ^(H)ǎ^(H)</i> ‘woman’	- <i>jǎ^(H)</i>	3FHON
Group 3			
f)	<i>jóó^(H)</i> ‘we’	- <i>jò^(H)</i>	1INCL
g)	<i>róó^(H)</i> ‘you’	- <i>rò^(H)</i>	2
h)	<i>rūù</i> ‘I’	- <i>rì</i>	1
i)	<i>kǎǎ^(H)</i> ‘animal’	- <i>tǎ^(H)</i>	3AN
j)	<i>í^(H)ǎ</i> ‘sacred person’	- <i>jǎ^(H)</i>	3DEI

First we make some general observations about the correspondence between the tones of the disyllabic morphemes and the enclitics. Under Pike’s analysis, for six of

the ten enclitics, the tone of the enclitic corresponds to the tone of the final syllable of the disyllabic morpheme. For example, in (4.43c) the disyllabic morpheme *ʃàā* ‘man’ has a final Mid tone, and the corresponding enclitic has a Mid tone. There is also a high level of correspondence between the presence of a floating High tone on the disyllabic morpheme and the enclitic; only one enclitic out of the five with floating High tones does not have a corresponding floating High tone in the disyllabic morpheme. For example in (4.43i) both the disyllabic morpheme and the enclitic have a floating High tone, even though the surface tones do not correspond.

We now look at each group in turn. The enclitics in Group 1 have a High tone: these are the enclitics *-náⁿ* 1HON and *-níⁿ* 2HON. These enclitics always have a High tone regardless of the final tone of the previous morpheme. In the data in (4.44), we see that the floating High of the negative prefix *βàⁿ-* associates with the initial syllable of *kí^ʔíⁿ* ‘go’, replacing the Mid tone. The tone on *-náⁿ* 1HON is the High tone which it sponsors.

4.44. High tone enclitic

tē	βà ⁿ	kí ^ʔ í ⁿ	-ná ⁿ
tē	βà ⁿ (^H)-	kí ^ʔ í ⁿ	-ná ⁿ
and not		go	1HON

I won't go.

Evidence for the claim that neither of the Group 1 enclitics has a floating High tone is shown in (4.45). We see that the initial syllable of *nū^ʔʃī* ‘eyes’ is realised as Mid after *-níⁿ* 2HON. If this enclitic had a floating High tone, we would have expected it to associate with the initial syllable of *nū^ʔʃī* ‘eyes’. These data also show that in MIG final tones of one word do not always spread to the initial syllable of the next.

4.45. No floating tone sponsored by the enclitic

ʃí ^ʔ í	-ní ⁿ	nū ^ʔ ʃī	-ní ⁿ
ʃí ^ʔ í	-ní ⁿ	nū ^ʔ ʃī(^H)	-ní ⁿ
open	2HON	eyes	2HON

Open your eyes...

Group 2 enclitics have surface Mid tones. Two of them, namely $-\delta\bar{e}$ 3MHON and $-i$ 3G do not have a floating High tone⁶; the other pronoun in this group $-j\bar{a}^n$ 3FHON does have a floating High tone. The interesting feature of these three enclitics is that floating High tones sponsored by the previous morpheme associate with them, if and only if the final tone of the sponsoring morpheme is other than High. In (4.46), we see the floating High tone of $\beta\acute{a}\acute{a}^n$ (H) ‘EMPH’ does not associate with $-\delta\bar{e}$, whereas the floating High tone of $n\bar{u}t\bar{f}\bar{i}$ (H) ‘beans’ does. We claim that the floating High of $\beta\acute{a}\acute{a}^n$ (H) EMPH is prevented from spreading to $-\delta\bar{e}$ as there is a High tone associated with the final mora of $\beta\acute{a}\acute{a}^n$ (H).

4.46. Association of floating High tones

tē	βáá ⁿ	-δē	tú	há [?] á ⁿ	-δē	nū̀ ⁿ	nútfī	-δé
tē	βáá ⁿ (H)	-δē	tú	há [?] á ⁿ	-δē	nū̀ ⁿ (H)	nútfī(H)	-δē
and	emph	3MHON	not	go	3MHON	face	beans	3MHON

And he himself did not go to the bean patch

However, it should be noted that there is not a general avoidance of two adjacent High tones in MIG. As we see in (4.47), there are five adjacent tone bearing units with High tones. The floating tone of $\beta\acute{a}\acute{a}^n$ EMPH associates with the enclitic $-t\bar{i}$ 3AN, unlike $-\delta\bar{e}$ 3MHON, for which such an association pattern is prohibited. The enclitic $-t\bar{i}$ 3AN is assigned by Pike to Group 3.

4.47. Series of High tones

tē	átfí	βáá ⁿ	-tí
tē	H-	ātí	βaa ⁿ (H) -tí(H)
and	IPFV	say	emph 3AN

And it said

We now turn to look at the enclitics which Pike assigns to Group 3. Pike divides Group 3 enclitics into two sub-classes on the basis of the surface tonal phenomena. One sub-class comprises $-t\bar{i}$ 1st person, which does not have a floating High tone, and $-t\bar{i}$ 3AN and $-j\bar{a}$ 3DEI, which do. In the case of these three enclitics there is no

⁶ In MIG this enclitic is used for children, as well as objects.

avoidance of two adjacent High tones, so that these enclitics are realised as High following morphemes which have a final High tone and also a floating High tone.

Pike also assigns two other enclitics to Group 3: $-r\acute{\alpha}^{(H)}$ 2nd person and $-j\acute{\alpha}^{(H)}$ 1INCL. As we shall see, the tonal phenomena associated with these two enclitics are different from the others in this group. Pike posits that these two enclitics have a Low tone associated with them. In (4.48), we give the surface tones found on the enclitics $-r\acute{\alpha}^{(H)}$ 2nd person and $-j\acute{\alpha}^{(H)}$ 1INCL following morphemes with different tonal specifications. We group the data according to the surface tone found on the enclitics $-r\acute{\alpha}^{(H)}$ 2nd person and $-j\acute{\alpha}^{(H)}$ 1INCL.

4.48. Surface tones of the enclitics $-r\acute{\alpha}$ and $-j\acute{\alpha}$

	Tones of the morpheme to the left	Tone on the enclitic
a)	H L	L
b)	M L	L
c)	H H	L
d)	L H	L
e)	M L (floating High)	L
f)	H M (floating High)	M
g)	M M (floating High)	M
h)	H M	H
i)	M M	H
j)	L M	H
k)	L H (floating High)	H
l)	H H (floating High)	H

First we see that the surface tones of these enclitics are Low following a morpheme which has a Low tone associated at the right edge or a High tone associated at the right edge. From (4.48f) to (4.48l) we posit that floating High tones do not associate with these enclitics. However, if we assume that these enclitics have a Low tone associated with them, then it is difficult to account for the presence of Mid tones in (4.48f) and (4.48g) and the presence of High tones in (4.48h) to (4.48l).

On the other hand, if we posit that the underlying tone of these enclitics is High, with a floating High, instead of Low with a floating High, then we can account for

most of the surface phenomena much more simply. As the free pronouns *róó* 'you' and *jóó* 'we' have High tones and most enclitics have the same tones as the disyllabic form from which they are derived, this analysis is in keeping with the rest of the data shown in (4.43). In (4.49), we repeat the table from (4.48), but now add the process which we consider gives rise to the resultant surface forms, assuming that the underlying tone is High not Low. These processes are explained following the table.

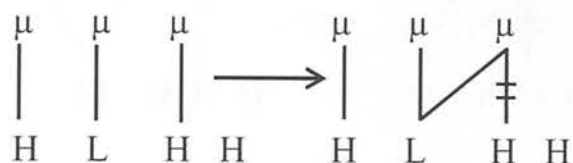
4.49. Surface tones of the enclitics *-ro* and *-jo*

	Tones of the morpheme to the left	Tone on the enclitic	Process
a)	H L	L	Avoidance of Low High sequence; final Low tone spreads to the enclitic.
b)	M L	L	
c)	H H	L	Dissimilation to avoid two adjacent High tones.
d)	L H	L	
e)	M L (floating High)	L	Spread final tone; floating High delinks underlying tone.
f)	H M (floating High)	M	Spread final tone; floating High delinks underlying tone.
g)	M M (floating High)	M	
h)	H M	H	Underlying tone.
i)	M M	H	
j)	L M	H	
k)	L H (floating High)	H	Spread final tone, floating High delinks underlying tone.
l)	H H (floating High)	H	

We now look at each of these processes in turn as they apply to the enclitics *-rǎ^(H)* 2nd person, and *-jǎ^(H)* 1INCL, which we now write according to the new analysis, that is, with a High tone.

First we look at the data in (4.49a) and (4.49b). We posit that there is a prohibition of the sequence Low High, where the Low tone is the final tone of one morpheme and the High tone is that of the enclitic. In (4.50), we see that the tone of the clitic is delinked and the final tone of the host morpheme spreads to the enclitic.

4.50. Avoidance of Low High sequence



Note that although in (4.50) the initial syllable of the disyllabic morpheme has a High tone, the same process occurs when the initial tone is also a Mid or a Low tone. The trigger is the final Low, followed by the High associated with the enclitic.⁷ In (4.51), we see this process at work. The surface tone of $-j\acute{\alpha}^{(H)}$ 1INCL is Low following $h\bar{i}n\bar{i}^n$ 'know'. The floating High tone of $-j\acute{\alpha}^{(H)}$ associates with the complementiser $h\grave{a}^{(H)}$.

4.51. Surface Low tone on $-j\acute{\alpha}^{(H)}$ 1INCL

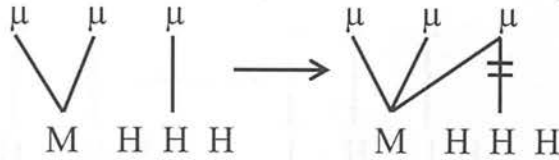
$\beta\bar{i}n\bar{a}^n$	$t\bar{e}$	$n\bar{i}^n-$	$h\bar{i}n\bar{i}^n$	$-j\grave{o}$	$h\acute{a}$	$t\acute{u}-k\acute{a}-$	$j\acute{a}\acute{a}^n$	$\bar{s}i\bar{n}\bar{i}^n$	$\bar{i}s\acute{o}$
βina^{nM}	te^M	$ni^{nL}-$	$hi^M ni^{nL}$	$-jo^{H(H)}$	$ha^{L(H)}$	$tu^M ka^H$	$ja^H a^{nH}$	$\bar{s}ini^{nL(H)}$	$i^M so^L$
<i>now</i>	<i>and</i>	<i>PFV</i>	<i>know</i>	<i>1INCL</i>	<i>COMP</i>	<i>no more</i>	<i>crazy</i>	<i>head</i>	<i>rabbit</i>

And now we know that the rabbit isn't stupid.

We now turn to look at the surface tones of $-r\acute{\alpha}^{(H)}$ and $-j\acute{\alpha}^{(H)}$ following a morpheme which has a floating High tone. From the data in (4.49), we see that floating High tones do not associate with these two enclitics. Not only do floating High tones not associate with the enclitics, but floating High tones also delink the High tone associated with the enclitic, and the final tone of the host morpheme spreads to the enclitic. The floating High tone sponsored by the enclitic is still present and associates with morphemes to the right. This process is illustrated in (4.52).

⁷ In the analysis of MXY enclitics presented in Chapters 6 and 7 we present instances of tone alternations which can be attributed to the avoidance of either the sequence High Low Mid or High Low High.

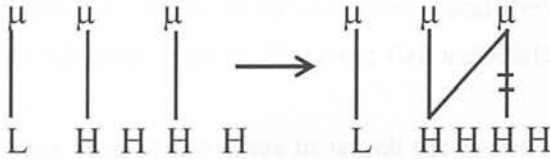
4.52. Effect of a floating High tone on the tones of $-r\acute{\alpha}^{(H)}$ or $-j\acute{\alpha}^{(H)}$



In (4.52), we see that the High tone associated with the enclitic is delinked and the Mid tone associated with the host morpheme associates with it. We claim that this process is only triggered when the morpheme to the left of the enclitic sponsors a floating High tone.

We claim that the processes described for the data in (4.52) also occur when a disyllabic morpheme which has a final High tone and a floating High tone is followed by either $-r\acute{\alpha}^{(H)}$ or $-j\acute{\alpha}^{(H)}$. In (4.53), we see a Low High word with a floating High tone followed by $-r\acute{\alpha}^{(H)}$ or $-j\acute{\alpha}^{(H)}$. Note that in the underlying representation there are four adjacent High tones.

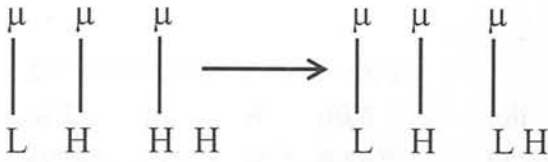
4.53. Final High morpheme followed by $-r\acute{\alpha}^{(H)}$ or $-j\acute{\alpha}^{(H)}$



In order to avoid the criticism that this process may seem rather ad hoc, we would motivate it by pointing out that if we were to follow Pike's analysis that these enclitics had a Low tone, we would have to posit a different ad hoc rule in order to account for the presence of the Mid tone as the surface tone for $-r\acute{\alpha}^{(H)}$ or $-j\acute{\alpha}^{(H)}$ in 4.49. The advantage of the proposed analysis over Pike's is that these two enclitics now form a separate class, distinguished from other enclitics which have a floating High tone by the fact that they, unlike the others, have a High tone.

We now turn to look at the process by which the enclitic has a surface Low tone after disyllabic morphemes with a final High tone and no floating High tone. This scenario is presented in (4.54).

4.54. Dissimilation of High tones

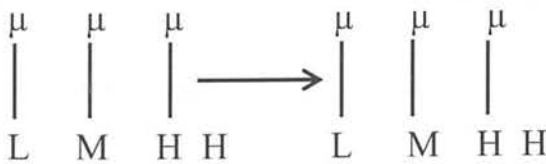


The schema in (4.54) raises two issues which could call in question the analysis just presented. One is the issue of why the final High tone of the disyllabic morpheme does not delink the High tone so that the final High tone would spread as it did in (4.53). We posit that it is only floating High tones that delink tones in MIG.

The other issue which needs to be addressed is why dissimilation does not occur in the cases where the disyllabic morpheme ends in a High tone followed by a floating High tone. In this case we posit that on the tone tier, there is an intervening floating High tone between the High tones associated with the final syllable of the disyllabic morpheme and the High tone associated with the enclitic, as shown in (4.53). In (4.54), on the other hand, the absence of a floating High tone means that the final High of the disyllabic morpheme and the High associated with the enclitic are indeed adjacent; that is, there are two associated High tones, which seem to be the trigger.

We now turn to the cases in which the enclitic occurs with its underlying tone. The schema in (4.55) is representative of the data in (4.49d), (4.49f) and (4.49h). As there is no floating High tone and the disyllabic morpheme ends in a Mid tone, then there are no triggers which would cause alternation of the tones of the enclitic.

4.55. Presence of underlying High tone of the enclitic



This is further illustrated in the data in (4.56) in which we see the enclitic $-j\acute{\alpha}^{(H)}$ with its underlying High following $s\acute{a}'\acute{a}$ 'do'. As this verb does not have a floating High tone, there is no trigger to cause any alternation to the enclitic. Note that in

these data the floating High tone sponsored by $-j\acute{o}^{(H)}$ 1INCL associates with the initial syllable of the numeral $\#^{nM}$ ‘one’.

4.56. Underlying tones of $-j\acute{o}^{(H)}$

$s\acute{a}^? \bar{a}$ $-j\acute{o}$ $\#^{nM}$ $\beta ik\bar{o}$ $l\acute{u}l\acute{i}$
 $sa^{H?} a^M$ $-jo^{H(H)}$ $\#^{nM}$ βiko^{MH} $lu^H li^H$
 make 1INCL one celebration small
We'll organise a small celebration.

There is one more feature of enclitics with a floating High tone that needs to be examined in the light of autosegmental phonology. Pike divides these enclitics into two subclasses based on whether they cause perturbation when they themselves have been perturbed. However, as Pike considers the underlying tones of 1INCL and 2nd person to be Low, then both classes (b1) and (b2) contain enclitics with Low tones. However, under our new analysis, we see that the classes are now formed on the basis of tone, with High tone enclitics forming class (b1) and enclitics with either Mid or Low belonging to class (b2). This is shown in (4.57).

4.57. Proposed analysis

Subclass	Pike's analysis	New Analysis		Pike's Description
Class (b1)	$-j\grave{o}^{(H)}$ $-r\grave{o}^{(H)}$	$-j\acute{o}^{(H)}$ $-r\acute{o}^{(H)}$	1INCL 2	Causes perturbation regardless of whether or not it is perturbed itself
Class (b2)	$-j\bar{a}^{(H)}$ $-t\grave{i}^{(H)}$ $-j\grave{a}^{(H)}$	$-j\bar{a}^{n(H)}$ $-t\grave{i}^{(H)}$ $-j\grave{a}^{(H)}$	3FHON 3AN 3DEI	Causes perturbation only when unperturbed itself

In (4.58), we see that the floating High tone of the enclitic $-t\grave{i}^{(H)}$ 3AN associates with the initial syllable of the following morpheme. When the enclitic follows a word which has a floating High tone, this floating tone associates with the enclitic.

4.58. Association of floating High tones with enclitic

tē nìⁿ stāā -tì sɪ^ʔfⁿ -tì stāā -tì ná^ʔā -tí
 tē nìⁿ stāā -tì^(H) sɪ^ʔfⁿ -tì^(H) stāā -tì^(H) nā^ʔā^(H) -tì^(H)
 and PRV pull 3AN leg 3AN pull 3AN hand 3AN
And it pulled its leg, and it pulled its front paw (lit. hand)

However, as shown in (4.59), when a floating High tone associates with -tì^(H) 3AN, then both the floating High tone, along with the Low tone it sponsors, are deleted. So in (4.59), there is no floating High tone present to associate with *isò* ‘rabbit’.

4.59. Deletion of floating High tone

tē kāhī -tí isò
 tē kāhī^(H) -tì^(H) isò
 and eat 3AN rabbit
and it will eat the rabbit

Taking into account the new analysis, we now summarise the differences and similarities between the two sub-classes of enclitics which have a floating High tone. In the case of all enclitics which have a floating High tone, a floating High tone from the morpheme to the left delinks the underlying tone of the enclitic. The differences arise from the fact that enclitics of subclass (b1) do not permit a floating High tone to associate with them, as they already have a High tone as well as a floating High tone underlyingly. Enclitics of subclass (b2), on the other hand, have either a Mid or a Low tone underlyingly so the floating tone sponsored by the morpheme to the left associates with them. Another difference is that in the case of subclass (b1) the floating High tone sponsored by the clitic remains even when a floating High tone associates with the enclitic.

The enclitic *-jǎ^(H)* in certain contexts is reduced to *-ó*. If the morpheme which precedes it is of the form CVV with like vowels, then the vowel of the enclitic associates with the second vowel position. When this happens, the tone associated with the enclitic is that of the second TBU of the morpheme, not the tone of the enclitic. This process is illustrated in (4.60).

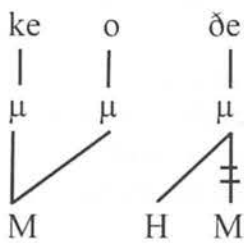
4.60. Association of vowel initial clitics

	néʔó		nú ⁿ	βà ⁿ -	níʔ ⁿ ò		-ðé	kēō		-ðé
H-	nèʔé	-jó ^(H)	nú ⁿ	βà ^{n(H)} -	níʔ ⁿ	-jó ^(H)	-ðe	kēē ^(H)	-jó ^(H)	-ðē
IPFV	see	1INCL	if	not	obtain	1INCL	3MHON	eat	1INCL	3MHON

We'll see if we can't grab him and eat him

We see that the three verbs in the sentence in (4.60) are of the word template CV: (given that unlike Pike's analysis we consider that glottal stop is a feature of the vowel). In each case, the reduced form of the enclitic $-j\alpha^{(H)}$ associates with the second syllable position of the verb root, and it also associates with the tone that is associated with that syllable. This is further illustrated in (4.61).

4.61. Tone association for the phrase 'we will eat him'



In (4.61), we see that the verb root $kēē^{(H)}$ 'eat' is reduced to $kē$. The reduced form of the enclitic $-\alpha^{(H)}$ now fills the second vowel position of the verb root, giving the surface form $kēō$. The floating High tone, sponsored either by the verb root or by the enclitic, associates with the enclitic $-ðē$ 3MHON.

In this section we have presented an alternative analysis to the phenomena of the surface tones of the enclitics in MIG. While this analysis is based on limited secondary data, it does provide a way for accounting for the variation in tone associated with the enclitics. Under this new analysis we posit a different set of groupings for the enclitics in MIG, based not only on the surface tones but also on the presence or absence of floating tones. These groups are presented in (4.62) on the next page.

4.62. Proposed groupings of MIG enclitics

Description	Enclitic	Gloss
High tone enclitics with no floating High tone. These enclitics always occur with a High tone.	-ná ⁿ -ní ⁿ	1HON 2HON
These enclitics occur as Mid, except when the host morpheme has a floating High tone and the final tone of that morpheme is other than High. In these cases and these cases alone the enclitic has a High tone.	-ǎē -ī	3MHON 3G
This enclitic exhibits the same surface tonal phenomena as the other two Mid tone enclitics above. The only difference is that this enclitic has a floating High tone which associates with the following morpheme when and only when this enclitic occurs with its underlying tones, that is with a surface Mid tone.	-jā ^{n(H)}	3FHON
This enclitic occurs as Low following a morpheme which does not have a floating High tone. However, when the host morpheme does have a floating High, this tone associates with the enclitic, deleting the Low tone.	-rì	1
Floating High tones associate with these enclitics with no restrictions. However, the floating High tone which associates with them delinks both the Low tone and the floating High tone sponsored by the enclitic.	-tî ^(H) -jà ^(H)	3AN 3DEI
The complex surface tonal phenomena for these enclitics is detailed above. In summary it can be said that floating High tones do not associate with these enclitics but rather delink the sponsored tone and then the final tone of the host morpheme is also linked with the enclitic. There is also a prohibition on the sequence Low High, in which case the enclitic is realised as Low, and a prohibition of High High in which cases the enclitic is realised as Low.	-jó ^(H) -ró ^(H)	1INCL 2

4.4.2 MIG verbal prefixes

We now turn to look at further data presented by K Pike which can be better understood in an autosegmental framework. In this section we examine data presented by Pike which show that although enclitics and their hosts may be multiply linked with one tone, this spreading of tones does not occur in the case of verbal prefixes and the initial syllables of verb roots.⁸ We claim that the spreading of tones between enclitics and their hosts is a result of phonological processes which leave the enclitic toneless. As no such processes are at work between verbal prefixes and their hosts, then spreading does not occur.

4.4.2.1 The perfective prefix

First we illustrate this phenomenon by presenting data that includes both the verb root and the perfective prefix *nìⁿ*. Following this prefix the tones of the verb root are that of the irrealis verb root. In (4.63), *nìⁿ* occurs with the verb *hāà* ‘arrive’.

4.63. No spread of Low tone to a Mid Low verb

tē	nì ⁿ -	hāà	βá [?] ù
tē	nì ⁿ -	hāà	βá [?] ù
and	PFV	arrive	coyote
		<i>and the coyote arrived</i>	

It could be assumed that the lack of spreading in (4.63) is due to the presence of the Low tone on the verb. But in (4.64) and (4.65) we give examples of verbs which do not have a Low tone and in these cases also the tones on the verb root are identical to that of the irrealis form. In (4.64), the irrealis form is Mid Mid and the verb is Mid Mid after the perfective prefix. Likewise in (4.65), the verb has a High Mid pattern in the irrealis and also High Mid after the prefix *nìⁿ*.

⁸ As was noted in Chapter 2, Pike does not consider these verbal morphemes to be prefixes but dependant words. Mak (1950) refers to them as verbal auxiliaries. However, as the morphemes plus the verb root form a phonological domain, and these morphemes can only occur with verbs and in a given order, we consider them to be prefixes.

4.64. No spread of Low tone to a Mid verb

tē nìⁿ- kī[?]īⁿ -ǎē
 tē nìⁿ- kī[?]īⁿ -ǎē
 and PFV take 3MHON
and he took...

4.65. No spread of Low tone to a High Mid verb

tē nìⁿ- sá[?]ā -ǎē ĥⁿ kàsī lúlí
 tē nìⁿ- sá[?]ā -ǎē ĥⁿ kàsī lúlí^(H)
 and PFV make 3MHON one pot small
and he made a small pot

In (4.66), we present the perfective form of the verb ‘notice’. This verb has an initial /k/ in the irrealis form *kōtō* and initial /h/ in the imperfective form *hītō*. However, the imperfective form is not mono-morphemic as the High tone on the initial syllable is the prefix which marks the imperfective. Note that the perfective prefix *nìⁿ-* occurs with the form which has /h/ initially. In the perfective the /h/ initial stem is associated with the underlying tones of the verb root, which is Mid in this case. The perfective prefix associates with this form.

4.66. Association of the perfective prefix with the /h/ initial form

tē nìⁿ- hītō -ǎē
 tē nìⁿ- hītō -ǎē
 and PFV notice 3M
and he noticed

The data in (4.67) show that there is no prohibition of adjacent Low tones. In these data the prefix *nìⁿ-* occurs with a verb which has a Low tone on the initial syllable.

4.67. No prohibition of adjacent Low tones

nìⁿ- kàβī̄ -tì̄ tʃíí nū́tǎ̄
nìⁿ- kàβī̄ -tì̄^(H) tʃíí nū́tǎ̄
PRV enter 3AN beneath water

It went down into the water.

The fact that the Low tone of the perfective prefix *nìⁿ-* does not spread to the initial syllable of the verb root is an important fact to consider in the analysis of the status of Mid tones in MIG. If all Mid tones are not present in the underlying representation, then we need to account for the fact that the Low tones do not spread. For example, we could claim that there was some prohibition against the Low tones of the prefix spreading. However, if we claim that the Mid tones are present, then the lack of spreading is simply due to the fact that all the tone bearing units are associated with tones, so no repair strategy is called for.

4.4.1.2 The plural prefix

In MIG the verbal prefix *kà-* indicates that the subject of the verb is plural. Examples are given in (4.68).

4.68. Occurrence of the plural prefix

nìⁿ- kà- jēē -ǎ́é
nìⁿ- kà- jēē^(H) -ǎ́ē
PFV PL eat 3MHON

They ate.

When the plural prefix co-occurs with a verb in the imperfective, the floating High tone of the imperfective prefix associates with the plural morpheme, and not the verb root. This is illustrated in (4.69). Note that the High tone associated with the prefix does not spread to the verb root.

4.69. Floating High of the imperfective associated with the plural marker

βà ⁿ	βáni ⁿ	īsò		ká-	jēē	núŋi	-ní ⁿ
βà ^{n(H)} -	βáni ⁿ	īsò	H	kà-	jēē ^(H)	nūŋi ^(H)	-ní ⁿ
not	just	rabbit	IPFV	PL	eat	beans	2HON

And it isn't just the rabbits who are eating your beans

In (4.70), the plural prefix occurs with a High tone, preceding the verb *hākū* 'laugh'. That is, the floating High tone of the imperfective associates with it. In these data the plural prefix also occurs following the perfective prefix which in these data has a floating High tone associated with it. Note that the tone of the plural prefix *kà-* remains Low, following the perfective marker.

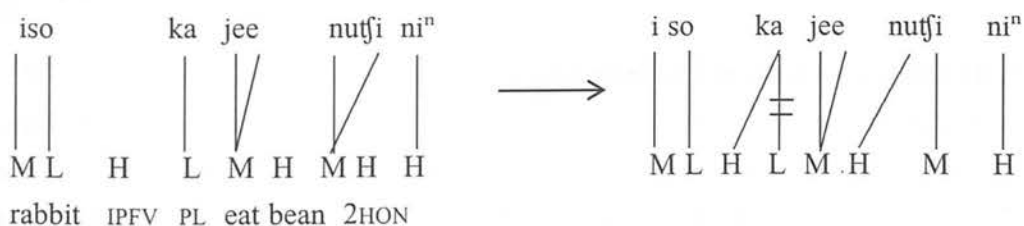
4.70. Association of tones with the plural prefix

tē		ká-	hākù	-ðē	hà	ní ⁿ -	kà-	sá [?] ā	-ðē	hí ⁿ	sūtú
tē	H	ká-	hākù	-ðē	hà ^(H)	ní ⁿ -	kà-	sá [?] ā	-ðē	hí ^{n(H)}	sūtù
and	IPFV	PL	laugh	3MHON	COMP	PFV	PL	do	3MHON	with	priest

and they were laughing at what they had done to the priest

We have seen in (4.69) and (4.70) that the floating High tone prefix which marks the imperfective delinks the Low tone associated with plural prefix *ka-*. Note that the High tone associated with *ka-* does not spread to the verb root *jee* 'eat', nor does the delinked Low tone associate with the verb root. In (4.71), we illustrate these processes.

4.71. Delinking of the Low tone of the plural prefix *kà-*



It is the RABBITS that are eating your beans.

From these data we conclude that tones in MIG do not spread and delete tones that are already associated with the initial syllable of the following morpheme, unless spreading would provide a tone for a TBU that has become toneless as the result of some phonological process such as we saw in Section 4.4.1 on enclitics. As

there is no evidence to the contrary, we assume that the Mid tone associated with the initial syllable of *īsò* ‘rabbit’ is present in the underlying form. Also in the diagram in (4.71), we have assumed that there is only one Mid tone linked to both TBUs of *jēā^H* ‘eat’.

This leads to the question of whether one tone can be multiply linked to two TBUs in a morpheme. We have presented data to show that words which are Mid in isolation have the surface form High Mid when a floating High tone associates with them. It would be possible for there to be two Mid tones present underlyingly and that the initial one be delinked. Or there could be just one, and the association of a floating High tone results in the underlying Mid tone only being linked to one TBU. Although we have assumed such a scenario in the diagram in (4.71), there is no unambiguous evidence to substantiate this claim.

It is also not possible to determine whether words which are pronounced High High have one or two tones linked with them. We have seen that MIG does permit floating High tones to associate with words which already have a High tone associated with them, so it could be possible that in the data in (4.72), two High tones are present.

4.72. One High tone or two?

sáá	‘thus’
jáá ⁿ	‘crazy’
háá	‘new’
hí ^m	‘with’
sókó	‘water spring’
βíló	‘lizard’

We have seen that there are disyllabic morphemes in MIG that have either High or Mid on both syllables although there are no morphemes which have two Low tones in their isolation form. Whether these are one tone linked to two TBUs or two tones is impossible to determine from the data which are available.

CHAPTER 5

MIXTEC TONE CATEGORIES

The aim of this chapter is to demonstrate that the membership of tone categories in Mixtec varieties is relatively stable, even though the surface tonal phenomena vary considerably. Comparison of tonal data from different Mixtec varieties shows that words form classes, membership of which is based on underlying tones. Although there may be segmental variation across varieties, the underlying tones for the word for 'tortilla' are the same as the underlying tones for 'grains of corn', but the underlying tones on the word for 'beans' are different from both 'tortilla' and 'grains of corn'. An understanding of these groupings can then serve as the backdrop for the analysis of the tone system of any Mixtec language.

The model for our examination of Mixtec tone systems comes from Chen (Chen 2000). He points out that knowledge of the Middle Chinese categories is crucial to the understanding of present day dialects (Chen 2000). He also shows that although tone patterns may differ greatly from one Chinese dialect to another, there is a remarkable degree of correspondence between varieties.

In this chapter we show that a similar phenomenon occurs in Mixtec varieties whereby knowledge of the tone system of other varieties can shed light on tonal analysis of a particular variety. We claim that just as words in Chinese varieties can be classified into categories based on the tones of Middle Chinese, so words in Mixtec varieties can be classified into groups based on the tonal group to which they belonged in some previous stage of the development of Mixtec varieties which we will call Proto-Mixtec. However, more research is needed to determine whether this stage can actually be equated with Proto-Mixtec or with some unnamed intermediate stage. We show in subsequent sections that there has been very little change in the underlying tones in Mixtec varieties.

There have been few published papers comparing tonal phenomena between Mixtec varieties. Some problems faced by any researcher is the confounding array of different surface tone patterns on words between varieties, the perplexing variety of surface tone patterns on some words depending on their context within a variety, and the lack of comparative data. However, looking at the underlying tones in a number of varieties and positing some diachronic as well as synchronic phenomena

can yield a surprisingly clear explanation of these differences in tone. The analysis in this chapter is based on a database of 115 items collected from 12 varieties.

In Section 5.1 we review two reconstructions of Mixtec tone; in Section 5.2 we compare data from different varieties of Mixtec to show that there are correlations between the tonal patterns of one variety with those of another; and finally in Section 5.3 we demonstrate the stability of membership of the tonal classes.

5.1. PREVIOUS SYNCHRONIC COMPARISONS

We now turn to look at comparative studies and reconstructions of Mixtec tone. Unlike Chinese, there are no ancient records of Mixtec which shed light on the tone systems of earlier stages of development. Pre-Hispanic Mixtec codices, documenting mainly wars, marriages and genealogical information, are presented in pictures, not alphabetic form. Early Mixtec documents, such as de los Reyes *Arte en Lengua Mixteca* or de Alvarado's dictionary (both published in 1593) do not write tones, although de los Reyes makes a reference to 'accent'. The absence of documentation of previous stages of tonal development means that in order to reconstruct Proto-Mixtec tone, researchers must rely exclusively on synchronic data. In this section we first consider existing published papers which compare tonal phenomena from more than one Mixtec variety; then we present a summary of two different reconstructions of Mixtec tone.

5.1.1. Previous comparative studies

There are few comparative studies of Mixtec tone. Two Mixtec varieties, MIG and MIB, are compared by Mak (1953) and a third, MIE, was added to the comparison in Mak (1958). Much of the content in both of these papers is devoted to detailing the complex surface tonal alternations of these three varieties, and the strength of these papers is Mak's attention to fine phonetic detail. MIG and MIE are reported as having three contrastive levels, whereas MIB has four. For ease of comparison we call this fourth level "Lowered-Mid", symbolised as Λ , or as a dieresis on the vowel on which the tone occurs. Note that in the following table, Lowered-Mid is restricted to two tone patterns: High Lowered-Mid and Low Lowered-Mid (the latter optionally occurring as Low Mid). In (5.1), we give the correspondences in tone patterns between MIG, MIB and MIE.

5.1 Comparison of the tone systems of MIG, MIB, MIE

	H-H	H-M	H-L	M-H	M-M	M-L	L-L	L-M	L-H	H-Λ	L-Λ or L-M
MIG	✓	✓	✓	✓	✓	✓		✓	✓		
MIB	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
MIE	✓	✓	✓	✓	✓	✓	✓	✓	✓		

In (5.1), we see that there are eight tone patterns found on two-syllable morphemes in MIG and MIB; that is, all the logical two-tone combinations of High, Mid and Low are present except for Low Low. On the other hand Low Low is present in MIE. In MIB, there are tone patterns not attested in the other two varieties as this variety has a fourth level, Lowered-Mid. The level appears only as the second element in High Lowered-Mid and Low Lowered-Mid tone patterns. The absence of Low Low from both MIG and MIB leads Mak to conclude that Low Low is not a basic tone pattern in Mixtec, citing Longacre (1957). Mak notes that morphemes which in MIE are Low Low are, on the whole, Mid Low in MIG and either Mid Mid or Mid Low in MIB. In (5.2), we give Mak's examples of data which show this correlation.

5.2 Correlation of Low Low with Mid Low

	MIE		MIG		MIB		
a)	nùn ⁿ	L L	nūn ⁿ	M L	nūn ⁿ	M L	'corn'
	tàtà ⁿ	L L	tānà ⁿ	M L	tātà ⁿ	M L	'medicine'
	βi ⁿ² nè	L L	βi ²ⁿ tʃà	M L	βi ² nè	M L	'prickly pear cactus'
b)	jūù ⁿ	M L	jūù ⁿ	M L	jūū ⁿ	M M	'town'
	sāà	M L	t̄sāà	M M L	sāā	M M	'bird'
	jū ² ù ⁿ	M L	jū ² ù ⁿ	M L	jū ² ù ⁿ	M L	'fire'

In (5.2), we see that in MIE there is a contrast between words which have a Low Low tone melody as shown in (5.2a) and those which have a Mid Low tone melody shown in (5.2b), a tone melody being the tone pattern sponsored by a morpheme. This contrast is absent in MIG, where all these words have a Mid Low tone pattern. In the case of the MIG form for 'bird', we consider that this word is a compound of

the animal prefix *t̄* - plus the word *sā̀à*. For MIB we see that in (5.2a), the words have a Mid Low tone pattern, whereas the data in (5.2b) have either a Mid Mid pattern, or a Mid Low pattern. There are important aspects to note in the data in (5.2): the contrast between two of the MIE tone patterns is lost in MIG; also these data do not indicate whether there are any floating tones or not. It is not that Mak ignores perturbation, but rather that she did not always indicate the class to which morphemes belong. The MIB data are very interesting, since two of the words shown have a Mid Mid tone pattern. Alexander (1980) reports that the word *jū̀ū̀* 'town' belongs to class (c): that is, words which can perturb the following word to lower, suggesting that there is a floating Low tone in these words.

In Chapter 2 we looked at Mak's (1958) comparison of tone perturbation in the three varieties. We summarise this again briefly here. Following Pike, Mak divides words into classes based on the effect they may have on the morpheme to the right. Class (a) morphemes have no effect on the following morpheme; class (b) morphemes perturb them to a higher tone; and class (c) morphemes perturb them to lower. Note that this last class (c) is found almost exclusively in MIB, the variety which has four levels. Another important part of Mak's analysis is her observation that tone alternations behave differently in certain syntactic constructions which she refers to as "special sequences". She points out that in MIG, perturbation to higher occurs in all syntactic constructions. In MIB, on the other hand, there is perturbation to higher after class (b) morphemes, perturbation to lower after class (c) morphemes and also a special perturbation in certain "special sequences." Perturbation in MIE is limited to these special sequences. Mak lists these special sequences as:

- noun + descriptive adjective
- head nouns + noun or (rarely) verb acting as a descriptive modifier
- locational or introductory noun + noun or dependent clause
- head verb + noun modifier.

Mak gives examples of these special sequences with data from all three varieties. In these data we see the presence of floating High tones which only are apparent in these sequences. In (5.3) we see that none of the isolation forms of the word have a High tone associated with them. However, in the surface form of the phrase, all varieties have a High tone associated with *tata* 'offspring'. In MIE and MIG, the High tone is associated with the second syllable whereas in MIB there is a Mid-High glide on the first syllable and a Mid tone on the second of *tata*.

5.3 Evidence for floating High tone in MIE, MIB and MIG

	<i>corn grains</i>		<i>offspring</i>		<i>seed corn</i>
MIE	nùni ⁿ	+	tàtà	→	nùni ⁿ tàtá
MIG	nūni ⁿ	+	tàtà	→	nūni ⁿ tàtá
MIB	nūni ⁿ	+	tātā	→	nūni ⁿ tātā

There are examples in Mak (1958) where MIE has a High tone in the surface form but MIG and MIB do not. For example, in (5.4), we see that the tone pattern on 'hand' in MIE is Mid High, but in MIG and MIB there is a Mid tone associated with both syllables. However in the output form of 'prickly pear cactus branch' all three varieties have a High tone associated with the initial syllable; MIE and MIG have a Low tone associated with the second syllable, but MIB has a High tone associated with both syllables.

5.4 Evidence for floating High tone in MIB and MIG

	<i>hand</i>		<i>prickly pear cactus</i>		<i>prickly pear cactus branch</i>
MIE	nā [?] á	+	βi ^{n?} nè	→	nā [?] á βi ^{n?} nè
MIG	nā [?] ā	+	βi ^{n?} ɬà	→	nā [?] ā βi ^{n?} ɬà
MIB	nā [?] ā	+	βi [?] nè	→	nā [?] ā βi [?] né

These data are illustrative of a problem in studies of Mixtec tonal phenomena. Often floating tones, especially High tones, are not evident in surface forms in some varieties, but the cognate word in another variety may or may not have a High tone associated with it. Another problem is that floating tones may only be evident under certain circumstances, such as the special sequences documented by Mak.

5.1.2. Proto-Mixtec tone

Having looked briefly at Mak's analysis of the tone systems of three Mixtec languages, we now turn to we look at two published studies of Proto-Mixtec tone. First we look at Longacre's doctoral study, and secondly we look at Dürr (1987).

5.1.2.1. Longacre (1957)

Mak's research provides one of the main sources for Longacre's reconstruction of Proto-Mixtec tone, to which we now turn. Longacre (1957) has one chapter on Proto-Mixtecan tone in his monograph on Proto-Mixtecan. Longacre reconstructs four tone levels for Proto-Mixtecan. He claims that these four levels are reduced to three in Proto-Mixtec. He bases his analysis of Proto-Mixtec tone on data from MIB and MIG. Recall that MIB has four levels and MIG has three. A feature shared by these two varieties is the absence of Low Low sequences. Longacre claims that the Lowered-Mid in MIB is an innovation. In his cognate sets, High tone is absent, other than in sandhi forms. He finds correlation between Mixtec words which have Mid Mid, Mid Low and Low Mid tone patterns with other Mixtecan varieties, namely Cuicatec and Triqui. He claims that Mid Low in opposition to Low Mid reflects the difference in Proto-Mixtecan between falling and rising tone sequences. Longacre also concludes that Low Low is an innovation in Mixtec.

It is important to note that Longacre posits that some tone patterns, and even tone levels, are restricted to sandhi forms: that is, tone patterns which occur only when the words are perturbed in some way. He gives examples of Proto-Mixtecan sandhi forms which correspond to data from MIB, which has a High tone, although there are no High tones present in other cognate sets which are not sandhi forms.

The research done by Longacre on Proto-Mixtecan tone is used by Rensch (1976) in his work on Proto-Otomanguean phonology. Rensch does not shed any additional light on Proto-Mixtec tone, although one important contribution by Rensch is his suggestion of a link between High tone and final glottal stop for another Oto-Manguean language family (an issue which we do not pursue here).

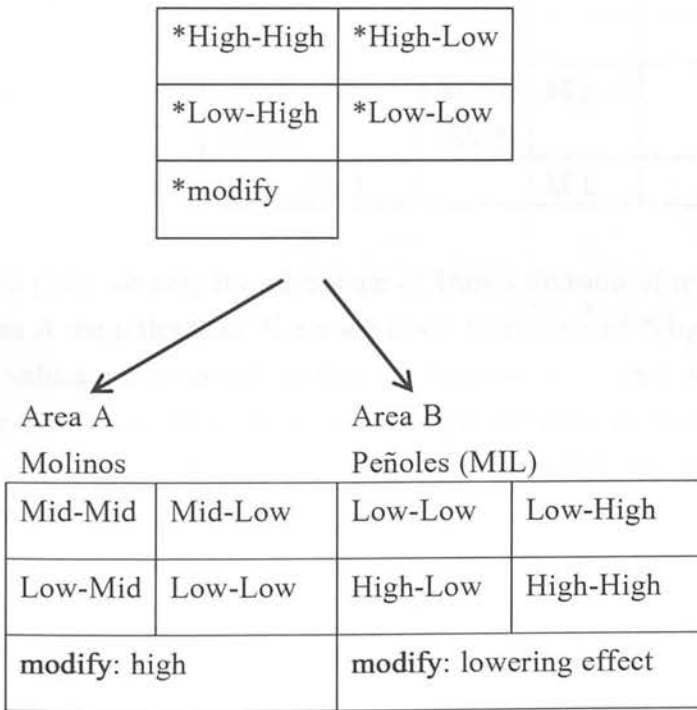
5.1.2.2. Dürr (1987)

We now turn to examine a more recent study of comparative Proto-Mixtec in Dürr (1987). His reconstruction is based on previously published data from 17 varieties of Mixtec. He reconstructs two tone levels: *Low and *High. (Note that Dürr's

*High corresponds to Longacre's *Mid.) This gives four basic patterns for Proto-Mixtec: *High-High(?), *Low-Low(?), *Low-High and *High-Low. Note that it is only the tone patterns with two identical tones that can occur with a final glottal stop. He also adds an additional tone feature, [+/-modify], which is restricted to tone sandhi. In this analysis he follows Daly (1973a). In Dürr's analysis, words that are High High or Low Low are specified as to the feature [tone modification]. This feature correlates with final glottal stop in MIY.

As these source works were not published with the intent of being compared one with the other, there are many gaps in Dürr's cognate sets. However, with the data available, he points out that in some varieties, it seems that proto-High and proto-Low have been switched. This leads Dürr to divide Mixtec varieties into two groups: Area A, for which he gives Molinos Mixtec as an example, and Area B, for which he gives Peñoles (MIL) as an example.¹ Dürr gives the figure presented in (5.5) to show his proposed correspondences.

5.5 Dürr's proposed correspondences



¹Molinos Mixtec, which was documented by Hunter and EV Pike (1969), does not have an Ethnologue code.

Dürr defines Area B as varieties in which the reflex of *Low-Low is higher than the reflexes of *High-High. As we see in the chart above, *High-High corresponds to Low-Low in Peñoles, but Mid-Mid in Molinos. Note that the feature [+modify] in Area B results in the lowering of tones to the right, whereas in Area A the feature [+modify] results in the raising of tones.

He presents data to show the correlation between the surface tone patterns. In (5.6), we present a summary of the reflexes that Dürr documents for each of his Proto-Mixtec tone classes. For simplicity's sake we have excluded patterns found in only one variety.

5.6 Correspondences between Dürr's reconstruction and synchronic data

	Area A					Area B		
*High High [?]	M H	M M (Mod)	M M	M L (Mod)	M L	L L (Mod)	L L	
*High High			M M				L L	
*High Low	M M	M L				L H		
*Low High	L M					H L		
*Low Low [?]	L L (Mod)	L L	M L (Mod)	M L		H H (Mod)	H H	
*Low Low		L L		M L			H H	

First in (5.6) we note the advantage of Dürr's division of reflexes into two groups: in Area A the reflexes of *Low are lower than those of *High. In Area B, however, these values are reversed, so that we find that tones that correspond to *Low are higher than those that correspond to *High. We also see that the feature [+modify] only occurs in tone melodies for which a final glottal stop is proposed in the Proto-Mixtec form. This is in keeping with his analysis that the word final glottal stop is the source of floating High tones. We also note that there is a greater variety of reflexes for tone patterns for which Dürr proposes a final glottal stop in his proto-forms. This is reminiscent of the situation documented by Chen (2000) for Beijing Mandarin for which the loss of the coda consonant from Tone IV resulted in items belonging to that grouping having many different reflexes.

Dürr also claims that Proto-Mixtec had non-basic tonemic couplets; that is, disyllabic morphemes which have undergone tone sandhi may exhibit surface tone patterns not found on any morpheme in isolation. In this, he is following Longacre, Mak and others, including K Pike (1948), who have pointed out that certain tone

patterns never occur on words in isolation, only in longer utterances where the words have been perturbed by the morpheme to the left. He suggests that Proto-Mixtec had two different forms of tone sandhi: one in which at least one tone was modified, and the other in special syntactic constructions in which both tones often were modified.

The studies carried out by Longacre and Dürr come with different theoretical assumptions which reflect the linguistic scene at the time in which they were written. For example, as Longacre himself readily acknowledges (personal communication), it seems totally inadequate to use data from only two varieties to reconstruct Proto-Mixtec tone. However, in the late 1950's the extent of the variation within the Mixtec language family was not yet documented. In the case of Dürr's reconstruction, the concepts found in autosegmental phonology enable him to posit the idea of floating tones. The main limitation is that in his secondary sources, floating tones are not indicated. However, it seems that his reconstruction of two tone levels for Mixtec is a better analysis than the three reconstructed by Longacre, as we demonstrate below in Section 5.3.

5.2. SYNCHRONIC COMPARISON OF MIXTEC TONES

We now turn to examine new comparative data to document the correspondences in tone patterns between different Mixtec varieties. This comparison leads us to posit that words in Mixtec can be divided into tone categories. This study is based on a data corpus of 115 items. The items were chosen to reflect the different surface tone patterns exhibited in Mixtec in general. In some cases the data are from previously studied works, but in most cases the data are either from unpublished manuscripts or data which have been recorded for the purposes of this study. It was not possible to collect all 115 items from all the 12 varieties in this study. A thorough comparative study would merit much more study but is outwith the scope of this thesis.

Although most modern day Mixtec varieties have three contrastive levels: High, Mid and Low, there are some varieties which have four levels. The fourth level, phonetically between Low and Mid, often corresponds to a sequence of Mid Low or Low Mid in other varieties. In this thesis we refer to this fourth level as Lowered-Mid (Λ). In the transcription of surface tones, this level is represented by a dieresis, for example, \ddot{a} . In (5.7), we give examples of Lowered-Mid on both

syllables of mono-morphemic words in XTA. Note that these correspond to either a Mid Low or a Low Mid pattern in MIG.

5.7 XTA Lowered-Mid

	MIG	XTA	
a)	kùjū ⁿ	küjü ⁿ	'meat'
	kàā	kää	'metal'
	kù [?] ā	kü [?] ä	'amount'
b)	kākà	käkä	'quick lime'
	sāà	sää	'bird'
	tṣā [?] ā	tṣä [?] ä	'gourd'

Not all four-level systems can be attributed to the fusion of Mid and Low on one syllable. For example, MEH also has four levels. However, in this case the two lowest levels correspond to Low and Mid in other varieties; High corresponds to High in other varieties. However, the highest level, Extra High, seems to have a limited distribution. In the data used for this study, this level is restricted to syllables following a glottal stop. Although the MEH data presented in the rest of this chapter do not have any forms with Extra High, we give some examples in (5.8); note that Extra High is represented by the symbol ! after the vowel.

5.8 MEH Extra High

MIG	XTA	MEH	
M ^(H)	M H	ME	
kāsī ^(H)	kāsí	kāsi! [?]	'cat'

We now turn to data which show a correlation between floating High tones, word final High tones, and word final glottal stop. In (5.9), we show examples of the surface forms found in isolation which demonstrate this correspondence. Note that in MIY there is a final glottal stop; in XTA there is a final High tone and in MIG a floating High. The data in (5.9a) are given for comparison. Note that for all varieties in (5.9a) each syllable has the same tone: Low Low in the case of MIY and Mid Mid in the cases of XTA and MIG. In (5.9b) we see that the surface tone patterns on these words are also different: MIY has a Low Mid tone pattern; XTA

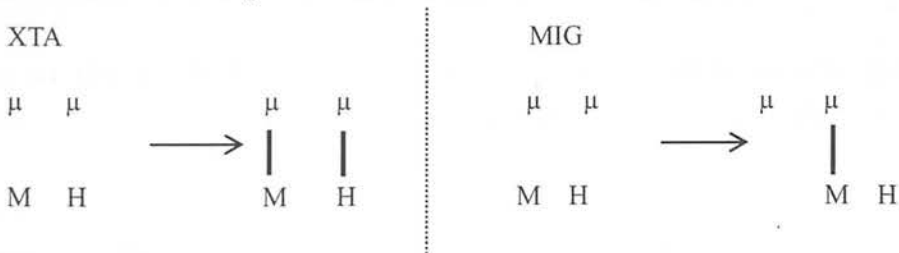
has a Mid High tone pattern: and MIG has Mid Mid with a floating High tone. We also note that MIY is the only variety that has a final glottal stop.

5.9 Correlation between final glottal stop, final High and floating High

	MIY	XTA	MIG	
	L L	M M	M M	
a)	βì [?] è	βē [?] ē	βē [?] ē	'house'
	L M [?]	M H	M M ^(H)	
b)	kìtí [?]	kítí	kī ^(H) tí	'animal'
	nù [?] tǎí [?]	nū [?] tǎí	nū ^(H) tǎí	'beans'
	βìkō [?]	βìkó	βìkō ^(H)	'fiesta'
	jù [?] ú [?]	jū [?] ú	jū ^(H) ú	'mouth'

The data in (5.9) provide two important insights into Mixtec tone: final glottal stop in MIY corresponds to a High tone in XTA and MIG. However, this High tone is not always present in the surface form of its sponsoring morpheme. One way to account for the surface differences between XTA and MIG is to posit that although they have the same underlying tones, the alignment conventions are different, as shown in (5.10).

5.10 Difference of alignment conventions between XTA and MIG



In (5.10), we see that both XTA and MIG have a Mid High tone pattern in the underlying form. However, in the surface form, XTA aligns the tones with the TBUs left to right. In MIG, on the other hand, we posit that the tones are aligned at the right edge, thus leaving the High tone unassociated. It is impossible to tell

whether the underlying Mid tone is associated with both TBUs, as shown in the figure, or whether a default Mid tone is inserted.

The data in (5.9) and (5.10) are illustrative of an important factor when comparing different varieties: the underlying correspondences may be masked by the surface isolation forms.

So far we have compared words that have a final glottal stop in MIY with words which in XTA have a Mid High tone pattern. We also find a similar correlation between the presence of glottal stop in MIY with a final High tone in XTA when we compare words which are Mid Low with a final glottalised vowel in MIY and are Low High in XTA. In the data in (5.11), we have included data from MJC as it exhibits a different strategy from MIG to avoid a Low High tone pattern on these words.

5.11 Comparison of words with final Low tones

	MIY	MJC	XTA	MIG	
	ML	LL	LL	ML	
a)	βíkà	kùkà	k ^w íkà	kūkà	‘comb’
	sūtù	hùtù	sùtù	sūtù	‘priest’
	ML [?]	LL ^(H)	LH	ML ^(H)	
b)	nūnì ^{n?}	nùjì ^{n(H)}	nùnì ⁿ	nūnì ^{n(H)}	‘corn grains’
	kōō [?]	kòò ^(H)	kòó	kōō ^(H)	‘snake’

First we see that for MIY, all the words in (5.11) have a Mid Low tone melody, noting that words in (5.11b) have a final glottal stop. In MJC, the words in (5.11a) have a Low tone melody, whereas the words in (5.11b) have a Low tone melody with a floating High tone. Note that in MJC there are no words with a Low High tone pattern. In XTA, words in (5.11a) have a Low tone, and those in (5.11b) have Low High. In MIG, words in (5.11a) are Mid Low and those in (5.11b) are Mid Low with a floating High tone.

So far in this section, we have seen data in which the contrast in MIY between the absence and presence of final glottal stop corresponds to the absence and presence of a High tone in other varieties. However, with some other tone patterns,

there is not a one-to-one correlation between the varieties. A good example of this are words which are Low in MIY. Examples are given in (5.12).

5.12 Comparison of MIY Low Low words

	MIY	MJC	XTA	MIG	
a)	L L	M M	L M	L M	
	kìsì	kīsī	kìsī	kīsī	'cooking pot'
	βà'à	βā'ā	βà'ā	βā'ā	'good'
b)	L L	M L	M M	M L	
	ìtù	ītù	ītù	ītù	'cornfield'
c)	L L	H M	Λ Λ	M L	
	tùtù	tútù	tütü	tütü	'paper'

In (5.12), we see that for these data, it is only MIY which has the same tone pattern on each item. In the case of the other varieties, MJC has three different patterns; XTA has three; and MIG has two patterns. The question arises as to how many tone patterns should be reconstructed for these data; or to put it in different terms, does the Low Low pattern in MIY represent a merger or do the other varieties demonstrate splits? Rather than re-construct the tone patterns for these words, we now show that insight is gained into Mixtec tonal phenomena by positing that words belong to different tone categories. As will be shown below, the evidence suggests that there has been a merger of tone patterns in MIY.

5.3. PROPOSED MIXTEC TONE CATEGORIES

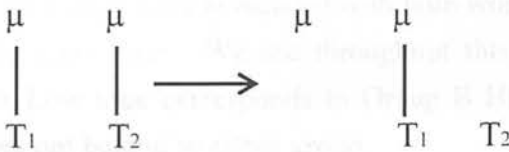
We use the division of Middle Chinese tone patterns as the model for dividing Mixtec morphemes into tonal categories. Careful comparison of comparative data leads us to posit that there were six categories in Proto-Mixtec. Like Dürr (1987), we posit that there were two levels at some stage in the development of Mixtec tone systems. As we will see, these two levels correspond to Low and Mid in present day varieties, so we will call them *Low and *Mid, following Longacre (1957). We claim that there were six tone classes on mono-morphemic words: *Low, *Low[?], *Mid, *Mid[?], *Low Mid and *Mid Low. Note that in this analysis,

final glottal stop only occurs in words which have only a single tone in their underlying specification. In the sections that follow, we document the proposed tone classes for Mixtec and the possible tone patterns they represent. We assume that words are at least bimoraic.

We claim that there are two processes which have affected the development of tone systems of Mixtec varieties: one, we claim that the loss of the final glottal stop resulted in the development of a third tone level, in this section called High; and two, in the tone systems of some Mixtec varieties, underlying tones align at the right rather than the left edge. Following Clements and Ford (1979) we use the term ‘tone shift’ for this process. Similar processes have been documented by Clements and Ford for Kikuyu, (Bantu Central Kenya) and for Ngamo (Chadic NE Nigeria) by Schuh (2005).

The process of tone shift proposed for Mixtec is illustrated in the figure in (5.13). Note that on the left-hand side of the figure, the two tones sponsored by the morpheme are associated left-to-right and one-to-one; that is T_1 is associated with the first mora and T_2 with the second. However, on the right-hand side of the figure, T_1 is now associated with the second mora and T_2 has become a floating tone.

5.13 Tone shift



Having described the processes at work, we now turn to look at the possible tone categories for Mixtec. Following Dürr, we divide Mixtec varieties into two groups. We choose the word ‘group’ rather than ‘area’ as the varieties in Group B are not geographically contiguous. Note that MIY doesn’t fall into either group. Recall that in Group B varieties, the tones that correspond to *Low are higher than those that correspond to *Mid.² It is difficult to posit a process which would result in this change.³

²Dürr refers to this level as *H. However, we choose to call the Proto-Mixtec levels *Low and *Mid, so that High tones only occur in innovations.

³ It is possible that Group B preserves the original values. More comparative research is needed to ascertain what were the original values.

5.3.1 Category 1

It is likely that Category 1 morphemes had only one Low tone in the underlying representation. We give some examples in (5.14).

5.14 Category 1 words

Group A						B		
MXY	MIG	MJC	MEH	XTA	MXB	MIL	MIY	
M L	M L	L L	L L	L L	M L ^(H)	H H	M L	
kūkà	kūkà	kùkà	kùkà [?]	k ^w íkà	k ^w íkà ^(H)	kúkà	βìkà	‘comb’
M L	M L	L L	L L	L L	M L ^(H)	H H ^(L)	M L	
ǎūtù	sūtù	hùtù	sùtù [?]	sùtù	ǎūtì ^(H)	ǎútù ^(L)	sūtù	‘priest’

We see from (5.14) that in some varieties, one tone is linked to both syllables, whereas in other varieties, such as MXY, there is a Mid tone on the initial syllable. We posit that this is an inserted default Mid tone.⁴ We also see that in the case of MXB, both words have a floating High tone and in MIL the word for ‘priest’ has a floating Low tone. The only group B variety in these data is MIL. We see that this variety has a High tone associated with both words, and in the case of ‘priest’ it has a floating Low tone. We see throughout this section many examples in which Group A Low tone corresponds to Group B High tone, and vice-versa. Note that MIY does not belong to either group.

5.3.2. Category 2

This category of morphemes is one of two categories in which we find a final glottal stop in MIY. Our preliminary analysis is that these words had a final glottal stop and a Low tone. As can be seen in (5.15), except for MIL, all varieties have a Low tone as part of the tone pattern.

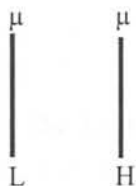
⁴ Although we do not have the data to substantiate this claim for other varieties, in Chapter 6 we present data to show that in MXY, default Mid tones which occur on initial syllables do not participate in phonological processes. However, underlying Mid tones can be shown to participate in these processes.

5.15 Correlation between final glottal stop and High tone

Group A						B		
MXY	MIG	MJC	MEH	XTA	MXB	MIL	MIY	
M L ^(H)	M L ^(H)	L L ^(H)	L L	L H	M L ^(H)	H H ^(L)	M L	
nūni ⁿ (^ˀ)	nūni ⁿ (^ˀ)	nũñi ⁿ (^ˀ)	nũñi ^{n?}	nùni ⁿ	nōni ⁿ (^ˀ)	núni ⁿ (^ˀ)	nūni ^{n?}	'corn grains'
kōò(^ˀ)	kōò(^ˀ)	kòò(^ˀ)	kòò [?]	kòó	kōò(^ˀ)	kóó(^ˀ)	kōò [?]	'snake'
M L ^(H)	M L	L L ^(H)	L L	L H	M L ^(H)	H H ^(L)	M L	
βìkò(^ˀ)	βìkò	βìkò(^ˀ)	βìkò [?]	βìkó	βìkò	βìkó(^ˀ)	βìkò [?]	'cloud'

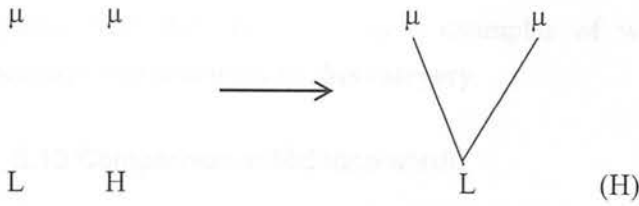
These data exemplify the two phonological processes which affect the development of Mixtec tone systems. First we note the correlation between the final glottal stop in MEH and MIY, final High in XTA, and floating High tone in the other varieties except for MIL which has High High with a floating Low. Secondly we note evidence for tone shift in that MXY, MJC and XTA all have the same underlying tone melody - that is, Low High - but that these tones are associated differently. In XTA, the Low High tones align at the left edge as shown in (5.16).

5.16 Left aligned tones



In the case of MJC, the Low tone is associated with both syllables, and the High tone is a floating tone, as shown in (5.17).

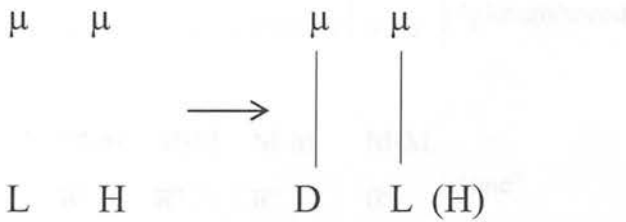
5.17 Tone Spread



The tonal association of MIL is similar to that of MJC in that the first tone of the tone melody (that is, the High tone) spreads to both syllables, and the Low tone becomes a floating tone.

For MXY, MIG, and MXB, the underlying Low High tones align at the right edge. In (5.18), we show the association pattern for words in MXY which sponsor a Low High tone melody.

5.18 Right Aligned Tones



In these varieties, the Low High tone melody is aligned at the right edge of the sponsoring morpheme; that is, the Low tone associates with the second mora, and the High tone becomes a floating High. A tone for the initial toneless mora is provided by the insertion of a default tone in MXY. Note that for MXY, the default tone which is inserted has different phonological properties from an underlying Mid tone, as will be shown in Chapter 6. For the other varieties in which Low High is aligned at the right edge, more data are required to ascertain whether the inserted tone is the same or different from underlying Mid tones, or whether the Mid tone is part of the underlying inventory, giving words three tones – Mid, Low and High – in their underlying form.

5.3.3. Category 3

There are very few nouns that belong to this category, which in many varieties has a surface Mid tone. However the pattern does occur on words of other grammatical categories. The data in (5.19) give examples of words which are tentatively considered to be members of this category.

5.19 Comparison of Mid tone words

	Group A		B		
MXB	XTA	MEH	MIL	MIY	
M M	M M	M M	M M	M M	
βē²ē	βē²ē	βē²ē	βē²ē	βī²ē	‘house’
M M	M M	M M	M M	L L	
	kākū	kākū	kākū		‘be born’
kākā	kākā	kākā	kākā	kàkà	‘walk’
kūtī	kūtū	kūtū	kūtū ^(L)	kùtù	‘plough/weed’
M M ^(H)	M-M	M-M	M-M	M-M	
īī ⁿ	īī ⁿ	īī ⁿ	īī ⁿ	īī ⁿ	‘one’

The data in (5.19) show that the correspondences are not the same across the grammatical categories for some varieties. For example, MIY has Mid for ‘house’ and ‘one’ and Low elsewhere, thus showing how MIY patterns with neither Group A nor B. It is interesting to note that the differences in tone patterns follow syntactic divisions. For MXB, most of the tones are Mid, but the word for ‘one’ has a floating High tone. These data indicate that any comparative study of Mixtec tone needs to look at different lexical categories as the developments may vary. For MIL, Daly and Hyman (2007) analyse words such as those in (5.19) as toneless, positing that there are no Mid tones in the underlying specifications. However, in Chapter 6 we will show that for MXY three tones, High Mid and Low, are specified underlyingly.

5.3.4. Category 4

We now turn to document a category which has considerable variation in surface tones across varieties; although, as was noted by Chen (2000) for Chinese varieties, within each language the tone patterns are on the whole consistent. This category of words also has a final glottal stop in MIY although not in MEH, unlike Category 2, where both MIY and MEH had a final glottal stop. Examples of patterns found are given in 5.20.

5.20 Correlation between final glottal stop and High tone

	Group A		B			
	MXB	MEH	XTA	MIL	MIY	
	H L ^(H)	M M	M H	M M	L M	
kítì(ˀ)	kítī	kítī	kítī	kītī	kìtī [?]	‘animal’
	H L ^(H)	M M	M H	M M ^(L)	L M	
nútŋì(ˀ)	nūtŋī	nūtŋī	nūtŋī	nūtŋī(ˀ)	nùtŋī [?]	‘beans’
	H L ^(H)	M M	M H	M M ^(L)	L M	
βíkò(ˀ)	βíkō	βíkó	βíkó	βíkō(ˀ)	βìkō [?]	‘fiesta’
	H L ^(H)	MH	M H	M M ^(L)	L M	
jú [?] ù(ˀ)	jū [?] ú	jū [?] ú	jū [?] ú	jū [?] ū(ˀ)	jù [?] ū [?]	‘mouth’

First we notice in MIY, all these words have a final glottal stop. We also note that the tone patterns for the words which are Mid High in XTA are all High Low with a floating High in MXB. However, it should be noted that in this variety when the word for ‘animal’ or ‘beans’ is part of a compound, the surface tone pattern is Mid High. We next turn to the data in column 4 for MIL. Again the reversal of High and Low is seen in these data. However, in (5.20), we see that the words listed have a final glottal in MIY but not in MEH. In Proto-Mixtec these words may have had an underlying Mid tone pattern, and a final glottal stop. The final glottal stop is what differentiates these words from those in Category 3 where there is no final glottal stop.

5.3.5. Category 5

We now turn to the first of two categories for which we posit two underlying tones. First we look at words with a rising tone pattern over the two syllables. In many varieties the surface form is a Low Mid pattern. In the next section, we look at Category 6 words which have a falling contour over the two syllables. In (5.21), we see that MIL and MBZ have High where the other varieties have Low. We also note that for most varieties, Mid tone is the second element of the tone melody. Only MIY and MBZ have two identical tones on both syllables of some of the words. Of the eight varieties listed, MIY is the only one which has Low Low. For MXY, these data have a Lowered-Mid tone word finally when they occur prepausally. Elsewhere these words occur with a final Low, and the Mid tone associates with the following morpheme. We also see that XTA has Lowered-Mid on both moras of the word *kää* ‘metal’. Lowered-Mid in XTA often occurs where other varieties have either Low Mid, as is true in this case, or Mid Low in other items.

5.21 Comparison of Low Mid words

	Group A				B				
	MXY	MIG	MEH	MXB	XTA	MIL	MBZ	MIY	
	M Λ	L M	L M	L M ^(L)	L M	H M	L L	L L	
a)	nó [?] ö	nò [?] ö	nò [?] ö	nò [?] ö(˘)	nò [?] ö	nó [?] ö	nò [?] ö	nò [?] ö	‘adobe’
b)	M Λ	L M	L M	L M ^(L)	L M	H M	H L	L M	
	tēē	tʃāā	tēē	tāā(˘)	tāā	tēē	rāā	tʃāā	‘man’
c)	M Λ	L M	L M	L M	L M	H M	H L	L M	
	βā [?] ā	βā [?] ā	βā [?] ā	βā [?] ā	βā [?] ā	βá [?] ā	βá [?] ā	βā [?] ā	‘good’
d)	M Λ	L M	LM	L M ^(L)	L M	H M	H L	L L	
	kīōī	kāsī	kīsī	kīōī(˘)	kīsī	kíōī	kīsī	kīsī	‘cooking pot’
e)	M Λ	L M	L M	L M ^(L)	Λ Λ	M H	M L	L L	
	kāā	kāā	kāā	kāā	kää	kāá	kāā	kāā	‘metal’

We see the presence of Lowered-Mid in these data in MXY and XTA. The occurrence of Lowered-Mid in MXY is described in Chapter 6, so here we only look at the occurrence of Lowered-Mid in XTA. The factors which have resulted in the presence of Lowered-Mid in this variety in some words but not in others are yet to be determined. From the data given in (5.7) and (5.21) it doesn't seem that the syllable types or the presence or absence of glottal stop have a role to play. However, more research is needed.

5.3.6. Category 6

We now turn to words for which we posit a falling contour over the two syllables. We give some examples in (5.22).

5.22 Falling contours on words

		Group A				B			
	MXY	MIG	MEH	MXB	XTA	MIL	MBZ	MIY	
	M M ^(L)	M L	M M	M M ^(L)	M M	M H	H H	L L	
a)	itū̀	itù	itū [?]	itī(˘)	itū	itú	ítú		'cornfield'
	iðū̀	isù	isū [?]		isū	iðú	ísú	isù	'deer'
	itā̀	ità		itā(˘)	itā	itá	ítá	ità	'flower'
b)	M M ^(L)	M L	M M	M M ^(L)	M M/Λ Λ	M H	H H	L L	
	inā ⁿ	inà ⁿ		tinā ⁿ (˘)	inā ⁿ /tinā ⁿ	iná ⁿ	íná ⁿ		'dog'
	tūtū̀	tūtù	tūtū [?]	tūtī(˘)	tütü	tütú	tútú	tütù	'paper'

In these data we notice that for MXY, the Mid Low tones form a falling contour on the second mora. We also see that for most of the varieties in (5.22), the tone pattern is the same for each word within the variety, although across varieties there are differences. XTA is the exception to this observation. We notice is that in (5.22a) XTA has M M, but in (5.22b), it has either M M or Λ Λ. We see that there is alternation between *ināⁿ* and *tināⁿ* for 'dog'. The word for 'dog' in many Mixtec varieties probably had an animal classifier prefix historically, either **ti* or **tʲi*. It seems that in some modern varieties this classifier has totally disappeared and in others all that remains is the /t/. However, Mixtec tends to preserve tones even when CV segments are lost. One solution which could account for the tones on 'dog' in XTA is to posit that the Lowered-Mid tone is a result of the tones which

belonged to the prefix and the tones of the root associating with one syllable. We also note that in the data in (5.22), MEH has a final glottal stop whereas MIL does not. However, there are no High tones present for Group A varieties which we might have expected given the presence of a final glottal stop in MEH. It is obvious that more research is needed to determine the correlations between final glottal stop in these data for MEH and the absence of High tone in other varieties or final glottal stop in MIY.

5.3.7. High tone

We claim that High tone is an innovation, since in some varieties it has a more limited distribution. For example, in some varieties (such as MJC) the pattern Low High is not permitted. In varieties such as XTA where final High tones are permitted, there is a high level of correspondence between words which in MIY have a final glottal stop and those which have a final High in XTA, as was shown above in (5.9). On the other hand, in many Mixtec varieties, most of the nouns which have an initial High tone are loans from Spanish. In (5.23), we give some examples from XTM. The Spanish accented syllable has been borrowed into Mixtec and the lexical accent re-interpreted as High tone.⁵

5.23 Initial High tone loan words in XTM

	Spanish source	
sérù	from <i>becerro</i>	'calf'
trìù	from <i>trigo</i>	'wheat'
píntū	from <i>pinto</i>	'mottled'

Not all borrowed words, however, have a High tone on the initial syllable, either in XTM or in MXY. In (5.24a), we see MXY words borrowed from Spanish in which the Spanish accented syllable has a High tone in MXY. In (5.24b), on the other hand, the High tone is associated with the final syllable. Thus we have evidence that tone shift also applies to some loan words in MXY.

⁵ We assume that the processes which resulted in a three-way contrast – that is, Low, Mid and High – occurred before the Spanish Conquest.

5.24 Spanish loan words in MXY

	Spanish source	
a) tʃélū	from <i>becerro</i>	'calf'
tílā	from <i>Castilla</i>	'bread' (shortened form of <i>đitā tīlā</i> 'bread' (literally Castillian tortilla))
búrū	from <i>burro</i>	'donkey'
b) k ^w ājú`	from <i>caballo</i>	'horse'

5.4. CONCLUSION

This chapter documents two important features of Mixtec varieties. One is that morphemes form categories based on tonal properties. This chapter gives only a bare outline of this analysis, and obviously further research is needed. Another important feature is that these similarities are only noted when it is taken into account that in different varieties of Mixtec, not all tones align in the same way on the morpheme. As we have seen in the case of MXY, all tone patterns of disyllabic words align at the right edge, apart from a few exceptions which have a High Low tone melody. This right-ward shift is only partial in varieties such as MIG. However, recognising tone shift is one major element in the analysis of the development of floating tones; the other important feature is that of the loss of segments. In Chapter 6 we show how positing the right alignment of the underlying tones helps account for the complex surface tonal phenomena.

CHAPTER 6

BASIC TONAL PHENOMENA OF MXY MIXTEC

6.2 UNDERLYING TONES

6.1. INTRODUCTION

This chapter sees the start of a new section of this thesis. This and subsequent chapters are based on previously unpublished data from the variety of Mixtec known as MXY which comprises three main sub-variants. Research has been carried out in all three sub-variants, noting the similarities and differences. The recorded data used in Chapters 6-11 come from two of these variants. The descriptive data focus on the variety spoken in the *municipio* of Santo Domingo Nuxaá as that is the one with which the author is most familiar. However, data from the other varieties are drawn on when they elucidate phonological processes.

Having looked at mainly published data to establish the presence of floating tones and having posited that there is tone shift in some Mixtec varieties, we now turn to data from MXY in which we see that the tones usually align at the right edge of their sponsoring morpheme. We also look at the consequences of this alignment, using mainly nouns and quantifiers to exemplify the processes. As tones sponsored by most bimoraic words align at the right edge, the initial moras are unspecified for tone. MXY uses three different strategies to provide tones for these moras: association of a floating tone, spreading of the final tone of the first word in the phrase, or insertion of a default tone. The contexts in which each of these processes occurs are described below. We also show that floating tones in MXY are the result of this right alignment. In the cases where words are specified for two tones, the first tone associates with the final mora of its sponsoring word. The second tone usually becomes a floating tone and associates with the following morpheme.

With this overview of the findings which are presented in this chapter, we now turn to data which support these claims. First, we look at the surface tone patterns found on nouns and the corresponding underlying patterns; secondly, we examine the strategies used to provide a tone for the initial toneless TBU, including inserting a default Mid tone; thirdly, we present data to show that in the underlying representations moras may be specified as High, Mid, Low, or toneless; fourthly, we present data to show that the default tone, although phonetically indistinguishable from Mid, does not participate in phonological processes; and

finally we give a brief overview of two theoretical issues which arise from the data presented in this chapter.

6.2. DETERMINING UNDERLYING TONES

In order to account for the tonal phenomena of MXY, we must first determine the underlying tones of morphemes, and then examine the strategies whereby these underlying tones are associated with the moras in the surface forms. In MXY, identifying underlying tones is complicated by the variation in surface patterns of many morphemes. In this section we first look at surface variations; secondly, we look at evidence for floating tones; thirdly we present the underlying tonal melodies proposed for MXY; and finally, we show the correspondences between tones in MXY and other varieties in order to substantiate the claim that tone shift has occurred in MXY.

6.2.1. Surface tonal alternation

The surface tonal phenomena of MXY show an extremely high number of alternations. First we look at surface alternations of nouns. The level of complexity is illustrated by the data in (6.1) where we see the tone alternations found on the word *niðr*^{MH} 'corn-on-the-cob'. This morpheme is pronounced with a Mid tone on both syllables when it occurs in isolation. However, this is only one of six possible surface patterns found on words which have a Mid tone pattern in isolation. Note that of the possible combinations of High, Mid and Low in the array in (6.1), there are no patterns in which the first tone is higher than the second. That is, words which are pronounced Mid in isolation never occur with the surface patterns High Mid, High Low, or Mid Low. The reason for this prohibition is yet to be determined.

6.1 Tone alternations

		Tones on niði	Underlying tones of the first word	
a	nīðī	Mid Mid		‘corn-on-the-cob’
b	ī ⁿ nīðī	Mid Mid	ii ^{nM}	‘one corn-on-the-cob’
c	βāá ⁿ níðí	High High	βaa ^{nH}	‘many corn-on-the-cobs’
d	βēē ⁿ nīðí	Mid High	βee ^{nMH}	‘the very corn-on-the-cob’
e	sēkū nīðī	Low Mid	seku ^{ML}	‘a few corn-on-the-cobs’
f	kūū ⁿ níðí	Low High	kuu ^{nLH}	‘four corn-on-the-cobs’
g	ðītà nīðì	Low Low	ðita ^{LH}	‘sweet corn tortillas’

In (6.1a) above, we see that *niðī*^{MH} ‘corn-on-the-cob’ is realised as Mid Mid, but in (6.1d) it is realised as Mid High, when it follows a word with a final Mid tone and a floating High tone. In (6.1f), the tones are Low High following *kūū*^{LH} ‘four’ but Low Low following *ðita*^{LH} ‘tortilla’ in (6.1g). In Chapter 10, we describe the contexts in which final Low tones spread to both moras of Mid toned words. Nevertheless in spite of this surface variation, the meaning of *niðī*^{MH} ‘corn-on-the-cob’ does not change. On the other hand, when analysing verbs, the difference between Mid Mid and Mid High distinguishes different aspectual forms. Examples of this phenomenon are given in (6.2).

6.2 Mid Mid contrasted with Mid High

Mid Mid		Mid High	
ðītā	‘will remove’	ðītá	‘is removing’
ðūtē	‘will swim’	ðūté	‘is swimming’
dāsā	‘will distribute’	dāsá	‘is distributing’
sēē	‘is flowering’	sēc	‘is arriving’

Due to this degree of complexity, we have chosen to start the description of MXY tonal phenomena using data comprising mainly nouns and quantifiers. A description of some aspects of the verb phrase and its complex morphology is described in Chapter 8.

We now turn to look at the surface tones of mono-morphemic nouns. Unlike MIG (K Pike 1948), the syllable template of a word has no role to play in determining the sandhi forms. More specifically, morphemes with glottal stop and/or unlike vowels show the same sandhi forms as those with no glottal stop and/or those which have only one specified vowel. Mono-morphemic nouns have one of the word templates shown in (6.3).¹

6.3 MXY word templates found on nouns

	Surface tones	Underlying tones	
a) VCV	$\bar{i}n\bar{a}^n$	ina^{nML}	'dog'
	$\bar{i}t\bar{i}$	$it\bar{i}^{MH}$	'path'
b) CV:	$j\bar{u}\bar{u}$	juu^{LH}	'stone'
	$j\bar{u}^?u$	$ju^?u^{MH}$	'mouth'
c) $CV_\alpha V_{-\alpha}$	$k^w\bar{i}\bar{a}$	$k^w\bar{i}a^L$	'year'
	$\bar{\delta}i^?a^n$	$\bar{\delta}i^?a^{nMH}$	'bird of prey'
d) CVCV	$\bar{\delta}i\bar{t}\bar{a}$	$\bar{\delta}ita^{LH}$	'kind of tortilla'
	$\beta\bar{i}^?n\bar{e}$	$\beta\bar{i}^?ne^{LH}$	'prickly pear cactus'

In (6.3) we differentiate between CV: words which we consider to be mono-syllabic, but bimoraic, and $CV_\alpha V_{-\alpha}$ words which are interpreted as disyllabic, consisting of two light moras. The rationale behind this division will be explained in Chapter 9, where we see that CV: words when they occur as the first element of a compound lose a mora.

In our discussion of the tonal phenomena we draw on data which include words of any of the types shown in (6.3). In most cases, alternations occur on the

¹ In addition to these templates, there are some quantifiers and adjectives which are VV, for example $u^?u^L$ 'difficult' and uu^L 'two'.

initial mora. However, nouns which have Mid tones on the second mora when pronounced in isolation show the greatest amount of alternation when they occur in a location other than phrase initial. In (6.4), we give a few examples of alternations of surface patterns that are found. In (6.4a), we see that words which have the surface tone pattern Mid Low in isolation also can have the pattern High Low when they occur other than phrase initial. In (6.4b) we see that words which have the pattern Mid High in isolation can have the pattern Low High when they occur other than phrase initial.

6.4 Tonal alternations on mono-morphemic nouns

	Isolation		Other surface pattern		
a)	M L	ǒítà	H L	ǒítà	'tortilla'
		kūkà		kúkà	'comb'
b)	M H	lítú	L H	lítú	'baby goat'
		jè'é		jè'é	'door'

Based on the data in (6.4), we could claim that the patterns in the second column were basic and that in isolation initial High and Low tones occur as Mid. However in Section 6.2.4, we show that underlying tones in MXY usually align at the right edge. As rising contours are prohibited on single moras, then floating High tones are not apparent unless the word being analysed is followed by a morpheme with which the floating High tone associates. Another result of this right alignment is that the Mid tone which is associated with the initial mora in (6.4) can be shown to be a default tone. The difference between underlying Mid tones and default tones is shown in Section 6.6.2.

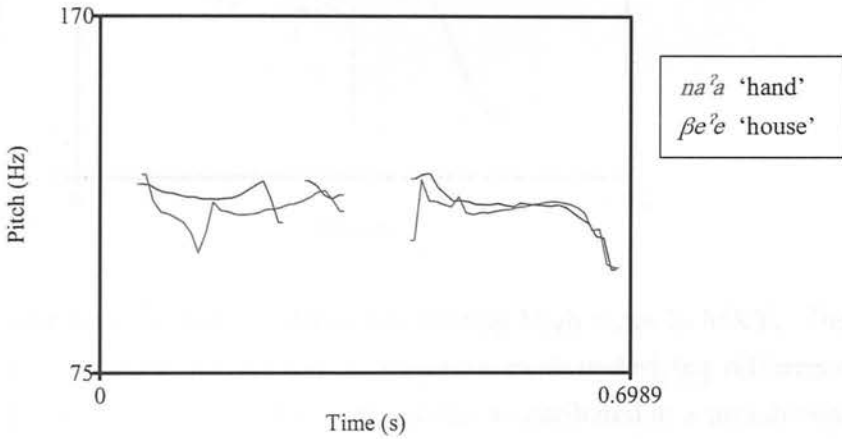
6.2.2. Evidence for floating tones

We now turn to examine evidence for floating tones in MXY and how identifying these floating tones provides insight into both the surface tonal phenomena as well as what the underlying tones are.

Identifying the underlying tones in MXY is made more difficult by the fact that floating High tones are not evident when the morphemes which sponsor them are pronounced in isolation. To illustrate this phenomenon we look at the F0 traces

of two words which are both pronounced Mid Mid in isolation, βe^2e ‘house’ and na^2a ‘hand’. In the figure in (6.5), the red line shows the F0 trace for the word na^2a ‘hand’, and the blue line is the F0 trace for βe^2e ‘house’. In both cases, there is a slight fall pre-pause, which is typical of sentence-final intonation; otherwise the tone pattern is the same for both words: that is, Mid Mid.

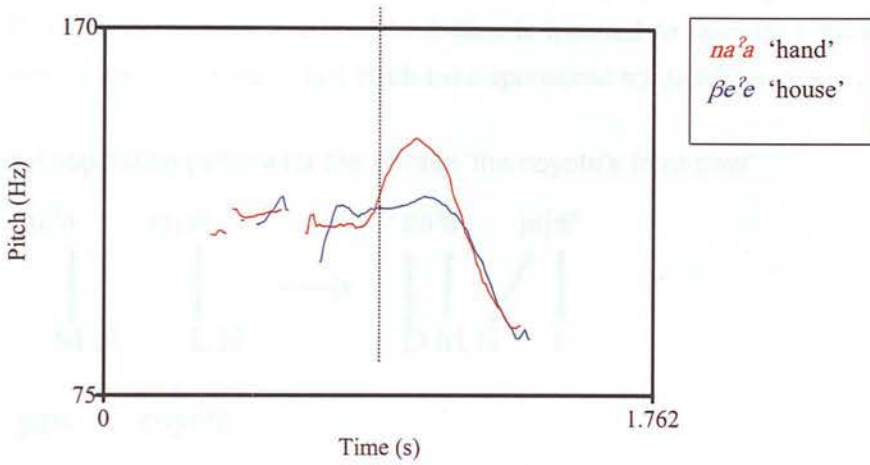
6.5 Comparison of F0 trace words with Mid and Mid floating High



However, when these words occur as the first word in a two-word phrase, the surface tones of the initial syllable of the second word in the phrase are not the same. This is shown in 6.6. The blue line shows the F0 trace for the phrase βe^2e $jaja^n$ ‘the coyote’s house’; the red line shows F0 for the phrase na^2a $jaja^n$ ‘the coyote’s front paw’². We see that both phrases start and end at approximately the same frequency. However in the phrase ‘the coyote’s front paw’ – the red line – we see that F0 rises on the initial syllable of $jaja^n$ ‘coyote’, indicating High tone. The vertical line shows the approximate onset of the word $jaja^n$ ‘coyote’.

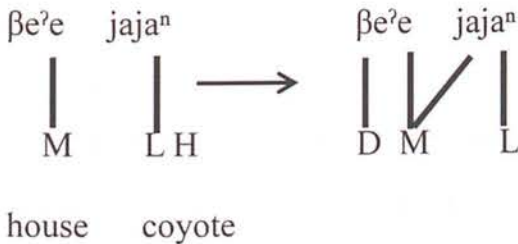
² The word na^2a refers to the hands of humans or the front paws of animals.

6.6 Contrast of surface tones of *jajaⁿ* 'coyote' following a Mid word and a Mid High word



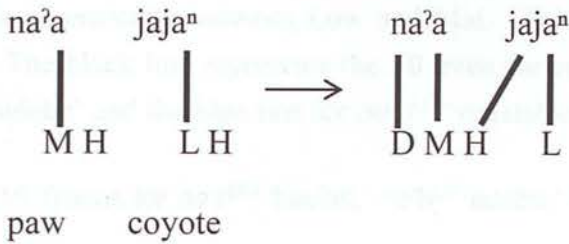
Data like these provide evidence for floating High tones in MXY. They show that the surface forms in isolation or pre-pause mask underlying differences. The fact that the F0 traces in (6.5) are identical can be attributed to a prohibition against rising contours on a single mora. The differences in the underlying tones only emerge when these words form part of a phrase as shown in (6.6). The association patterns for the two phrases in (6.6) are shown in (6.7) and (6.8). In (6.7), we see that the word $\beta e^2 e^M$ 'house' sponsors a Mid tone, and that $jaja^{nLH}$ 'coyote' sponsors a Low and a High tone. These underlying tones align at the right edge of their sponsoring morphemes. In the surface form, a default Mid tone is inserted to provide a tone for the initial mora of $\beta e^2 e^M$ 'house'. The Mid tone of $\beta e^2 e^M$ 'house' spreads to the initial mora of $jaja^{nLH}$ 'coyote'. The floating High tone sponsored by $jaja^{nLH}$ 'coyote' is deleted.

6.7 Association pattern for the phrase 'the coyote's house'



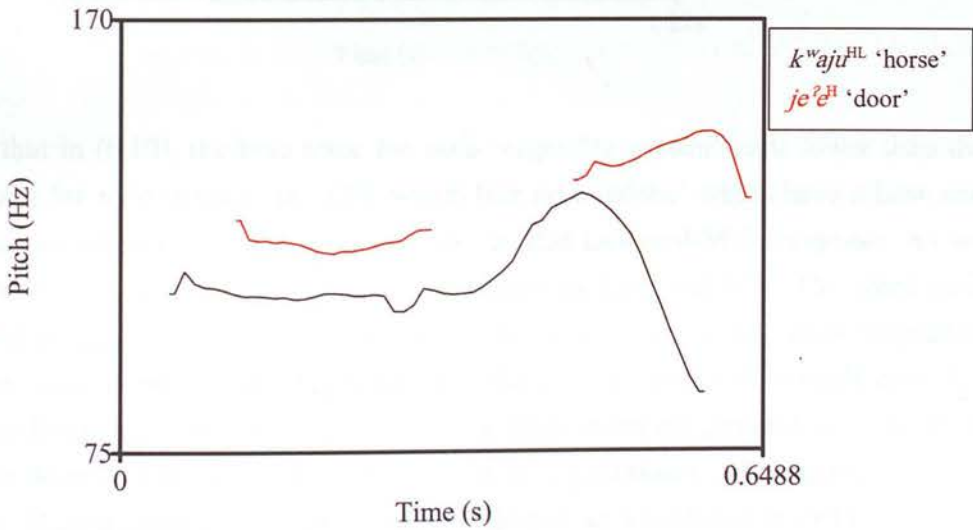
The data in (6.7) contrast with that in (6.8), in which we see that the word *na^{2aMH}* ‘hand’/‘paw’ has a floating High tone. It is this floating High tone which associates with the initial mora of *jaja^{LH}* ‘coyote’, causing the rising F0 contour we saw in (6.6) above. Again a default Mid tone is inserted to provide a tone for the initial mora of *na^{2aMH}* ‘hand’. The High tone sponsored by *jaja^{LH}* is again deleted.

6.8 Association pattern for the phrase ‘the coyote’s front paw’



We now turn to look at evidence for floating Low tones. Floating Low tones form audible falling contours on the final syllable before a pause. These are visible in pitch traces. The figure in (6.9) shows the pitch trace for the words *k^{wajuHL}* ‘horse’ (represented by the black line) and *je^{2eH}* ‘door’ (represented by the red line). The long fall of the High-Low glide on the final mora of *k^{wajuHL}* ‘horse’ is evident.

6.9 Contrast between Mid High-Low and Mid High

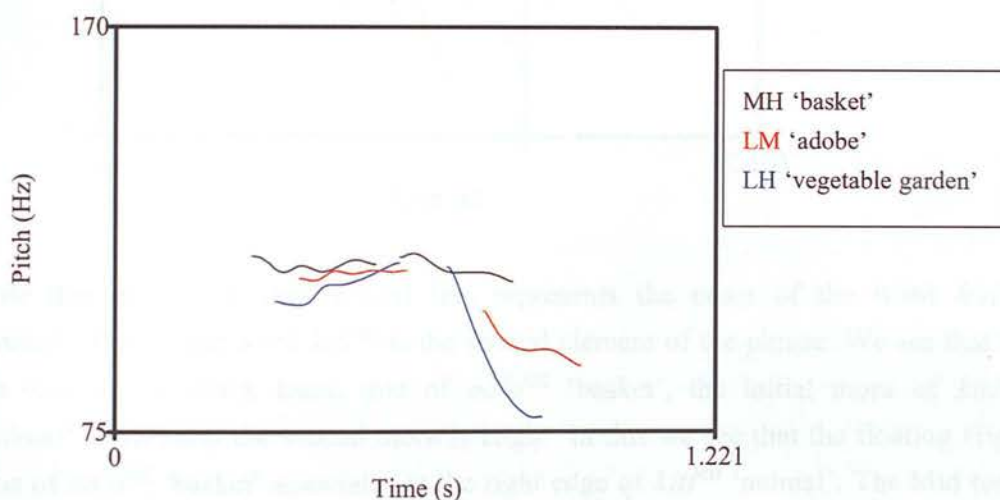


When words with floating Low tones occur in pre-pause position, there is an audible down-glide. Floating Low tones are also evident when words which sponsor floating Low tones occur in other than pre-pause position and the word to

the right does not have a Low tone associated with it. Data to illustrate this claim are given in Section 6.3 below.

We now turn to words for which we propose a floating Mid tone. We claim that in MXY there are words which have an underlying Low Mid tone pattern. In this case, Mid tones which are the second element of a tone melody do not become floating tones when the word is pronounced in isolation or pre-pause (unlike High tones which are the second element of a tone melody). Instead the F0 of these moras is phonetically between Low and Mid. This is illustrated in the figure in (6.10). The black line represents the F0 trace for $no^?o^{MH}$ 'basket', the red line for $no^?o^{LM}$ 'adobe' and the blue line for $no^?o^{LH}$ 'vegetable garden'.

6.10 Traces for $no^?o^{MH}$ 'basket,' $no^?o^{LM}$ 'adobe,' & $no^?o^{LH}$ 'vegetable-garden'

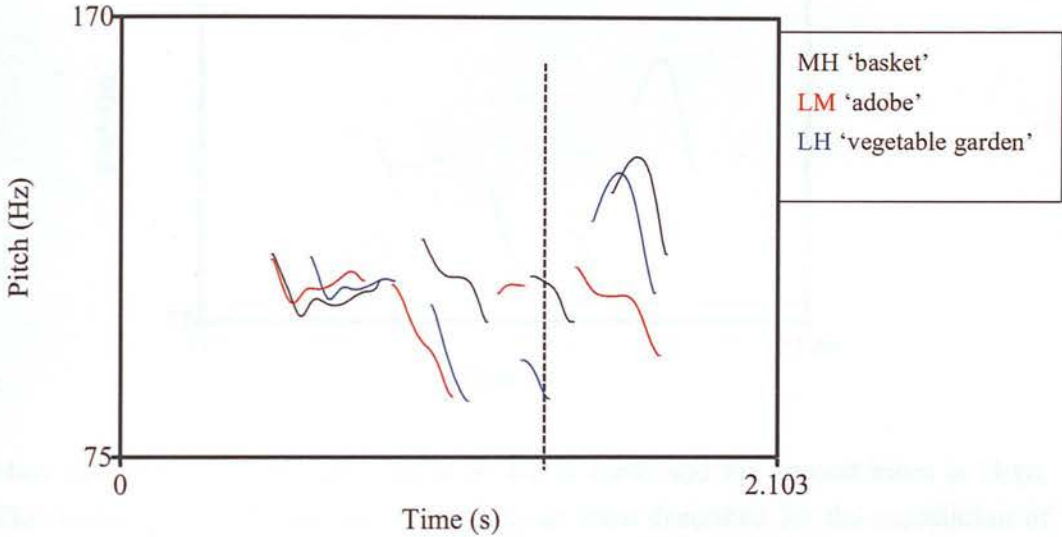


Note that in (6.10), the blue trace for $no^?o$ 'vegetable garden' ends lower than the red trace for $no^?o$ 'adobe'. In MXY words like $no^?o$ 'adobe' which have a Low and a Mid tone in their underlying form occur as Mid Lowered-Mid pre-pause. As we see in (6.10) Lowered-Mid is phonetically between Low and Mid. The word $no^?o$ 'vegetable garden' ends in a Low tone. Further data shows that $no^?o$ 'vegetable garden' also sponsors a floating High tone. The absence of the floating High in the surface form shows that rising contours on a single mora are prohibited so the High tone is deleted. Note that this prohibition on rising contours only applies to single moras. Rising contours over two moras is attested, as was shown in (6.1).

However, when words that sponsor a Low Mid tone pattern occur other than pre-pausally, the Low tone associates with the sponsoring morpheme and the Mid tone with the morpheme to the right as shown in (6.11). Each of the three F0

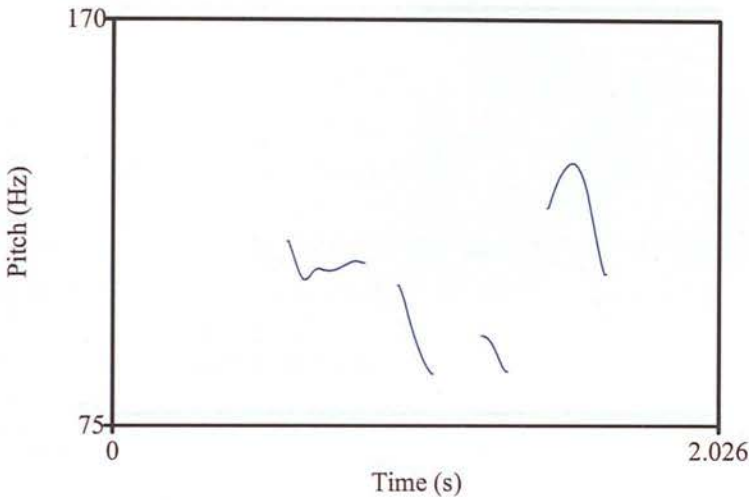
traces represents a two word phrase comprising $no^?o$, with its three different tone patterns, plus $kitt^{MH}$ 'animal'.

6.11 F0 traces for 'the animal's basket', 'the animal's adobe and 'the animal's vegetable garden'



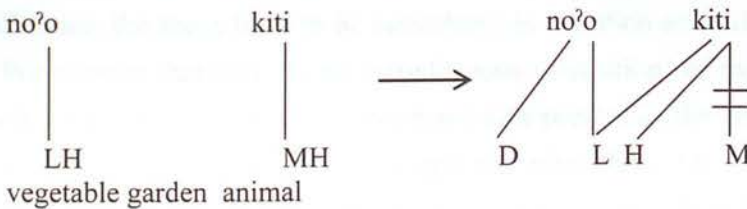
Note than in (6.11), the vertical line represents the onset of the word $kitt^{MH}$ 'animal'; that is, the word $kitt^{MH}$ is the second element of the phrase. We see that in the case of the black trace, that of $no^?o^{MH}$ 'basket', the initial mora of $kitt^{MH}$ 'animal' is Mid and the second mora is High. In this we see that the floating High tone of $no^?o^{MH}$ 'basket' associates at the right edge of $kitt^{MH}$ 'animal'. The Mid tone of $no^?o^{MH}$ 'basket' spreads to the initial syllable of $kitt^{MH}$ 'animal'. We see that the F0 traces for both 'adobe' (the red line) and 'vegetable garden' (the blue line) end at about the same level. However the differences in F0 traces are found on the different tone patterns on $kitt^{MH}$ animal as is shown in (6.12) and (6.14).

6.12 F0 trace for the phrase 'the animal's vegetable garden'



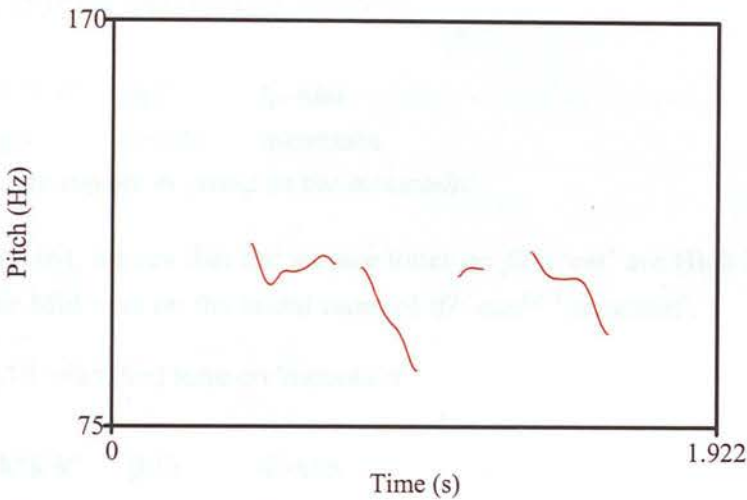
Note that in (6.12), the initial mora of *kiti* is Low, and the second mora is High. This is due to two phonological processes as were described for the association of tone for the phrase *no^o kiti* 'the animal's basket': one, floating High tones align as far to the right as possible. In this case the floating High tone of *no^o* 'vegetable garden' deletes the Mid tone associated at the right edge of *kiti^{MH}*. Two, the final Low of *no^o* 'vegetable garden' spreads to the initial syllable of *kiti^{MH}* 'animal'. The association of underlying to surface tones is given in (6.13).

6.13 Association pattern for the 'animal's vegetable garden'



However, in (6.14), we see that both moras of *kiti^{MH}* are Mid following the word for 'adobe'. As we will show later in Section 6.4, there are words in MXY which have floating Mid tones. So in these data we claim that the floating Mid of *no^o* 'adobe,' associates with the initial mora of *kiti^{MH}* 'animal',

6.14 F0 trace for the phrase 'the animal's adobe'



In this section we have presented preliminary acoustic evidence for the presence of floating tones in MXY. This issue is further discussed in the remainder of this chapter. The surface forms which result from the association of floating tones are discussed in Section 6.3 below.

6.2.3. Proposed underlying tones for mono-morphemic nouns

Having presented evidence for surface alternations and for floating tones in MXY, we now turn to examine the surface tone patterns found on mono-morphemic nouns and their corresponding underlying tones. In order to determine the underlying tone patterns of nouns, the tones have to be considered in isolation as well as in different contexts. We assume that there is no 'spontaneous generation' of tones; that is, all tones which are present in the surface form are also present in the underlying form, although they may be sponsored by a morpheme other than that with which they are associated in the surface form. The exception to this principle is the default Mid tone, which (as we will show) is used only as the last resort in MXY.

In order to identify the tones, we need to examine the surface tones of a given word, as well as the tones on the word which follows it in different tonal contexts. As we saw in (6.1) above, some words can show a number of different surface tonal patterns; the issue is how to determine the underlying tones. One method is the careful comparison of surface tones in different environments. In (6.15), we see

that the surface tones of *jaja*^{LH} ‘coyote’ are Mid Low, and that there is a High tone on the initial syllable for *tʃi-nu*^{LH} ‘mountain’.

6.15 Initial High tone on ‘mountain’

k^wa[?]aⁿ *jājäⁿ* *tʃi-nù*
 go coyote mountain

The coyote is going to the mountain.

In (6.16), we see that the surface tones on *βilu* ‘cat’ are High Low, and there is a surface Mid tone on the initial mora of *tʃi-nu*^{LH} ‘mountain’.

6.16 Initial Mid tone on ‘mountain’

k^wa[?]aⁿ *βílù* *tʃi-nù*
 go cat mountain

The cat is going to the mountain.

On the basis of these two utterances, we conclude that *jaja*ⁿ ‘coyote’ has a floating High tone, as this analysis allows us to account for the surface form of *tʃi-nu*^{LH} ‘mountain’ in (6.15). It also follows that *βilu* ‘cat’ doesn’t have a floating High tone as the initial syllable of *tʃi-nu*^{LH} ‘mountain’ in (6.16) is Mid, and as we will see later, a Low tone sponsored by a word does not spread to another word with a Low tone associated at the right edge. Also by comparing (6.15) and (6.16), we conclude that *βilu* ‘cat’ has a High tone on the initial mora whereas *jaja*ⁿ ‘coyote’ does not. If the High tone on the initial mora of *βilu* ‘cat’ were sponsored by *k^wa[?]aⁿ* ‘go’ then we would have expected to find a High tone on the initial mora of *jaja*ⁿ ‘coyote’ as well. So from these data we conclude that *jaja*^{LH} ‘coyote’ has an underlying Low High tone melody, aligned at the right edge of the word, whereas *βi^Hlu^L* ‘cat’ has a High Low melody aligned at the left edge. The importance of the claim that in MXY most tones align at the right edge of their sponsoring morpheme is presented in Section 6.6.1. We claim that *βi^Hlu^L* ‘cat’ is one of a small set of nouns which has a High tone linked to the initial syllable.

Analysis of the surface tones on words in different contexts, as exemplified in (6.15) and (6.16), has led to the identification of the underlying tone melodies found on bimoraic words in MXY. The data in (6.17) give a comparison between the surface tone patterns found on MXY nouns in isolation and the underlying tones. The other factor which was taken into consideration to determine the tones of words is the tones of the word following them. The tone patterns given in the

first column show the surface forms found on nouns in isolation; the second column gives the proposed underlying tones. We also include the number of nouns with this tone pattern found in a data base of 406 bimoraic nouns. These words are all the bimoraic nouns found in the preliminary dictionary for MXY.

6.17 Comparison of surface and underlying tone patterns

	Surface tones in isolation	Underlying tones	Example		Count	Percentage
1	Mid Low	L	kūkà	comb	20	5.4%
2	Mid Low	L H	ōītà	tortilla	86	21.2%
3	Mid	M	βē [?] ē	house	2	0.5%
4	Mid	M H	kītī	animal	89	22.9%
5	Mid Lowered-Mid	L M	kīðī	pot	77	20.4%
6	Mid Mid-Low	M L	īnā ⁿ	dog	57	14%
7	Mid High	H	jē [?] é	door	4	1.0%
8	Mid High-Low	H L	k ^w ājú [˘]	horse	23	6.2%
9	High Low	H L	βílù	cat	29	6.9%
10	High Mid	H M	tʃélū	calf	5	1.5%

From the data in (6.17), we see that 91.6% of the bimoraic nouns used in the study have their underlying tones aligned at the right edge of their sponsoring morpheme. The data in (6.17-9) and (6.17-10) exemplify the exceptions: namely nouns which are High Low or High Mid, with the High tones associated at the left edge. We claim that the Mid tone found on the initial mora of Categories 1 through 8 when pronounced in isolation are provided by default, rather than being part of the underlying inventory. Evidence for the presence of Mid tones in the underlying forms and the differences in behaviour between underlying Mid tones and default Mid tones are presented in Section 6.4.

Categories 1-6 in (6.17) correspond to the six categories proposed for Proto-Mixtec in Chapter 5. These categories account for 84.5% of the total. Or put in slightly different terms, innovative patterns with an initial High tone in their underlying tone melody only account for 15.5% of the bimoraic nouns. These words fall into two broad groups: those with the High tone associated with the second mora, as found in categories 7 and 8, which amount to 7.2% of the total;

and those with the High tone associated with the first mora as found in categories 9 and 10, accounting for 8.4%. Loans from Spanish occur in both of these broad groupings. For example, the High tone occurs on the initial syllable words such as *tʃe^Hlu^M* 'calf', from Spanish 'becerro'. Other loan words from Spanish have the High tone associated with the second mora, for example *k^waju^{HL}* 'horse' from Spanish 'caballo'.

We also note that nine possible combinations of High, Mid and Low are represented in (6.17), assuming that identical adjacent tones are represented by one tone underlyingly. A preliminary examination of the surface forms show that on the initial syllable there are only two possibilities, High or Mid, whereas on the second syllable there are six possibilities. By positing that tones align at the right edge, we see that the contrast on the initial syllables is actually between unspecified and High.

We have also seen that only a few nouns have a High tone as the initial element in their tone patterns. When we consider the tone patterns of verbs, the percentage is even lower. For example, in over 1500 verbs in the MXY lexical database, there is only one verb, *saβi^{HL}* 'tire' which has an initial High tone that is associated with the right edge.³ One reason for this is probably that High tone marks morphological categories. In the case of verb roots, High tones are almost always the second element of the tone melody; that is, they usually occur as a floating tone. It is noteworthy that the tone patterns found on almost all monomorphemic verb roots correspond to the six tonal categories proposed for Proto-Mixtec.

6.2.4. Tone shift in MXY

In this section we present a comparison of the surface and underlying tones of MXY with the tones of other varieties to substantiate the claim that in MXY, tones align at the right edge of their sponsoring morpheme, and that this alignment has resulted in floating tones.

In Chapter 4 we showed how Pike's class (b) morphemes' can be better analysed as having a floating High tone. In (6.18) we compare words which in

³ The verb */saβi^{HL}/* 'tire' is an exception of the allophonic variation of the phoneme /s/ in that the initial consonant is [ʃ] even though it occurs before a mid vowel.

MXY and MIG are pronounced Mid in isolation, but in XTA only the word $\beta\bar{e}^?e$ 'house' has Mid on both syllables, whereas for the other words there is a Mid High tone pattern.

6.18 Comparison between Mid Mid and Mid High

	MXY	SMG	XTA	
M M	$\beta\bar{e}^?e$	$\beta\bar{e}^?e$	$\beta\bar{e}^?e$	'house'
M H	$k\bar{i}t\bar{i}(\text{'})$	$k\bar{i}t\bar{i}(\text{'})$	$k\bar{i}t\bar{i}$	'animal'
	$n\bar{u}t\bar{f}\bar{i}(\text{'})$	$n\bar{u}t\bar{f}\bar{i}(\text{'})$	$n\bar{u}t\bar{f}\bar{i}$	'beans'
	$\beta\bar{i}k\bar{o}(\text{'})$	$\beta\bar{i}k\bar{o}(\text{'})$	$\beta\bar{i}k\bar{o}$	'fiesta'
	$j\bar{u}^?u(\text{'})$	$j\bar{u}^?u(\text{'})$	$j\bar{u}^?u$	'mouth'

In the data in (6.19), we see that in MIG and MXY, words which have a Mid Low tone pattern in isolation are divided into two groups: one with a floating High tone and the other one without. The words which form these groupings correspond in the first case to words which in XTA are Low High in isolation and in the second case, those which are Low Low.

6.19 Mid Low versus Mid Low floating High

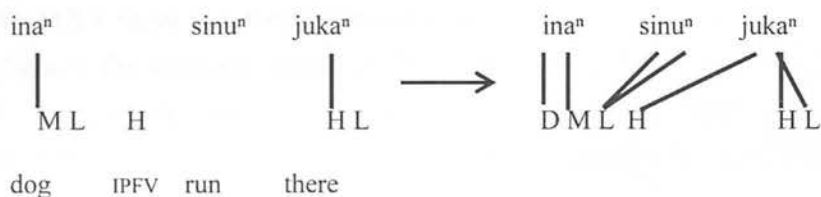
	MXY	MIG	XTA	
Low	$k\bar{u}k\bar{a}$	$k\bar{u}k\bar{a}$	$k^w\bar{i}k\bar{a}$	'comb'
	$k^w\bar{e}^?e$	$k^w\bar{e}^?e$	$k^w\bar{e}^?e$	'illness'
	$\bar{o}u\bar{t}\bar{u}$	$s\bar{u}t\bar{u}$	$s\bar{u}t\bar{u}$	'priest'
Low High	$k\bar{o}^?o(\text{'})$	$k\bar{o}^?o(\text{'})$	$k\bar{o}^?o$	'bowl'
	$n\bar{u}n\bar{i}^n(\text{'})$	$n\bar{u}n\bar{i}^n(\text{'})$	$n\bar{u}n\bar{i}^n$	'corn (grains)'
	$k\bar{o}\bar{o}(\text{'})$	$k\bar{o}\bar{o}(\text{'})$	$k\bar{o}\bar{o}$	'snake'

The correspondences between the underlying tones of these varieties substantiates the claim that the presence or absence of a floating High tone is not purely arbitrary but rather can be attributed to the right shift of tones.

We now turn to look at evidence for floating Low and Mid tones, which suggests that the right-ward shift has been even more thorough-going in MXY, so that in this variety of Mixtec the tones sponsored by a lexeme are usually aligned at the right edge of the sponsoring morpheme.

MXY permits falling contours pre-pausally. These contours are analysed as a sequence of either High-Low or Mid-Low. When words with either of these two tone melodies are pronounced before a pause, the downglide is audible. Elsewhere, the second element of the contour associates with the morpheme to the right. In (6.20), we give data in which the noun subject 'dog' is fronted for contrastive focus.

6.20 Association of floating tones in MXY



It's the DOG that is running over there.

In these data the floating Low tone sponsored by *ina^{nML}* 'dog' associates with the verb *sinuⁿ* 'run'. The High tone which marks the imperfective associates with the first mora of *juka^{nHL}* 'over there'. The High and Low tones sponsored by *juka^{nHL}* 'over there' form a falling contour. In Chapter 8 we give evidence for the claim that the imperfective stem of *sinuⁿ* 'run' is toneless.

The right-ward movement of tones also is seen in loan words from Spanish or Nahuatl, so that the High Low pattern found in other varieties is realised as a High-Low glide word final in MXY when these words occur pre-pausally. When these words occur other than pre-pausally, the Low tone of the glide associates with the initial syllable of the following word.

6.21 Nouns with High-Low falling contour

Input Form	Gloss
tūlíˆ	'corn drink', from Nahuatl <i>atolli</i>
k ^w ājúˆ	'horse' from Spanish <i>caballo</i>

Words which have Mid-Low falling contours on the final syllable in MXY have Mid Low in MIG and Mid Mid in XTA as shown in (6.22).

6.22 Mid-Low contour in MXY

MXY	MIG	XTA	
itū̀	itù	itū	'cornfield'
iðū̀	isù	isū	'deer'
itā̀	ità	itā	'flower'
ðiðì̀	ʃi	ʃiʃi	'aunt'

In MXY there is a fourth phonetic level which is between Low and Mid which we claim is the phonetic result of a Low and a Mid tone being associated with one TBU. We call this level Lowered-Mid. The following table gives examples of words with this tone pattern; note that in other varieties the Low Mid tone melody is realised over both moras of the word.

6.23 Low-Mid nouns in MXY

MXY	MIG	XTA	
kīðì	kàsā	kisī	'cooking pot'
tānī ⁿ	tānī ⁿ		'palm belt'
nō ^ʔ ō	nò ^ʔ ō	nò ^ʔ ō	'adobe'

In MXY, when Low Mid words are pronounced other than pre-pause, the Low tone associates with the sponsoring morpheme and the Mid tone associates with the following morpheme. The tonal phenomena exhibited by this group of words provide evidence for the existence of underlying Mid tones in MXY as we show in Section 6.4 below where we provide additional evidence for the claims that all three tone levels – High, Mid and Low – can occur as floating tones. We claim that this is a result of right-ward shift of the underlying tones.

6.3. PROVIDING TONES FOR TONELESS TBUS

Having established that tones usually align at the right edge of their sponsoring morpheme, we now examine the three strategies used by MXY to provide tones for toneless TBUs. These strategies are:

- Spread the final tone from the word to the left
- Associate a floating tone
- Insert a default tone

First we present data to show how tones spread; and secondly, we show how the association of floating tones provide tones for toneless TBUs. In these two sections we also show that when neither of these two processes applies, then a default Mid tone is inserted.

6.3.1. Tone spreading

First we look at how the final tone of the quantifier can spread to the initial mora of the noun it modifies. Morphemes which belong to these two lexical classes can be given as answers to content questions, so we refer to these as words. In (6.24), we give examples of phrases which consist of a quantifier plus noun in which there is a High tone associated with the final mora of the quantifier. We see that the final High tones spread to the following word regardless of what tone is associated with the final mora of the second. In order to present the different options, we have included words which have a Mid tone associated with them, although the evidence for the presence of underlying Mid tone is presented in Section 6.4.

6.24 Spread of High tone

a) High spreading to words with a High tone

$\beta\bar{a}\bar{a}^n$	$t\acute{i}j\acute{u}^n$	‘much work’	$\beta\bar{a}\bar{a}^n$	$j\acute{e}^?e$	‘many doors’
$\beta\bar{a}\bar{a}^n$	$l\acute{i}t\acute{u}$	‘many kids’	$\beta\bar{a}\bar{a}^n$	$j\acute{i}^?i^n$	‘many steam bath houses’

b) High spreading to words with a Mid tone

$\beta\bar{a}\bar{a}^n$	$k\acute{i}t\acute{i}$	‘many animals’	$\beta\bar{a}\bar{a}^n$	$t\acute{i}t\acute{i}$	‘many avocados’
$\beta\bar{a}\bar{a}^n$	$n\acute{u}t\acute{i}$	‘many beans’	$\beta\bar{a}\bar{a}^n$	$n\acute{i}\acute{o}i$	‘many corn-on-the-cobs’

c) High spreading to words with a Low tone

$\beta\bar{a}\bar{a}^n$	$k\acute{u}k\grave{a}$	‘many combs’	$\beta\bar{a}\bar{a}^n$	$j\acute{u}k\grave{u}$	‘many medicines’
$\beta\bar{a}\bar{a}^n$	$\acute{o}t\acute{u}t\grave{u}$	‘many priests’	$\beta\bar{a}\bar{a}^n$	$\acute{o}o^?n\grave{o}^n$	‘many blouses’

In (6.24a), we see that High tone spreads to words which already have a High tone associated with them. In (6.24b), we see that the final High tone spreads to both the moras of words which have Mid tone on both moras in isolation. In (6.24c) we see that words which have a Low tone on the second mora now have the surface form High Low. There are no cases in which words which have an underlying Mid or Mid High tone pattern were realised with a High Mid pattern. Data such as these in (6.24b) could suggest that these words are underlyingly toneless, although we will also see data that show otherwise.

We now turn to look at quantifiers which have a final Mid tone. In (6.25), we see the surface tones of words which follow words such as $i\acute{i}^M$ ‘one’, which have a Mid tone associated at the right edge. Note that in all of these cases, the Mid tone spreads to the initial syllable of the noun, no matter what tone is associated at the right edge.

6.25 Spreading of Mid tone (final tone of *ii^M* ‘one’)

a) Mid tone spreading to words with a High tone

\bar{i}^n	tijú ⁿ	‘one work’	\bar{i}^n	jē [?] é	‘one door’
\bar{i}^n	lītú	‘one kid’	\bar{i}^n	jī [?] i ⁿ	‘one steam-bath house’

b) Mid tone spreading to words with a Mid tone

\bar{i}^n	kītī	‘one animal’	\bar{i}^n	tīfī	‘one avocado’
\bar{i}^n	nūfī	‘one bean’	\bar{i}^n	nīđī	‘one sweet corn’

c) Mid tone spreading to words with a Low tone

\bar{i}^n	kūkà	‘one comb’	\bar{i}^n	jūkù	‘one medicine’
\bar{i}^n	đūtù	‘one priest’	\bar{i}^n	đō [?] nò ⁿ	‘one blouse’

It could be argued that *ii^M* ‘one’ is toneless. However, in MXY we distinguish between toneless syllables and syllables with which a Mid tone is associated. This difference is crucial in understanding the tonal phenomena of the verbal morphology, as will be explained in Chapter 8. We also present more evidence for the presence of underlying Mid tones in Section 6.4 below.

We now turn to words which have a Low tone associated at the right edge. As in the case of the data presented in (6.24a) in which the final High tone spreads, we can see from the data in (6.26) below that final Low tones spread to the initial syllable of the following word, unless a Low tone is associated with the second TBU, in which case spreading is prevented. The data in (6.26a) and (6.26b) show how Low tones spread to the initial syllables of words which have either a High tone (6.26a) or a Mid tone (6.26b). However, in (6.26c) we see that Low tones do not spread to words which already have a Low tone. In these cases a default tone is inserted to provide a tone for the initial syllable of the noun.

6.26 Spreading of Low tone (final tone of *uni*^L ‘three’)

a) Low tone spreading to words with a High tone

$\bar{u}ni^n$	$tij\acute{u}^n$	‘three works’	$\bar{u}ni^n$	$j\grave{e}^?e$	‘three doors’
$\bar{u}ni^n$	$lit\acute{u}$	‘three kids’	$\bar{u}ni^n$	$j\grave{i}^?i^n$	‘three steam-bath houses’

b) Low tone spreading to words with a Mid tone

$\bar{u}ni^n$	$k\grave{i}t\bar{i}$	‘three animals’	$\bar{u}ni^n$	$t\grave{i}t\bar{i}$	‘three avocados’
$\bar{u}ni^n$	$n\grave{u}t\bar{i}$	‘three beans’	$\bar{u}ni^n$	$n\grave{i}\bar{d}\bar{i}$	‘three corn-on-the-cobs’

c) No spreading to words with a Low tone

$\bar{u}ni^n$	$k\bar{u}k\grave{a}$	‘three combs’	$\bar{u}ni^n$	$j\bar{u}k\grave{u}$	‘three medicines’
$\bar{u}ni^n$	$\bar{d}\bar{u}t\bar{u}$	‘three priests’	$\bar{u}ni^n$	$\bar{d}\bar{o}^?n\bar{o}^n$	‘three blouses’

The data given in (6.24), (6.25), and (6.26) show some of the similarities and differences between the behaviour of the three tone levels. All three tones spread across word boundaries and thereby supply a tone for the initial toneless TBU of the following word. However, there is a restriction in that a final Low tone does not spread to a word which already has a Low tone associated with it, whereas Mid and High do.

6.3.2. Association of floating tones

We now look at a different strategy used in MXY to provide tones for toneless TBUs, namely the association of floating tones.

First we provide further evidence for the presence of floating High tones in the underlying representations. In (6.27), we contrast the surface tones on nouns following the quantifiers *uni*^L ‘three’ and *kuu*^{LH} ‘four’. The words *uni*^L ‘three’ and *kuu*^{LH} ‘four’ have the same tone pattern in isolation: in isolation, the floating High tone of *kuu*^{LH} ‘four’ is not manifest and both words occur as Mid Low. In each of the sets of data given in (6.27), the surface tones of the noun are given at the top of the column.

6.27 Comparison of tones of nouns modified by *uni*ⁿ ‘three’ and *kuu*^{n,H} ‘four’

a) Words with a High tone aligned at the right edge

L H		L H		
<i>ūnìⁿ</i>	<i>tìjúⁿ</i>	<i>kūùⁿ</i>	<i>tìjúⁿ</i>	‘work’
<i>ūnìⁿ</i>	<i>lìtú</i>	<i>kūùⁿ</i>	<i>lìtú</i>	‘kid’
<i>ūnìⁿ</i>	<i>jè[?]é</i>	<i>kūùⁿ</i>	<i>jè[?]é</i>	‘door’
<i>ūnìⁿ</i>	<i>jì[?]íⁿ</i>	<i>kūùⁿ</i>	<i>jì[?]íⁿ</i>	‘steam bath house’

b) Words with a Mid tone aligned at the right edge

L M		L H		
<i>ūnìⁿ</i>	<i>kìtì</i>	<i>kūùⁿ</i>	<i>kìtì</i>	‘animal’
<i>ūnìⁿ</i>	<i>nùtǽí</i>	<i>kūùⁿ</i>	<i>nùtǽí</i>	‘bean’
<i>ūnìⁿ</i>	<i>tìtǽí</i>	<i>kūùⁿ</i>	<i>tìtǽí</i>	‘avocado’
<i>ūnìⁿ</i>	<i>nìðí</i>	<i>kūùⁿ</i>	<i>nìðí</i>	‘corn-on-the-cob’

c) Words with a Low tone aligned at the right edge

M L		H L		
<i>ūnìⁿ</i>	<i>kūkà</i>	<i>kūùⁿ</i>	<i>kúkà</i>	‘comb’
<i>ūnìⁿ</i>	<i>ðútù</i>	<i>kūùⁿ</i>	<i>ðútù</i>	‘priest’
<i>ūnìⁿ</i>	<i>jūkù</i>	<i>kūùⁿ</i>	<i>júkù</i>	‘medicine’
<i>ūnìⁿ</i>	<i>ðò[?]nòⁿ</i>	<i>kūùⁿ</i>	<i>ðó[?]nòⁿ</i>	‘blouse’

Consider first the data in (6.27a). The surface tones on the nouns are the same following both *uni*ⁿ ‘three’ and *kuu*ⁿ ‘four’, so if we considered only these data we would wrongly assume that both *uni*ⁿ ‘three’ and *kuu*ⁿ ‘four’ have only a Low tone underlyingly. Note that in these data the High tone associated with the second mora of the nouns is sponsored by the noun itself. On the other hand, in the data in (6.27b), we see that there is a High tone associated with the second mora of the noun, when it follows *kuu*ⁿ ‘four’ but not *uni*ⁿ ‘three’. We claim that this High tone is sponsored by *kuu*ⁿ ‘four’. These data illustrate the tendency of floating High

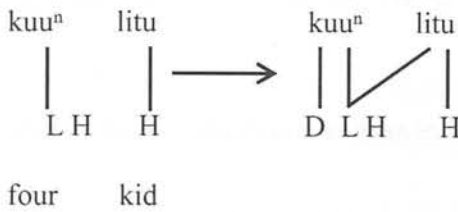
tones in *MXY* to associate at the right edge of the following morpheme. This association of floating High tones with the second mora of a noun only occurs if the noun has an underlying Mid tone as the first or only element of its tone melody. In these data we also see that the Low tone associated with the second mora of *kuu*^{LH} 'four' spreads to the initial mora of these words. Turn now to the data in (6.27c). There the surface tones of the noun are again different following *uni*ⁿ 'three' and *kuu*ⁿ 'four'. Therefore, on the basis of the data in (6.27), we claim that *kuu*^{LH} 'four' has a floating High tone which associates with the initial syllable of the following noun. In other words, *uni*^L 'three' is differentiated from *kuu*^{LH} 'four' in that the latter has a floating High tone, whereas the former does not. Thus if we consider both the data in (6.24) above and (6.27a), we see that while a final High will spread to a following word which has a High tone, in this context a floating High will not associate with a noun which already has a High tone.

The data in (6.27) exemplify three processes which account for the association of underlying tones to TBUs: one, floating High tones do not associate with words with which a High tone is already associated; two, spreading an associated underlying tone is preferred to inserting a default Mid tone; three, floating High tones align as far to the right of the prosodic constituent as possible. Theoretically these processes are better expressed in terms of Optimality Theory constraints rather than rules, as their application needs to be seen in terms of preferences rather than categorical application of rules.⁴ The theoretical issues are discussed in Section 6.6 below. Here we give a brief description of these processes.

First we look at data which show two processes: floating High tones do not associate with words which already have a High tone associated with them, and spreading underlying tones is preferable to inserting a default Mid tone. In (6.27a) the Low tone of *kuu*^{LH} 'four' spreads to the initial syllable of *litu*^H 'baby goat', leaving the floating High tone of *kuu*^{LH} 'four' un-associated. This is illustrated in (6.28).

⁴ A brief account of tonal association using an Optimality Theory framework is given in Appendix E.

6.28 Spread of final Low tone when association of floating High is blocked

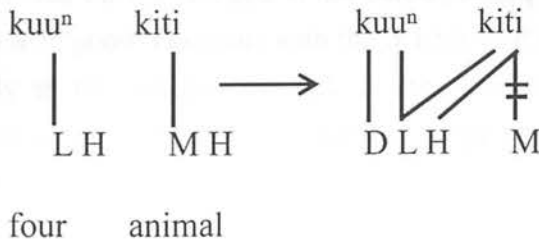


four kids

We claim that the floating High tone of kuu^{nH} does not associate with litu^H because litu^H has a High tone associated with it. We claim that the Low tone of kuu^{nH} spreads to the initial syllable of litu^H as MXY has a preference to spread underlying tones rather than to insert a default Mid tone. However, we also see that there is a default Mid tone associated with the initial syllable of kuu^{nH} as no other tone is available for this initial toneless TBU.

We now look at data from (6.27b) which exemplify that floating High tones align at the right edge of prosodic constituents. In these data we see that not only does the Low tone sponsored by kuu^{nH} 'four' spread to the initial syllable of kitt^{MH} 'animal', but the floating High tone associates at the right edge, deleting the Mid tone that is associated with it. The association pattern for $\text{kuu}^n \text{kitti}$ 'four animals' is illustrated in the figure in (6.29).

6.29 Association of floating High at the right edge



four animals

The data in (6.29) assume the presence of an underlying Mid tone. We show in Chapter 9 on verb morphology that floating High tones do not associate with final TBUs when these are unspecified for tone, whereas they do associate with moras associated with Mid tones.

We now turn to look at phrases which exemplify the association of floating Mid tones. Since we have not found a quantifier which has a Low Mid tone

pattern, the adjective $\beta a^?a^{LM}$ ‘good’ is used in these examples (6.30 a-c). Note that when the adjective occurs before the noun, the adjective is the predicate of the sentence.

6.30 Association of floating Mid tone in the phrase ‘the noun is good’

a) Association of floating Mid tones with words with a High tone

$\beta a^?a$	tǐjú ⁿ	‘work’	$\beta a^?a$	jē ^é	‘door’
$\beta a^?a$	lītú	‘kid’	$\beta a^?a$	ji ^í í ⁿ	‘steam-bath house’

b) Association of floating Mid tones with words with a Mid tone

$\beta a^?a$	kītī	‘animal’	$\beta a^?a$	tǐfǐ	‘avocado’
$\beta a^?a$	nūfǐ	‘beans’	$\beta a^?a$	nīdī	‘corn-on-the-cob’

c) Association of floating Mid tones with words with a Low tone

$\beta a^?a$	kūkà	‘comb’	$\beta a^?a$	jūkù	‘medicine’
$\beta a^?a$	ōūtù	‘priest’	$\beta a^?a$	ōō [?] nò ⁿ	‘blouse’

From the data in (6.30) we see that the floating Mid of $\beta a^?a^{LM}$ ‘good’ associates with the following word no matter what tone is associated at the right edge. (This will be pursued further in Section 6.4 below, where we will show how the floating tone of $\beta a^?a^{LM}$ ‘good’ contrasts with the default Mid tone.)

Finally in this section we look at the association patterns for floating Low tones. Data to illustrate these phenomena are given in (6.31), using $seku^{ML}$ ‘a few’ as the quantifier.

6.31 Association of floating Low tone

- a) Association of floating Low tones with words with a High tone

sēkū tìjúⁿ ‘few works’ sēkū jè[?]é ‘few doors’
sēkū litú ‘few kids’ sēkū jì[?]íⁿ ‘few steam-bath houses’

- b) Association of floating Low tones with words with a Mid tone

sēkū kiti ‘few animals’ sēkū títí ‘few avocados’
sēkū nùtí ‘few beans’ sēkū nìdì ‘few corn-on-the-cobs’

- c) No association of floating Low tones with words with a Low tone

sēkū kūkà ‘few combs’ sēkū jūkù ‘few medicines’
sēkū òtù ‘few priests’ sēkū òò[?]nòⁿ ‘few blouses’

In (6.31), we see that floating Low tones associate with words with High and Mid tones, but not with words which already have a Low tone associated with them. In (6.31c), the floating Low tone sponsored by *seku*^{ML} ‘few’ is deleted. Although no definitive evidence is available at present, it is likely that the final Mid tone of *seku*^{ML} ‘few’ spreads to the initial syllable of the following word, rather than inserting a default tone, based on the observed phenomenon that in MXY tones associated with the final mora of one word spread to the initial mora of the following word, unless there is some condition which prohibits spreading.

In this section we have seen some similarities and differences in the behaviour of High, Mid and Low tones. We have seen that final High tones spread to a word which already has a High tone associated with it, and final Mid tones also spread to words which have a Mid tone associated at the right edge. However, Low tones do not spread if there is already a Low tone associated at the right edge. It is only floating Mid tones that will associate with morphemes which have a Mid tone associated at the right edge; neither floating High tones nor floating Low tones associate with morphemes which have a High or a Low tone associated with them, respectively.

We have also documented data in which we claim that a default Mid tone is inserted. There are two tonal association prohibitions which make the insertion of a default tone necessary:

- 1) Low tones do not spread to words which have a Low tone associated at the right edge.
- 2) Floating Low tones do not associate with words which already have a Low tone associated with them.

6.4. EVIDENCE FOR UNDERLYING MID TONES

In the data shown in this chapter so far we have assumed that there are instances of the presence of Mid tones in the underlying representation. In examples where Mid tones are present we have shown how their presence accounts for the surface forms. We now turn to examine evidence of the presence of Mid tones underlyingly. Whereas the phonetic Mid tones on the initial syllables can be shown to be default, we posit that in addition there exists a fully specified underlying Mid tone.

There are four reasons for such a claim:

- underlying Mid tone contrasts with Low and High
- Mid tones form contours
- Mid tones form a barrier between adjacent Low tones
- the most compelling reason: underlying Mid tones participate in certain phonological processes which default Mid tones do not

We now discuss each of these reasons in turn.

6.4.1. Evidence of contrast between Mid, Low, and High

First we establish the presence of floating Mid tones in the input forms by contrasting the tones on the initial syllables of the second word of the phrase. In these examples, we use genitival phrases to illustrate the processes as there are no quantifiers which have a Low Mid underlying tone melody. In (6.32) we see that the surface tone of the initial syllable of *ɔutu*^L 'priest' is Mid in (6.32a) and (6.32b), but High in (6.32c). To account for this High tone, we claim that *ɔita*^{LH} 'tortilla' has a floating High tone.

6.32 Surface forms of *ɔutu* 'priest'

- a) kūkà ɔūtù 'priest's comb'
- b) tǎkà ɔūtù 'priest's fish'
- c) ɔìtā ɔútù 'priest's tortilla'

From the data in (6.32), we could assume that *tǎka*^{LM} 'fish' and *kuka*^L 'comb' only have a Low tone in the input and that the Mid tone on the initial syllable of *ɔutu*^L 'priest' is a default Mid tone which is inserted to prevent two adjacent Low tones. However, the data in (6.33) show that a different analysis is required. We see that the surface tone of the initial syllable of *litu*^H 'kid' is Low in (6.33a) and (6.33c), but not in (6.33b).

6.33 Final Low tone nouns followed by *litú* 'kid'

- a) kūkà litú 'kid's comb'
- b) tǎkà litú 'kid's fish'
- c) ɔìtā litú 'kid's tortilla'

The data in (6.33a) and (6.33c) show that final Low tones spread to provide the initial tone of *litu*^H 'kid'. However, the floating High tone of *ɔita*^{LH} is prevented from associating with *litu*^H (as we have seen, floating High tones do not associate with words which already have a High tone). On the other hand, in (6.33b), we see that the final Low tone of *tǎka*^{LM} 'fish' does not spread to the initial mora of *litu*^H 'kid', but the initial mora of *litu*^H 'kid' has a Mid tone. We posit that this Mid tone is sponsored by *tǎka*^{LM} 'fish'. Thus from the data in (6.33) and (6.32), we posit the following underlying patterns as shown in (6.34).

6.34 Underlying tones for nouns with final Low tones

- a) kuka L 'comb'
- b) tǎka L M 'fish'
- c) ɔita L H 'tortilla'

Therefore we claim that for MXY there are floating Mid tones as well as floating High and Low tones. We have shown how underlying Mid tones contrast with both High and Low tones.

6.4.2. Evidence that Mid tones form contours and that they are not transparent

We now turn to words which have an audible Mid-Low falling contour pre-pause. In (6.26) above we saw that the final Low tone of a word was prevented from spreading to the initial syllable of the following word when that word had a Low tone associated at the right edge. In (6.35a) we see that the Low tone of *kuka*^L 'comb' does not spread to *đutu*^L 'priest'. However, in (6.35b) it spreads to *ina*^{ML} 'dog'.

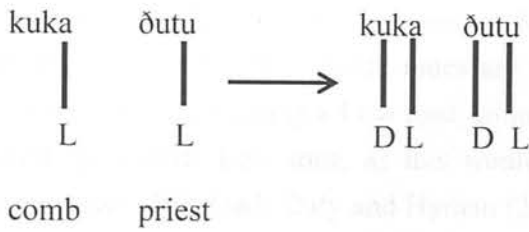
6.35 Association of Low tones

- a) *kūkà* *đūtù* 'priest's comb'
- b) *kūkà* *ìnāⁿ* 'dog's comb'

We consider that it is the avoidance of two adjacent Low tones that prevents the spreading of the Low tone of *kuka*^L in (6.35a).⁵ This association pattern is illustrated in (6.36). Note that in the underlying form there are only two Low tones. In the surface form, the Low tone of *kuka*^L 'comb' is prevented from spreading due to the Low tone associated at the right edge of *đutu*^L 'priest'. We propose that two default Mid tones are inserted to provide tones for the initial syllables of both words in the phrase.

⁵ Sequences of two Low tones are permitted in the perfective form of compound verbs where the derivational prefix sponsors a Low tone. This is further discussed in Chapter 10.

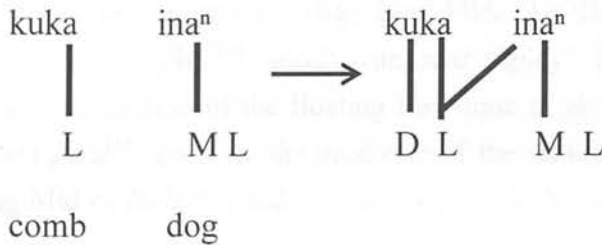
6.36 Prohibition of two adjacent Low tones



the priest's comb

These data in 6.36 contrast with the data in (6.35b) in which the final Low tone of *kuka*^L 'comb' spreads to the initial mora of *ina*^{ML} 'dog'. This is illustrated in (6.37). In the underlying form, we have the Low tone sponsored by *kuka*^L 'comb', but this time, the second word of the phrase sponsors both a Mid and a Low tone. On the right hand side of the diagram we see that the Low tone of *kuka*^L 'comb' spreads to the initial mora of *ina*^{ML} 'dog'. Note that the underlying Mid tone of *ina*^{ML} 'dog' acts as a barrier, or in other terms is not transparent, so that two Low tones do not occur adjacent to each other.

6.37 Spread of Low tone to a Mid-Low word



the dog's comb

If *ina*^{ML} 'dog' had only a Low tone in the melody, then the Low tone of *kuka*^L 'comb' would not be expected to spread as that would result in two adjacent Low tones. As we have already seen in (6.35a) above, spreading of a final Low tone to the following morpheme is prohibited if there is a Low tone associated with the second mora of that morpheme. If both *δutu* 'priest' and *ina*ⁿ 'dog' had the same underlying tones, then some account would have to be given for the difference in association patterns. The most straightforward solution is to posit that there is a Mid tone present which associates with the second TBU of the sponsoring morpheme, and to say that in positions other than pre-pause, the Low tone

associates with the word to the right, unless that word already has a Low tone associated with the second TBU.

These data from MXY contrast with another Mixtec language, that of MIL (Daly and Hyman, 2007). In MIL “Mid” tones are transparent, so that there is a prohibition on sequences containing a Low tone, followed by any number of “Mid” tones, followed by another Low tone, as this would result in two adjacent Low tones on the tonal tier. This leads Daly and Hyman (2007) to posit that in MIL only High and Low are specified and that the third tone is underspecified. In MXY, however, the Mid tone posited for the input of *ina*^{ML} ‘dog’ forms a barrier between the two Low tones so that the two Low tones are not adjacent.

6.4.3. Underlying Mid tones participate in phonological processes that default tones do not

We now turn to look at differences in behaviour between underlying Mid tones and default Mid tones. These differences are detected in contexts where, based on the underlying tones of the morphemes, we would expect the sequence High Low Mid to occur. However this tone sequence is not permitted in MXY. When the underlying tones give a surface pattern of High Low Mid, the Low tone is raised to Mid. However, when the Mid tone in this sequence is in fact an inserted default tone, then the sequence remains High Low Mid. To illustrate these processes we contrast phrases with *βa*^{ʔa}^{LM} ‘good’ with *setu*^l ‘spicy’. In (6.38), we illustrate the results of the association of the floating Low tone of *βa*^{ʔa}^{LM} ‘good’ with the noun. In these data *βa*^{ʔa}^{LM} ‘good’ is the predicate of the sentence. Note that in all cases the floating Mid of *βa*^{ʔa}^{LM} ‘good’ is associated with the noun.

6.38 Contrast between Low Mid underlyingly and Low

	Surface tones on noun	Underlying tones of noun	
a)	<i>βā</i> ^{ʔā} <i>kūjū</i> ⁿ M Λ	L M	‘the meat is good’
b)	<i>βā</i> ^{ʔā} <i>nūnī</i> ⁿ M L	L H	‘the maize is good’
c)	<i>βā</i> ^{ʔā} <i>tʃitē</i> [˘] M ML	M L	‘the banana is good’

The data in (6.38) contrast with those in (6.39), where we see that the Low tone sponsored by *setu*^l ‘spicy’ does not spread to words which have a Low tone associated at the right edge; however, the Low does spread to the initial mora of

ʃʃite^{ML} ‘banana’ as this word has a Mid tone associated at the right edge as well as a floating Low tone.

6.39 Spread of final Low tones

		Surface tones on noun	Underlying tones of noun	
a)	sētù kūjü ⁿ	M Λ	L M	‘the meat is spicy’
b)	sētù nūnì ⁿ	M L	L H	‘the maize is spicy’
c)	sētù ʃʃitē [`]	L ML	M L	‘the banana is spicy’

We now turn to examine the results of associating a floating High tone with the initial mora of *βa²a^{LM}* ‘good’ and *setu^L* ‘spicy’. We consider each noun in turn in these two different contexts. In (6.40) and (6.41) we note the surface tones of *nuni^{nLH}* ‘maize’. We observe that in both contexts the surface tones of *nuni^{nLH}* ‘maize’ are Mid Low. But crucially in (6.40), the tone on the second mora of *βa²a^{LM}* ‘good’ is Mid. We claim that this is due to the occurrence of the tonal sequence High Low Mid, in which Low is raised so that it is acoustically indistinguishable from a Mid tone.

6.40 Raised Low in a High Low↑ Mid sequence

	sēsī	βá ² ā	nūnì ⁿ
H	sesi ^(H)	βa ² a ^{LM}	nuni ^{nLH}
IPFV	taste	good	maize
	<i>the maize tastes good</i>		

However, in (6.41), we see that the tones on *nuni^{nLH}* ‘maize’ are the same following *setu^L* ‘spicy’ as they were following *βa²a^{LM}* ‘good’. But in this case the Low tone of *setu^L* ‘spicy’ is not raised, even though the surface tonal pattern is High Low Mid. We claim that the reason for this is that the surface Mid tone which forms part of the High Low Mid sequence is not part of the underlying tonal inventory for this phrase, but rather has been inserted to prevent two adjacent Low tones.

6.41 No raising of Low in the sequence High Low Default

	sēsī	sétù	nūnì ⁿ
H	sesi ^(H)	setu ^L	nuni ^{nLH}
IPFV	taste	spicy	maize
	<i>the maize tastes spicy</i>		

We see further examples of the same phenomenon in (6.42), (6.43), (6.44) and (6.45). The Low tone of $\beta a^?a^{LM}$ ‘good’ is raised to Mid, whereas the Low tone of $setu^L$ ‘spicy’ is not.

6.42 Raising of Low in the sequence High Low Mid

	sēsī	$\beta a^?ā$	kūjū ⁿ
H	sesi ^(H)	$\beta a^?a^{LM}$	kuju ^{nLM}
IPFV	taste	good	meat
	<i>the meat tastes good</i>		

6.43 No raising of Low in the sequence High Low Default

	sēsī	sétù	kūjū ⁿ
H	sesi ^(H)	setu ^L	kuju ^{nLM}
IPFV	taste	spicy	meat
	<i>the meat tastes spicy</i>		

6.44 Raising of Low in the sequence High Low Mid

	sēsī	$\beta a^?ā$	tʃītē [`]
H	sesi ^(H)	$\beta a^?a^{LM}$	tʃite ^{LM}
IPFV	taste	good	banana
	<i>the banana tastes good</i>		

Note that in 6.44, the floating Mid tone of $\beta a^2 a^{LM}$ ‘good’ associates with a word that has a Mid tone associated with the second mora.

6.45 No raising of Low in the sequence High Low Default

	sēsi	sétù	tʃítḕ
H	sesi ^(H)	setu ^L	tʃite ^{LM}
IPFV	taste	spicy	banana
	<i>the banana tastes spicy</i>		

The data in (6.39) to (6.45) provide evidence that underlying Mid tones are not identical with inserted default tones. This leads to the claim that in MXY there is an underlying contrast between High, Low and Mid, and the inserted default tone is not the same tone as the underlying Mid tone.

6.5. ACOUSTIC EVIDENCE FOR THE DIFFERENCE BETWEEN MID TONE AND DEFAULT TONE

So far the data presented in this chapter have been largely impressionistic. We now present acoustic evidence to show that underlying Mid tones participate in phonological rules which default tones do not. We examine data which show that a Low tone in the sequence High Low Mid is raised so that it is phonetically indistinguishable from Mid tone, whereas a Low tone in the sequence High Low Default is not raised.

6.5.1. Methodology

Data shown in Section 6.4.3 above indicate that the Low tone in the sequence High Low Mid is raised to Mid, whereas the Low tone in the sequence High Low Default is not. This section presents acoustic evidence for this claim. As the experiment described in Section 6.5.2 is the first in this thesis, we now explain the methodology used in collecting the data for all experiments documented in this and subsequent chapters. The elicitation lists used for the experiments are given in Appendix C. For all the materials presented, the surface tones, the underlying tones, the morphemic gloss and free translation are given.

Recordings used in this thesis were made by a number of participants, all native speakers of MXY, representing two of the counties included in the MXY

designation. The people who participated in the different experiments were determined by who was present at the time of the recording. In (6.46) we give a list of all the people who participated in the experiments described in this thesis.

6.46 List of participants

	Age	Sex
GA	40's	Male
GO	30's	Female
LF	30's	Male
MR	50's	Male
PG	40's	Male
SM	60's	Female

The participants were given sentences to read. To ensure that the order in which sentences were read did not influence acoustic features, each participant read the sentence prompts in a different random order. Each sentence prompt was printed on a separate slip of paper. These slips of paper were put in a box and selected at random by the participant. All participants had had practice in reading MXY, although some were more fluent readers than others.

The technician conducting the recordings was Rodolfo Miguel-López, a native speaker of MXY. The materials used in each experiment were prepared with his help in order to provide as near to natural utterances as possible given the constraints of each experiment. Rodolfo's insights into his language helped identify possible differences of interpretation of the utterances due to changes of focus.

The recordings were made in a sound-proof room using an EDIROL R-09HR recorder (the internal microphone was used). The large digital files were broken down into individual files for each of the target words. Each individual file contains two repetitions of an utterance. The second repetition of each utterance was saved to a separate 88.2 kHz 16 bit .wav file for analysis. The target words were segmented manually using Praat version 5.2.25 (Boersma & Weenink, 1992-2011). The segmentation was done using the visual cues from spectrograms. The measurements were taken using Praat scripts, and then analysed using SPSS.

The statistical analysis methods used in most cases look for variance in results that are not likely to be the result of random variation. In the analysis of variance (ANOVA) it is assumed that each measurement is a separate case. However, in

these data the measurements taken are not all independent of one another in that the participants recorded various utterances. We compare the measurements taken for each speaker with measurements gathered from other utterances by the same speaker in the same experiment set; that is, we are looking at within-subject repeated measure variance. Therefore the ANOVA results given show variation between speakers rather than variation between the utterances.

6.5.2. Evidence that Mid and Default tones are not the same

We now turn to look at the acoustic evidence for the claim that a Low tone is raised in the sequence High Low Mid, but not in the sequence High Low Default. In order to be able to check this hypothesis, eleven nouns with a variety of underlying tonal patterns were used in sentences with each of the two verbs *see*^M ‘buy’ and *ḍiko*^{MH} ‘sell’. In addition two nouns *ḍita*^{LH} ‘tortilla’ and *tíjfi*^{MH} ‘avocado’ were used with the verb *kasí*^{MH} ‘eat’. Three enclitics were used, *ḍa*^{HL} 1HON, *na*^(H) 1INCL and *sí*^(H) 3G. The combinations of verbs, enclitics and nouns provide a wide range of tonal contexts. Sample utterances are given in (6.47), (6.48) and (6.49). The entire elicitation set is given in Appendix C. Note that when Low tones which form part of the sequence High Low Mid are raised, this is indicated by ↑.

6.47

nīⁿ- sècēⁿ ḍá ḍità kájì↑nīⁿ
 PFV buy 1HON tortilla day before yesterday
I bought tortillas the day before yesterday.

6.48

nīⁿ- ḍìkō ḍá ḍità kájì↑nīⁿ
 PFV sell 1HON tortilla day before yesterday
I sold tortillas the day before yesterday.

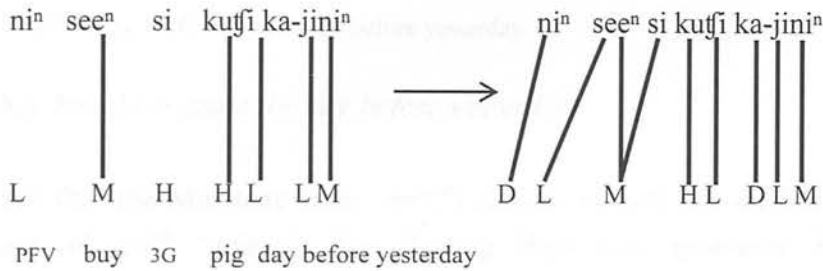
6.49

nīⁿ- sèsī ḍá ḍità kájì↑nīⁿ
 PFV eat 1HON tortilla day before yesterday
I ate tortillas the day before yesterday.

We now look briefly at some of the phonological processes exhibited in this data set. First we note that the tones of most verbal prefixes and enclitics do not

associate with their sponsoring morpheme. In (6.50) we see that in the underlying form, the tones of both the perfective prefix $ni^{(L)}$ - and the 3G enclitic are not associated with their sponsoring morphemes. When we look at the surface tones we see that a default tone is associated with the perfective prefix $ni^{(L)}$ - and the Mid tone associated with the final mora of the verb $see^{(M)}$ spreads to the enclitic $st^{(H)}$ 3G.

6.50 Spread of a Mid tone from the verb to the enclitic

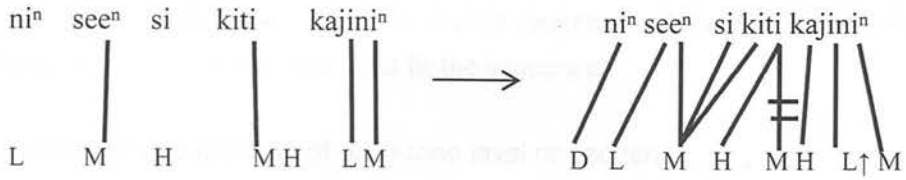


They bought a pig the day before yesterday.

Note that in (6.50), the High tone of the enclitic is deleted in the surface form, as there is no TBU with which it can associate. We also see that a default tone is inserted to provide a tone for the initial mora of $ka-jt^i ni^{(M)}$, as the Low tone of $ku^H jt^i$ is prevented from spreading as there is a Low tone associated with the second mora of $ka-jt^i ni^{(M)}$. This prohibition of a Low tone spreading to a morpheme with a Low tone is described in Section 6.3.1 above. Note also that in the surface form the two moras of $ku^H jt^i$ and the initial mora of $kajt^i ni^{(M)}$ form the sequence High Low Default, which is one of the sequences we are investigating with this experiment.

The floating High tones sponsored by enclitics associate with the noun object, unless that word already has a High tone associated with it, as was the case in (6.50). However, in (6.51), we see how the floating High tone of $st^{(H)}$ 3G associates at the right edge of $kit^{(MH)}$ 'animal'.

6.51 Association of the floating High tone of the enclitic



PFV buy 3G animal day before yesterday

They bought animals the day before yesterday.

We also see that the Mid tone from *see*^{n(M)} spreads to both the enclitic and the initial mora of *kiti*^{MH} ‘animal’. The floating High tone sponsored by *kiti*^{MH} associates with the initial mora of *kaji*^t*ni*^{t(M)}, thus forming a High Low Mid sequence, which is at the centre of this experiment.

These two examples in (6.50) and (6.51) show how by carefully selecting the items, we can ensure that the surface forms vary and provide examples of both sequences: High Low Mid and High Low Default. One key feature was selecting two verbs, one with a floating High tone, *ḍiko*^{MH} ‘sell’, and *see*^{n(M)} ‘buy’ which does not have a floating tone. This selection increased the variation in surface forms.

We now turn to describe the experiment. The data for this experiment were recorded by 5 speakers using the method described above in Section 6.5.1. A preliminary repeated measures ANOVA was conducted with the following factors: Speaker, Tone and Vowel. The results show an interaction between the factors Tone and Vowel. Therefore the in-depth analysis was carried out on a subset of the data; that is, only occurrences of the vowel /i/ were used, as this vowel was the most frequent in this data set. In (6.52) we give the number of occurrences of the vowel /i/ per speaker.

6.52 Database size

Speaker	
MR	169
LF	156
GO	143
GA	111
PG	166
Total	745

In (6.53), we give the number of occurrences of each tone, noting that the sequence High Low Mid (hLm) and High Low Default (hLd) were classified separately as was the default tone (D). Note that in sequences, the tone indicated by uppercase letter is the one being measured in the sequence.

6.53 Number of occurrences of each tone level or sequence

Tone	
L	118
hLd	37
hLm	199
M	123
D	35
H	233

A repeated measures ANOVA was run using the factors Speaker and Tone. The mean F0 of the mid 50% of the vowel being measured was used. Considering that MXY is a tone language it is not surprising that the mean F0 of the different tone levels is significantly different, $F(5, 20) = 161.02, p < 0.001$. However, what is of interest is the comparison of the mean F0 of the Low tones in the sequences hLd and hLm with Low and Mid. The results of the post hoc pairwise comparisons are given in (6.54) on the next page. The results which show no significant difference are shaded in grey. We see that there is no significant difference between the F0 of a Low tone and the Low tone in the sequence High Low Default, $p = 0.2$. On the other hand, a comparison of the F0 of Low tones and the Low in a High Low Mid sequence is significantly different, $p < 0.001$. We also see that there is no significant difference between the F0 of Mid and Default, $p = 1.0$.

6.54 Pairwise comparison

Tone (1)	Tone (2)	Mean Difference (I-J)	Std. Error	Value of p
L	hLd	-3.432	1.391	0.2
	hLm	-22.079	.838	<0.001
	M	-21.486	.924	<0.001
	D	-23.79	1.348	<0.001
	H	-40.185	.816	<0.001
hLd	hLm	-18.646	1.309	<0.001
	M	-18.054	1.366	<0.001
	D	-20.358	1.682	<0.001
	H	-36.752	1.295	<0.001
hLm	M	0.592	.794	1.0
	D	-1.712	1.262	1.0
	H	-18.106	.666	<0.001
M	D	-2.304	1.321	1.0
	H	-18.699	.772	<0.001
D	H	-16.394	1.248	<0.001

In summary, the data in (6.54) show, as expected for a tone language, that there are significant differences in F0 for the different tone levels, High Low and Mid. These data also provide evidence that Low tones in the sequence High Low Mid are raised so that phonetically they are indistinguishable from Mid tones. As the raising of F0 does not occur in the sequence High Low Default, these data also provide evidence that there are underlying Mid tones in MXY which are distinct from the inserted Default tones. In other words, underlying Mid tones participate in phonological processes which Default tones do not.

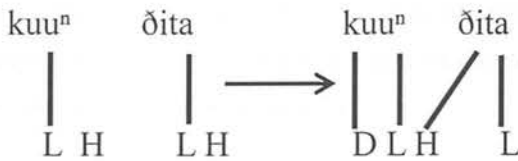
6.6. THEORETICAL ISSUES

In this chapter we have explained some foundational features of MXY tonal phonology. Here we look at some theoretical issues in relation to the association patterns of MXY noun phrases. Theoretical issues are further discussed in Chapters 10 and 11.

6.6.1. Alignment

An important fact in understanding MXY tonal phonology is that in most cases tones sponsored by a morpheme align at the right edge of that morpheme. Thus surface alternations are usually the result of tonal association rather than any changes in the underlying tones of the morpheme. For example in (6.55), we see that the High tone in the surface form of the word δita^{LH} ‘tortilla’ is the result of the association of a floating High tone.

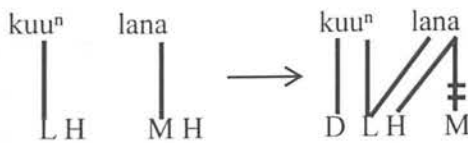
6.55 Tone association for the phrase ‘four tortillas’



four tortilla

In (6.56), we see that the floating High tone of kuu^{LH} ‘four’ delinks the Mid tone of $lana^{MH}$ ‘child’ and the Low tone of kuu^{LH} ‘four’ spreads to the initial syllable of $lana^{MH}$ ‘child’.

6.56 Tone association for the phrase ‘four children’



four child

The data in (6.56) also illustrate that in MXY, High tones prefer to align at the right edge of prosodic phrases. In Chapter 10 we present more data to show the domains in which floating High tones align at the right edge. When examining the

tonal phenomena of nouns, we see that floating High tones do not delink Low tones associated at the right edge, as was shown in (6.55). However, as we will see in Chapter 8 on verbal morphology, some floating High tones sponsored by verbal prefixes do delink Low tones associated at the right edge of verb roots.

6.6.2. Underlying tonal inventory

In this chapter, we have presented evidence for the presence of a fully specified underlying Mid tone, in addition to a default tone which is phonetically indistinguishable from underlying Mid, although the default Mid tone does not participate in phonological rules, as was shown in (6.41) above. We now look at this analysis against the background of other research into the underlying tonal inventory of tone languages.

Hyman (2001), following Stevick (1969), points out that it is usually possible to ‘zero out’ a tone, in the sense that when there are two contrasting entities, it is often possible to claim that rather than there being two underlying contrasting entities, the surface contrast can be regarded as the presence versus the absence of some feature. Hyman (2001) presents examples of varying tonal systems. Hyman’s examples of the most frequent situations involving languages with a two- or three-way contrast are cited in (6.57).

6.57 Common contrasts in tone systems (Hyman, 2001)

Phonetic Opposition	Phonological Opposition	Examples
a) [H] vs [L]	/H/ vs /Ø/	Slave, Navajo, Somali, Paicĩ
b) [H] vs [M] vs [L]	/H/ vs /Ø/ vs /L/	Fasu, Yoruba

The languages given in (6.57a), where there is a two-way opposition, have an underlying system where a TBU is either High or toneless, and toneless is realised as lower than High. In these cases, Hyman (2001) points out that this situation can also be described as having a ‘marked’ High vs an ‘unmarked’ Low. In (6.57b), there is a three-way opposition underlying /H/, /L/ or /Ø/, where /Ø/ is realised as Mid. These cases can be described as having an unmarked Mid. Daly and Hyman (2007) analyse MIL Mixtec as having an underlying system of /H/ vs /L/ with Mid being unmarked.

Hyman also lists some less common possibilities, for two- and three-level tone systems; these are given in (6.58).

6.58 Less common contrasts in tone systems (Hyman, 2001)

	Phonetic Opposition	Phonological Opposition	Examples
a)	[H] vs [L]	/L/ vs /∅/	Dogrib, Sekani, Jabem, Dubea
b)	[H] vs [L]	/H/ vs /L/ vs /∅/	Margi, Nande
c)	[H] vs [M] vs [L]	/∅/, /L/	Engenni
d.	[H] vs [M] vs [L]	/H/, /L/	Kom

In (6.58a), the situation is similar to (6.57a), except that in this case, the system is analysed as the presence vs the absence of Low. In (6.58b), we see a system in which there is a three-way underlying representation where /∅/ receives either a High or a Low by rule. In Engenni, shown in (6.57c), /L/ is marked and /∅/ is realised as Mid (unless it is followed by a Low tone, in which case it is realised as High). In (6.57d) we have the case of an underlying binary system that is realised as High, Mid, or Low on the surface.

The data from MXY presented in this chapter show that MXY is different from the scenarios listed in (6.57) and (6.58). There is a four-way phonetic opposition of High, Mid, Lowered-Mid and Low, as shown in (6.59).

6.59 MXY four-way surface contrast

	M H	M M	M Λ	M L
a)	tūú ⁿ 'black'		tūü ⁿ 'feather'	tūù ⁿ 'soot'
b)		nō ^ʔ ō 'basket'	nō ^ʔ ö 'adobe'	nō ^ʔ ò 'vegetable garden'
c)		kīðī 'to shake'	kīðī 'pot'	
d)	k ^w ē ^ʔ é 'red'			k ^w ē ^ʔ è 'illness'

As we have shown above in Section 6.2, Lowered-Mid can be analysed as a sequence of Low and Mid associated with one mora, thus we can zero-out the fourth level, leaving us with three levels. Given the analysis presented in Daly and Hyman (2007) for MIL, it would seem possible that MXY, which is geographically adjacent, would have the same underlying tone system: that is, High and Low and unmarked Mid. However, in this chapter we have presented evidence of underlying Mid in MXY, along with evidence that this underlying tone, although phonetically indistinguishable from the default tone, participates in processes that the default tone does not.

CHAPTER 7

TONAL ASSOCIATION

In this chapter we look at some further phonological processes which determine the surface tonal association of MXY. A first step towards this goal is the examination of the tonal phenomena represented by the enclitics. We have seen in Chapter 6 that in MXY, the underlying tones of disyllabic morphemes usually associate at the right edge. In this chapter we look at evidence which shows that the underlying tones of most MXY enclitics do not associate with the enclitic itself but usually with the morpheme to the right. This presents a double challenge: one, to determine what the underlying tones of the enclitics are; and two, how to account for the surface tones found on the enclitics and the morphemes to their right. In Section 7.1 we present data to show what are the underlying tones of the enclitics; then in Section 7.2 we turn to examine data which shows that in certain contexts the Low tones in the sequence High Low High are raised to Mid; in Section 7.3 we describe processes by which High tones are multiply linked; in Section 7.4 we look at data in which the syntactic relationship between the enclitic and its host determines the surface tones of the enclitic. Section 7.5 gives a summary of the findings presented in this chapter.

7.1 DATA FROM ENCLITICS

In (7.1), we give a list of the enclitics found in MXY, grouped according to their underlying tones, although the evidence for these tones has yet to be presented. Note that for each enclitic, the group to which it belongs is given in column 1, the gloss in column 3 and the underlying tones in column 4. Data to substantiate the four groups are given in (7.1) is provided in this section. A list of abbreviations is given in Appendix A.

7.1 MXY enclitics

Group		Gloss of enclitic	Underlying tones
1	ǎá	1HON	HL
	ní ⁿ	2HON	HL
2	na ⁿ	2FS	(H)
	ti	3AN	(H)
	si	3G	(H)
	ja ⁿ	3HON	(H)
	nu ⁿ	3F	(H)
	ji	3MFS	(H)
	te	3LQ	(H)
3	ni ⁿ	1	(L)
	no ⁿ	2MS	(L)
	ǎe	3MMS	(L)
	ja	3DEI	(L)
4	no	1INCL	(H)

In the data examples used in this chapter, we provide the surface tones of two clitics from groups, 1, 2 and 3, and also the surface tones found on *no*^(H) 1INCL.

One feature of the underlying tones of MXY enclitics is that most of them do not associate with their sponsoring morpheme, but rather occur as floating tones. Therefore, in order to determine the underlying tones of the enclitics and account for their surface tones, we look at the enclitics in different tonal environments. In each case the enclitic is followed by the complementiser *ha*^(LH) as this morpheme accepts any floating tone. We divide the contexts into three groups: the first group, in which the word preceding the enclitic either has a final High tone or sponsors a floating High tone; the second group, in which the word to the left of the enclitic either has a final Low tone or sponsors a floating Low tone; and lastly we look at contexts in which the preceding morpheme has a Mid tone associated at the right edge or sponsors a floating Mid tone.

7.1.1 High tone contexts

We now turn to look at the first tonal context: that is, an enclitic following a word which has a High tone associated at the right edge, but does not sponsor any floating tone. The frame used is given in (7.2). Of interest to this discussion are the tones on the two morphemes in the grey cells: that is, the tones on the enclitic, in this instance illustrated by δa^{HL} 1HON, and the complementiser $ha^{(LH)}$.

7.2 Frame with a final High tone

	$n\bar{a}^?a^n$	δa	$h\grave{a}$	$k\grave{i}s\grave{i}$	$t\check{f}\acute{e}^?n\grave{u}^n$
H-	$na^?a^{nM}$	δa^{HL}	$ha^{(LH)}$	$kisi^M$	$t\check{f}e^{?H}nu^{nL}$
IPFV	know	1HON	COMP	come	old person

I know that the old person will come.

In (7.3), we give the surface tones of selected enclitics from each group given in (7.1) and the complementiser $ha^{(LH)}$, following a word with a final High tone. In this context, the surface tones of the verb and subject of the complement clause are the same after each enclitic.

7.3 Surface tones on enclitics and the complementiser following final High

Group					Gloss of enclitic	Underlying tones
1	δa	$h\grave{a}$	$k\grave{i}s\grave{i}$	$t\check{f}\acute{e}^?n\grave{u}^n$	1HON	HL
	$n\acute{i}^n$	$h\grave{a}$			2HON	HL
2	$s\acute{i}$	$h\acute{a}$	$k\grave{i}s\grave{i}$	$t\check{f}\acute{e}^?n\grave{u}^n$	3G	(H)
	$n\acute{u}^n$	$h\acute{a}$			3F	(H)
3	$n\acute{i}^n$	$h\grave{a}$	$k\grave{i}s\grave{i}$	$t\check{f}\acute{e}^?n\grave{u}^n$	1	(L)
	$\delta\acute{e}$	$h\grave{a}$			3MMS	(L)
4	$n\acute{o}$	$h\acute{a}$	$k\grave{i}s\grave{i}$	$t\check{f}\acute{e}^?n\grave{u}^n$	1INCL	(H)

First we note that in (7.3), all the enclitics have a surface High tone. However, as we will see, only the two enclitics in Group 1 have an underlying High tone which

is linked underlyingly. In the case of the other enclitics, the High tone found in the surface form in (7.3) is a result of the final High tone of the verb being spread to the enclitic. However, upon further examination of the data in (7.3), we see that although the tones are the same on all the enclitics, in the case of Groups 1 and 3, there is a Low tone associated with the complementiser. Further data will substantiate the division into Groups 1 and 3. We also see that for Groups 2 and 4 there is a surface High tone on these enclitics and on the complementiser. In these cases the data in (7.3) do not show whether the High tone associated with the complementiser is multiply linked with the enclitic or whether it is a separate tone sponsored by the enclitic. The motivation for putting $n\alpha^{(H)}$ 1INCL in a separate group will be shown in (7.5), where the enclitics follow a morpheme with a floating High tone.

We now turn to examine the surface tones on enclitics where they occur following a morpheme which sponsors a floating High tone. In (7.4), we give the frame used to provide this context.

7.4 Frame with a floating High tone

kāsī	ǎ́	hà	βá²ā
kasi ^{MH}	ǎ ^{HL}	ha ^(LH)	βa²a ^{LM}
eat	1HON	COMP	good
<i>I will eat what is good.</i>			

In (7.5), we give the surface tones of the selected enclitics in the frame given in (7.4). We see that there are very few differences between the surface tones on the enclitic and complementiser after a word with a final High tone and the surface tones when the enclitic and complementiser follow a word with a floating High tone. The tones of enclitics in Groups 1, 2 and 3 are the same as in (7.3) above. However, we note that for $n\alpha^{(H)}$ 1INCL, the floating High tone sponsored by *kasi^{MH}* 'eat' does not associate with the enclitic; instead the Mid tone associated with the second mora of *kasi^{MH}* spreads to the enclitic. The High tone sponsored by the enclitic associates with the complementiser. It is because of this distinctive behaviour of 1INCL that we have put it in a separate group.¹ It is the only enclitic that does not permit the association of a floating High tone.

¹ Note that the corresponding enclitic in MIG also showed idiosyncratic behaviour as is described in Chapter 4.

In (7.5), we see that the surface tones on $\beta a^?a^{LM}$ ‘good’ are High Mid. This results from the fact that a floating High tone is associated with the initial mora of $\beta a^?a^{LM}$ ‘good’, thus forming a High Low Mid sequence. As we saw in Chapter 6, Low tones which form part of the surface sequence High Low Mid are raised to Mid. In passing note that the sequence High Low High is permitted across the enclitic, complementiser and the initial mora of $\beta a^?a^{LM}$ ‘good’.

7.5 Surface tones following a morpheme with a floating High tone

Group				Gloss of enclitic	Underlying tones
1	ǎá	há	$\beta a^?a$	1HON	HL
	ní ⁿ	há	$\beta a^?a$	2HON	HL
2	sí	há	$\beta a^?a$	3G	(H)
	nú ⁿ	há	$\beta a^?a$	3F	(H)
3	ní ⁿ	há	$\beta a^?a$	1	(L)
	ǎé	há	$\beta a^?a$	3MMS	(L)
4	nō	há	$\beta a^?a$	1INCL	(H)

7.1.2 Low tone contexts

We now turn to look at contexts in which the morpheme to the left of the enclitic has either a final Low tone or a floating Low tone. Although the surface tones after a final High tone and a floating High tone were in most cases the same, in this section we see that there are enclitics to which a final Low tone does not spread, but a floating Low tone will associate.

First we look at contexts in which the previous word has a final Low tone. The frame for this context is given in (7.6).

7.6 Frame with a final Low tone

tʃĩnā ^ʔ a ⁿ	ǎ́	hà	kàsì	kítí
tʃĩna ^ʔ a ^{nL}	ǎ ^{HL}	ha ^(LH)	kasi ^{MH}	kiti ^{MH}
divide out	1HON	COMP	eat	animal
<i>I will divide out what the animals are going to eat.</i>				

The surface tones for the enclitics and complementiser are given in (7.7). It is in this set that we see the motivation for separating Groups 1 and 3. Here Group 1 enclitics have a surface High tone. As these enclitics always have a High tone, we conclude that they have a High tone associated with them underlyingly. The Low tone sponsored by them is either realised as a down-glide when the enclitic occurs pre-pause, or in other environments, for example in the context given in (7.6), the Low tone is associated with the following morpheme. In this set, we see that a final Low tone does not spread to Group 2 enclitics. In order to provide a tone for these enclitics a default Mid tone is inserted. The High tone sponsored by these enclitics associates with the complementiser. In the case of Group 3 enclitics, the final Low tone spreads to them. The Low tone sponsored by the enclitic associates with the complementiser. For Group 4, we claim that the Low tone spreads from the preceding morpheme and that the High tone sponsored by the enclitic associates with the complementiser, as we saw for Group 2. In this set we see that the surface tones of Group 2 enclitics are not the same as the tone of the enclitic in Group 4, even though both groups of enclitics sponsor a floating High tone.

7.7 Surface tones following a verb with a final Low tone

Group					Gloss of enclitic	Underlying tones
1	ǎ́	hà	kàsì	kítí	1HON	HL
	ní ⁿ	hà			2HON	HL
2	sī	há	kàsì	kítí	3G	(H)
	nū ⁿ	há			3F	(H)
3	nì ⁿ	hà	kàsì	kítí	1	(L)
	ǒè	hà			3MMS	(L)
4	nò	há	kàsì	kítí	1INCL	(H)

We now turn to examine the surface tones on the enclitics and on the complementiser *ha*^(LH) after verbs which have a floating Low tone. In (7.8), we present the sentence used as the frame.

7.8 Frame with a floating Low tone

tēkū	ǎ́	hà	kà [?] á ⁿ	tō [?] ò
teku ^{ML}	ǎ ^{HL}	ha ^(LH)	ka [?] a ^{nL}	to [?] o ^L
hear	1HON	COMP	say	town authority

I will hear what the town authorities will say.

In (7.9), we see that all the enclitics except for those of Group 1 accept the floating Low tone sponsored by the verb *teku*^{ML} 'hear'. We have shown already that Group 1 enclitics have a High tone associated with them underlyingly. The Low tone that they also sponsor is associated with the complementiser *ha*^(LH). For Groups 2-4 we claim that the surface tone of the complementiser *ha*^(LH) is the tone sponsored by the enclitic. In (7.9) we see that for Group 2 enclitics the tone on the complementiser is High, in Group 3 it is Low, and for Group 4 it is High.

7.9 Surface tones following a floating Low tone

Group					Gloss of enclitic	Underlying tones
1	ǒá	hà	kà [?] á ⁿ	tō [?] ò	1HON	HL
	ní ⁿ	hà			2HON	HL
2	sì	há	kà [?] á ⁿ	tō [?] ò	3G	(H)
	nù ⁿ	há			3F	(H)
3	nì ⁿ	hà	kà [?] á ⁿ	tō [?] ò	1	(L)
	ǒè	hà			3MMS	(L)
4	nò	há	kà [?] á ⁿ	tō [?] ò	1INCL	(H)

7.1.3 Mid tone contexts

We now look at the tones on the enclitics following verbs which have a final Mid tone or a floating Mid tone. First in (7.10), we show the frame used to gather these data.

7.10 Frame with a final Mid tone

kāǒā	ǒá	hà	k ^w ini ⁿ	tʃé [?] nù ⁿ
kaǒa ^M	ǒa ^{HL}	ha ^(LH)	k ^w ini ^{nML}	tʃe ^{H?} nu ^{nL}
do	1HON	COMP	wish	old person

I will do what the old person wishes.

In (7.11), we see that apart from Group 1, there is a Mid tone on all the enclitics. We also see that for Groups 2-4, the surface tones on *ha^(LH)* are the tones sponsored by the enclitics, so for Groups 2 and 4 the complementiser *ha^(LH)* is realised with a High tone. After Group 3 it is realised with a Low tone. Note that the floating Low sponsored by Group 1 enclitics also associates with the complementiser.

7.11 Surface tones following a final Mid tone

Group					Gloss of enclitic	Underlying tones
1	ǎá	há	k ^w íńí ⁿ	tʃé [?] nù ⁿ	1HON	HL
	ńí ⁿ	há			2HON	HL
2	sī	há	k ^w íńí ⁿ	tʃé [?] nù ⁿ	3G	(H)
	nū ⁿ	há			3F	(H)
3	ńí ⁿ	há	k ^w íńí ⁿ	tʃé [?] nù ⁿ	1	(L)
	ǎē	há			3MMS	(L)
4	nō	há	k ^w íńí ⁿ	tʃé [?] nù ⁿ	1INCL	(H)

In (7.12), we give the frame used to provide a context in which the enclitics follow a verb with a floating Mid tone.

7.12 Frame with a floating Mid tone

kātū [?] ù ⁿ	ǎá	há	kájù	nùkú
ka-tu [?] u ^{nLM}	ǎa ^{HL}	ha ^(LH)	kaju ^L	nuku ^{ML}
warn	1HON	COMP	burn	wood

I will warn (them) that the wood will burn.

We see in (7.13), that the floating Mid tone of *katu[?]u^{nLM}* associates with the enclitics in Groups 2-3. Once again the tones associated with the complementiser are the tones sponsored by the enclitics.

7.13 Following a floating Mid tone

Group					Gloss of enclitic	Underlying tones
1	ǎá	hà	kájù	nùkū	1HON	HL
	nī ⁿ	hà			2HON	HL
2	sī	há	kájù	nùkū	3G	(H)
	nū ⁿ	há			3F	(H)
3	nī ⁿ	hà	kájù	nùkū	1	(L)
	ǎē	hà			3MMS	(L)
4	nō	há	kájù	nùkū	1INCL	(H)

By comparing the data in (7.11) and (7.13), we see that the surface tones on the enclitics are the same following a floating Mid tone as they are following a Mid tone that is associated at the right edge of the previous word or morpheme.

Having documented the surface tones of the enclitics in various tonal contexts, we are now in a position to substantiate the groupings proposed. The table in (7.14) shows the surface tone found on the enclitics in each of the six contexts described above.

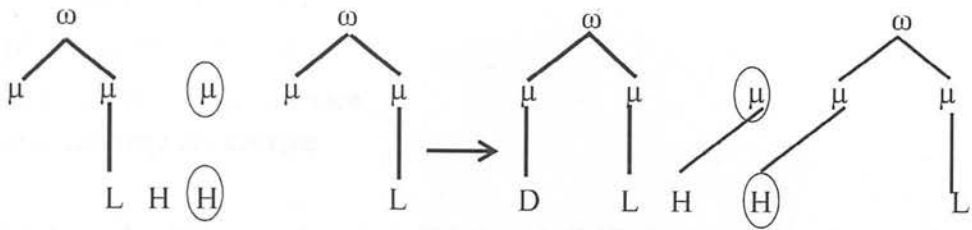
7.14 Summary of enclitic classes and tonal association conventions

		Gloss	Tones of the enclitic	Final High Spread	Floating High Association	Final Low Spread	Floating Low Association	Final Mid Spread	Floating Mid Association
1	ða	1HON	H L						
	ni ⁿ	2HON	H L						
2	si	3G	(H)	✓	✓		✓	✓	✓
	nu ⁿ	3F	(H)	✓	✓		✓	✓	✓
3	ni ⁿ	1	(L)	✓	✓	✓	✓	✓	✓
	ðe	3MMS	(L)	✓	✓	✓	✓	✓	✓
4	no	1INCL	(H)	✓		✓	✓	✓	✓

From the data in (7.14), we see that the surface tone found on the enclitics is entirely predictable from the context, once the restrictions are understood. First we re-iterate that it is only Group 1 enclitics that have tone associated with them underlyingly. The tones sponsored by the other enclitics usually associate with a morpheme to the right. We note that Low tones do not spread to Group 2 enclitics which sponsor a High tone, nor do floating High tones associate with the Group 4 enclitic *no*^(H) 1INCL. The differences observed between the surface tonal phenomena of Groups 2 and 4 provide grounds for considering them to be classified as separate groups, although in other contexts their surface tones are the same.

The figure in (7.15) shows the typical tonal association patterns for enclitics in which the surface tone of the enclitic is sponsored by the morpheme to the left, and the tone sponsored by the enclitic associates with the morpheme to the right. In (7.15), we show a sequence of a word followed by an enclitic followed by another word. For simplicity's sake, we have chosen that the first word in the series sponsors a Low High tone melody. We have enclosed both the mora of the enclitic and the High tone it sponsors in circles. The second word sponsors a Low tone. The Low tones sponsored by the words are associated underlyingly. However, the tone sponsored by the enclitic is a floating tone. In the surface form the floating High tone of the first word associates with the mora of the enclitic, shown in a circle. The High tone sponsored by the enclitic, also shown in a circle, associates with the initial mora of the second word.

7.15 Tone association of enclitics



In this section, we have shown different factors which determine the surface tones of MXY enclitics. First, we noted that in most cases, the tone sponsored by the enclitic does not associate with the enclitic. Secondly, we documented the association and spread of High, Mid and Low tones, noting the restrictions on the association of floating High tones and spreading of Low tones. Once these factors are taken into account, what looks like a very complex system becomes transparent.

7.2 RAISED LOW

We have already seen in Chapter 6, that a Low tone in the sequence High Low Mid is raised so that it is phonetically indistinguishable from Mid. We showed that this process only applies to underlying Mid tones, not default tones. We now turn to a second context in which Low is raised: that is, when the sequence High Low High occurs across prosodic phrase boundaries².

In order to investigate this phenomenon, sentences consisting of Verb Enclitic Subject and Noun Object and optional Locative phrase were recorded by five speakers. Examples of these sentences are given in (7.16), (7.17) and (7.18). The complete data set is given in Appendix C.

7.16

kīβì	tī	tíkū
kīβì ^{LM}	tī ^(H)	tiku ^{LM}
enter	3AN	crevice

It will enter the crevice.

² In Chapters 10 and 11 we show further evidence for determining prosodic boundaries in MXY.

7.17

kíβī tī tīkū
 H kɪβi^{LM} ti^(H) tiku^{LM}
 IPFV enter 3AN crevice
It is entering the crevice.

Note that the only difference between (7.16) and (7.17) is that in the former the verb is irrealis whereas in the latter it is imperfective. By using different verbal forms we increase the differences in the surface tones, while maintaining the same CV segments.

7.18

kīnīⁿ tī títā
 kɪni^{nML} ti^(H) tita^{LM}
 see 3AN opossum
It will see the opossum.

In (7.18), we see that the surface tone of the enclitic *ti*^(H) 3AN is Low, as the floating Low tone of *kini*^{nML} associates with it. By using a variety of verbs and nouns, we ensure a wide range of surface tonal patterns.

The recorded utterances were segmented and transcribed using Praat, as described in Chapter 6. From these utterances we selected only those moras which have the vowel /i/. In these utterances the vowel /i/ occurs under all tonal contexts, including those which sound as if Low tones have been raised to Mid, both where Low tones occur in the sequence High Low High and High Low Mid. In (7.19), we give the number of occurrences of the vowel /i/ in each tonal category. Low tones in the sequence High Low Mid (hLm) as well as those in the sequence High Low High (hLh) are treated as separate categories. We see that Mid tone is the most frequent, followed by High tone.

7.19 Number of occurrences of each tonal category

Tone	
L	24
hLm	8
hLh	47
M	84
H	113

In 7.20 we give the mean F0 for each tone category. This measurement was taken over the mid 50% of the duration of the vowel. We see that there is very little difference between the Low tone in the sequence High Low High or High Mid High and Mid tones.

7.20 Mean F0 for each tonal category.

Tone	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
L	145.273	1.409	142.498	148.048
hLm	168.001	2.585	162.910	173.091
hLh	167.562	0.998	165.598	169.527
M	167.060	0.741	165.600	168.520
H	190.787	0.641	189.524	192.049

A repeated measures ANOVA was conducted using Speaker and Tone as the factors. Not surprisingly the differences in F0 were significant for the factor Tone, $F(4,15) = 52.25$ $p < 0.001$. However, the post-hoc results do show interesting results. The multiple comparisons of tones show that there is no significant difference in F0 between Mid and the Raised Low tone in either the sequences High Low High or High Low Mid as shown in (7.21). This is clearly seen when the F0 of the Low tone in the sequence High Low Mid is compared with both the F0 of Mid tones and of Low tones in the sequence High Low High ($p = 1.0$); that is, the difference is not significant. Note that these rows are shaded.

7.21 Mean differences between the tone levels and sequences

(1) Tone	(2) Tone	Mean Difference (1-2)	Std. Error	Value for <i>p</i>
L	hLm	-27.08	2.763	<0.001
	hLh	-23.181	1.698	<0.001
	M	-23.466	1.567	<0.001
	H	-45.521	1.521	<0.001
hLm	hLh	3.899	2.589	1.0
	M	3.614	2.505	<0.001
	H	-18.441	2.476	<0.001
hLh	M	-0.285	1.233	1.0
	H	-22.34	1.175	<0.001
M	H	-22.055	0.975	<0.001

We conclude that in the contexts of the sequence High Low Mid and High Low High, the F0 of Low tones is indistinguishable from that of Mid tones. These contexts are two of the few contexts in MXY where alternations of underlying tones are found. In other contexts where there are surface alternations, we claim that these are due to the association and spread of tones rather than changes to underlying tones.

7.3 TONAL ASSOCIATION

We now turn to look at two processes of tonal association which occur as the result of the association of floating High tones: first we look at data in which floating High tones associate with a mora of one morpheme and spread across the morpheme boundary to the morpheme to the right; secondly we present data which demonstrate the interaction of syntax and phonology.

7.3.1 High tone link and spread (HTLS)

We first look at examples in which a floating High tone associates with a morpheme and then spreads to at least one TBU to the right. We refer to this process as 'High tone link and spread' (HTLS). One consequence of HTLS is the constraint against adjacent High tones is violated as we shall see in each of the examples in this section. The process of HTLS is illustrated in (7.22) and (7.23). In (7.22), we see that the only morpheme which sponsors a High tone is the enclitic

$t\acute{i}^{(H)}$ 3AN. Nevertheless, there is a High tone associated with both moras of ii^{nM} ‘one’ and the initial mora of $t\acute{i}t\acute{a}^{LM}$ ‘opossum’.

7.22 High tone link and spread

tē nīⁿ sīnīⁿ tì íⁿ títā
 te^(M) ni^{nL}- sini^{nML} ti^(H) ii^{nM}
 and PFV see 3AN one opossum
And it saw an opossum.

In 7.23, we give the association diagram to show how the underlying tones of the morphemes are associated to give the surface form.

7.23 Association of a floating High tone with three moras

te	ni ⁿ	sini	ti	ii ⁿ	tita		te	ni ⁿ	sini ⁿ	ti	ii ⁿ	tita	
						→	//	//	//		//	//	\
M	L	ML	H	M	LM		D	M	L	M	L	H	LM

and PFV see 3AN one opossum

And it saw an opossum.

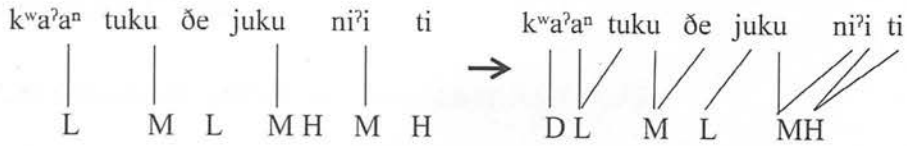
In the data in (7.23), we see that the floating Low tone sponsored by $sini^{nML}$ ‘see’ associates with $t\acute{i}^{(H)}$ 3AN. The floating High tone sponsored by the enclitic associates with both moras of ii^{nM} ‘one’ and also with the initial mora of $t\acute{i}t\acute{a}^{LM}$ ‘opossum’. So here we have an example of one High tone being associated with three adjacent moras belonging to two morphemes.

We now turn to another example of HTLS. In (7.24), we see that the surface tone of $t\acute{i}^{(H)}$ 3AN is High and that this High tone is spread from the previous word. However, this High tone is not sponsored by $ni^{?M}$ ‘with’, but by $juku^{MH}$ ‘pasture’.

7.24 HTLS from preposition to enclitic

k^{wā?}āⁿ tùkū ðē jùkū nī^{?í} tí
 k^{wā?}a^{nL} tuku^M ðe^(L) juku^{MH} ni^{?i}^M ti^(H)
 be going again 3MMS pasture with 3AN
He is going to the pasture with them again

7.25 Floating High tone skips the initial mora



go again 3_{MMS} pasture with 3_{AN}

He is going to the pasture with them again.

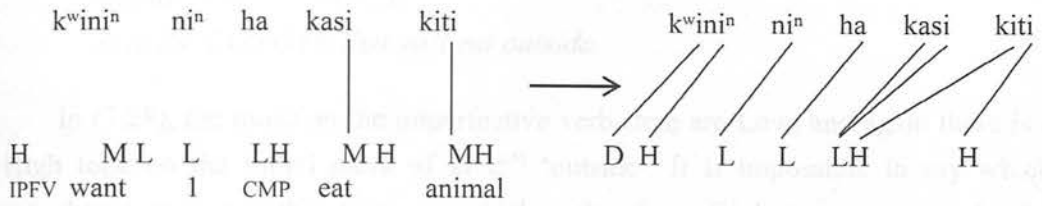
In (7.25), we see that the floating Low tone sponsored by $\delta\alpha^{(L)}$ 3_{MMS} associates with the initial mora of *juku*^{MH} ‘pasture’. The floating High tone sponsored by *juku*^{MH} associates at the right edge of *ni*^{?M} ‘with’ deleting the Mid tone associated with that TBU. It is this High tone which also provides a surface tone for the enclitic *ti*^(H). This analysis leaves two tones either deleted or unassociated in the surface form, namely the Mid tone sponsored by *ni*^{?M} ‘with’ and the High tone sponsored by the enclitic *ti*^(H) 3_{AN}. These association patterns show two significant processes: 1) the tendency for floating High tones to associate at the right of a morpheme; and 2) that floating tones not only cross morpheme boundaries to find a host, but also they cross syntactic phrase boundaries. The question then is what boundaries are relevant to tonal association. We return to this issue in Chapter 11.

7.3.2 Association of floating High

We now turn to look at some additional properties of floating High tones. We saw in (7.25) that there are contexts in which floating High tones skip the initial mora and are associated with the second mora of the host. This phenomenon is not limited to floating High tones which form part of a Mid High sequence. There are also contexts in which the floating High tone of a Low High sequence deletes Mid tones. An example of this phenomenon is in (7.26). In the underlying form we see that *kas*^{MH} ‘eat’ and *kit*^{MH} ‘animal’ both have Mid tones associated with their second moras. Now we look at the surface form. For ease of interpretation, in this diagram the underlying Mid tones which have been deleted in the surface form are not present in the right hand side of the diagram. Starting from the right-hand side of the diagram, note that the High tone sponsored by *kas*^{MH} ‘eat’ associates at the right edge of *kit*^{MH} ‘animal’ deleting the Mid tone associated with this mora in the underlying form. We also see that the floating High tone of the complementiser *ha* associates with the initial mora of *kit*^{MH} ‘animal’; that is, it skips both moras of

kasi^{MH} 'eat'. The Low tone sponsored by the complementiser *ha* associates with both moras of *kasi*^{MH} 'eat'.

7.26 Association pattern for 'I want the animals to eat'.



These data are illustrative of several processes which govern the association of tones in MXY. First, we see that in the input, it is only the disyllabic morphemes which have tones associated with them in the underlying representation. The mono-syllabic morphemes, on the other hand, sponsor floating tones. This does not mean that there are no mono-syllabic morphemes in MXY with underlying tones associated with them, but rather, it is more usual for mono-syllabic morphemes not to have tones associated with them underlyingly. We also notice that the underlying tones are associated at the right edge of their sponsoring morphemes. In these data, we also have evidence to show that MXY tends to preserve underlying tones, other than Mid tone, unless some prohibition would be violated. It is for this reason that we assume that all the input Low tones are present in the output, although they associate with morphemes other than the ones that sponsor them. In Chapters 10 and 11 we return to the examination of contexts in which the Low tone of a Low High sequence spreads, deleting Mid tones.

The data shown above in (7.26), might lead to the conclusion that the irrealis root of *kasi*^{MH} 'eat' is toneless. However, we now turn to look at evidence that the verb root *kasi*^{MH} 'eat' is not toneless, and that the imperfective stem *sesi*^(H) only sponsors a floating High tone. Consider the data in (7.27) and (7.28) in which we document the tones on both forms of the verb following *jaja*^{nLH} 'coyote'. In this position *jaja*^{nLH} 'coyote' is in contrastive focus. In (7.27), we see that the tones on the verb 'eat' in the irrealis are Low, and there is a High tone associated with the initial mora of *ke*^{2eLM} 'outside'. These data do not show whether this High tone sponsored by *jaja*^{nLH} 'coyote' is still present, as the floating High tone associated with *ke*^{2eLM} 'outside' could be sponsored by *kasi*^{MH} 'eat'. However, as we show in Chapter 11, there are data which show that the High tone is not deleted.

7.27 Low tone on irrealis verb

jājà ⁿ	kàsì	ké [?] ē
jaja ^{nLH}	kasi ^{MH}	ke [?] e ^{LM}
coyote	eat	outside

It is the COYOTE that will eat outside.

In (7.28), the tones on the imperfective verb stem are Low, and again there is a High tone on the initial mora of *ke[?]e^{LM}* ‘outside’. It is impossible to say which morpheme sponsors this tone, or whether the three High tones present in the underlying forms have fused.

7.28 Low tone on the imperfective

jājà ⁿ		sèsì	ké [?] ē
jaja ^{nLH}	H	sesi ^{MH}	ke [?] e ^{LM}
coyote	IPFV-	eat	outside

It is the COYOTE that is eating outside.

The data in (7.27) and (7.28) could lead to the analysis that both the verb root and the imperfective form of *kasi^{MH}* ‘eat’ were toneless.³ However, the data in (7.29) show otherwise. Note that in (7.29), the tones on *kasi* are Low Mid, while in (7.30) the tones on *sesi* are Low.

7.29 Low spread to the initial mora of the verb

βílù	kàsì	ké [?] ē
βi ^H lu ^L	kasi ^{MH}	ke [?] e ^{LM}
cat	eat	outside

It is the CAT that will eat outside.

7.30 Low spread to both moras of the verb

βílù		sèsì	ké [?] ē
βi ^H lu ^L	H	sesi ^(H)	ke [?] e ^{LM}
cat	IPFV-	eat	outside

It is the CAT that is eating outside.

³ In Chapter 8 we present data to show that some Mid or Mid High verbs lose their Mid tone in certain aspectual and modal forms.

We claim that there is an important phonological process at work in the data in (7.27) to (7.30). When a noun is fronted for contrastive focus, it forms a prosodic constituent with the verb. In these cases we see that floating High tones do not associate with the following morpheme if that morpheme has a Mid tone associated at the right edge. Instead, the floating High tone deletes the Mid tone of the verb and associates with the following word. This process then accounts for the difference in the surface tone patterns on *kasɪ*^{MH} ‘eat’ in (7.27) and (7.29). In (7.27) the floating High tone of *jaja*^{LH} ‘coyote’ deletes the Mid tone sponsored by *kasɪ*^{MH} ‘eat’. In 7.29, the Low tone of *βɪ^Hlu^L* ‘cat’ spreads to the initial mora of *kasɪ*^{MH} ‘eat’, but leaves the Mid tone associated with the second mora. In the data in (7.28) and (7.30), we see that both moras of *sesɪ*^(H) ‘eat’ have a Low tone. In the data in (7.28), the final Low tone of *βɪ^Hlu^L* ‘cat’ spreads to both moras as there is no Mid tone associated with the second mora. As we will show in Chapter 8.2.4, the verb ‘to eat’ belongs to a group of verbs which loses the underlying Mid tone in certain forms, including the imperfective. Thus the difference in surface tone on the verb in (7.29) and (7.30) is due to the presence of a Mid tone in the former and its absence in the latter. We claim that these data provide evidence that there is no Mid tone linked with *sesɪ*^(H) ‘eat’, but that this verb stem only sponsors a floating High tone. We return to this topic in Chapters 8 and 10, where we examine verbal morphology, and also in Chapters 10 and 11 where we examine the tonal phenomena in different syntactic constituents.

We now look at examples of constituents comprising a noun and a modifier to exemplify these tonal phenomena: that is, the deletion of a Mid tone by spreading the Low tone of a Low High tone sequence; and the prohibition of the association of a floating High tone with the second element of certain kinds of syntactic phrases. First we look at cases in which we would expect a floating High tone to associate but it does not. For example in (7.31), we see that the floating tone sponsored by *kiti*^{MH} ‘animal’ does not associate with the adjective *nu[?]u^{MH}* ‘fat’.

7.31 No association of floating High tone of a Mid High noun with adjective

kīti nū[?]ū
 kiti^{MH} nu[?]u^{MH}
 animal fat
a fat animal

In (7.32), we see that the Low tone of *jaja*^{nLH} ‘coyote’ spreads to both moras of the adjective *δuse*^{MH} ‘lazy’; that is, the High tone of *jaja*^{LH} ‘coyote’ does not

associate with δuse^{MH} 'lazy', just as we saw in the examples above in (7.27) and (7.28) where the Low tone of $jaja^{LH}$ 'coyote' spread to both moras of the verb, and the floating High tone did not associate with the verb.

7.32 No association of floating High tone of a Low High noun with adjective

jājāⁿ ðùsèⁿ
 jaja^{nLH} ðuse^{nMH}
 coyote lazy
a lazy coyote

However, when the adjective sponsors a Low tone, then the floating tone of the noun does associate with the adjective as shown in (7.33). Thus we see that although in certain tonal contexts the floating High tone does not associate, the presence of a Low tone forms a barrier to the right-ward movement of the floating High tone.

7.33 Association of floating High tone of a Mid High noun with adjective which has a Low tone

kītī ðéèⁿ
 kiti^{MH} ðee^{nLH}
 animal fierce
a fierce animal

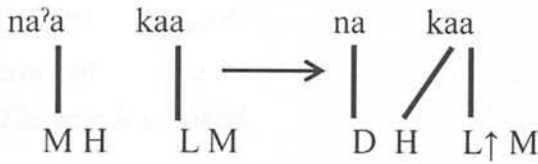
These restrictions on the association of floating High tones are also found in compounds. For example, in (7.34) we see that the floating High tone of δita^{LH} 'tortilla' does not associate with the second element of compounds, which in this case is $ni\delta i^{MH}$ 'corn-on-the-cob'.

7.34 Compound of δita^{LH} 'tortilla'

ðītā nīðī
 ðita^{LH} niðī^{MH}
 tortilla corn-on-the-cob
sweet corn tortilla

However, when the second root of the compound has a Low tone associated at the right edge, the floating High tone associates with the initial mora of the second root as is shown in (7.35).

7.35 Floating High tones associated when second element has Low tone



hand metal
key

In (7.35), we see that in the compound, the word *na^ʔa^{MH}* ‘hand’ is reduced to *na-*. It seems that the Mid tone is lost, but the floating High tone is preserved and links with the initial mora of *kaa^{LM}* ‘metal’. Note that although the floating Mid tone sponsored by *kaa^{LM}* ‘metal’ is not present in the surface form, its presence in the underlying representation causes the Low tone of *kaa^{LM}* ‘metal’ to be raised, as the Low tone is part of a High Low Mid sequence.

Floating High tones do not associate with an adjective or a noun when these words are part of a compound, as shown in (7.34), or in noun phrases, such as we saw in (7.32), if these adjectives or nouns have a Mid tone associated with them. However, if the adjective is used as the predicate of the sentence, then the floating High tone of the adjective will associate with the noun. Consider the data in (7.36) and (7.37). In (7.36), we give a noun phrase in which both the noun and the adjective have underlying Mid High tones. In this case the floating High tone of *jutu^{nMH}* ‘tree’ does not associate with *jak^{w^aMH}* ‘crooked’.

7.36 Noun phrase – no floating High tone association

jūtū ⁿ	jāk ^{w^a}
jutu ^{nMH}	jak ^{w^aMH}
tree	crooked
<i>a crooked tree</i>	

However in (7.37), we see *jak^{wā}* ‘crooked’ as the predicate of the sentence. In this case, the floating High tone of *jak^{wā}* ‘crooked’ associates with the subject of the sentence *jutu^{MH}* ‘tree’.

7.37 Adjective as predicate of the sentence

<i>jāk^{wā}</i>	<i>jūtúⁿ</i>
<i>jak^{wā}</i> ^{MH}	<i>jutuⁿ</i> ^{MH}
crooked	tree

The tree is crooked.

In cases where the adjective sponsors a Low High tone melody and the noun a Mid High tone melody, then the Low tone of the adjective spreads to the initial mora of the noun, which is the subject of the utterance as shown in (7.38). We also see that the floating High tone of the adjective associates with the final mora of the noun.

7.38 Spread of final Low to initial mora and right association of floating High

<i>ǒcēⁿ</i>	<i>kítí</i>
<i>ǒcē^{nLH}</i>	<i>kiti^{MH}</i>
fierce	animal

The animal is fierce.

The surface tonal patterns found in (7.37) and (7.38) are the same as those found in utterances which comprise a verb plus the subject. In (7.39) we give an example of a verb which has a Mid High tone melody followed by a noun which has the same tone pattern.

7.39 Mid High verb followed by Mid High subject

<i>kāsī</i>	<i>lāná</i>
<i>kasi^{MH}</i>	<i>lana^{MH}</i>
eat	child

The child will eat.

If we compare the surface tones of the data in (7.37) with those of (7.39), we see that the surface tones of the second word are Mid High in both cases; that is, the floating High tone sponsored by the first word in the utterance associates at the

right edge of the second. However, on the other hand, in (7.36), although the underlying tones of the two words are the same as those in (7.37) and (7.39), the surface tones are different. In (7.36) the floating High tone of the first word does not associate with the second. We claim that this is due to the fact that a noun plus a modifying adjective form a constituent for which the tonal phenomena are different from that of utterances which consist of more than one constituent. We return to this issue in Chapters 10 and 11 where we describe the tonal phenomena in other syntactic contexts.

In (7.40), the verb *tʃoʔo^{LH}* sponsors a Low and a High tone. In these data the Low tone of the verb root spreads to the initial mora of *nufɪ^{MH}* 'beans' and the floating High tone of the verb associates with the second mora of *nufɪ^{MH}* 'beans', just as we saw in (7.38) for an utterance which comprises an adjective followed by a noun.

7.40 Low High verb followed by Mid High subject

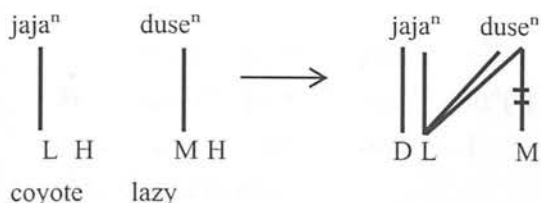
tʃoʔo	nùtʃí
tʃoʔo ^{LH}	nufɪ ^{MH}
cook	beans

The beans will cook.

Therefore, from the data in (7.38) and (7.40), we see that the floating High tones sponsored by the first word skip the initial mora and associate with the final mora of the second word. The Low tone associated with the final mora of the first word spreads to the initial mora of the second word. We claim that similar processes occur in (7.37) and (7.39), only in those cases it is the final Mid tone which spreads.

The role of constituent structure in tonal phenomena is further illustrated by considering additional data which comprise noun + modifying adjective. In (7.41) we see that the tones on the words following *jaja^{LH}* 'coyote' are Low. That is, even though *ɔuseⁿ* 'lazy' sponsors a Mid High tone pattern, following *jaja^{LH}* 'coyote' it has a Low tone associated with both moras. The association pattern for this phrase is shown in (7.41).

7.41 Noun plus adjective 'the lazy coyote'



In (7.41), we see that the Low tone of *jaja*^{LH} 'coyote' spreads to both moras of *duse*^{MH} 'lazy', deleting the Mid tone. The fact that the High tone of *jaja*^{LH} 'coyote' does not associate with *duse*^{MH} 'lazy' is the same tonal phenomenon as we saw in (7.36) above where we saw that the floating High tone sponsored by *jutu*^{MH} 'tree' did not associate with *jak*^{wM} 'crooked'. But in (7.41) we see that the final Low tone of *jaja*^{LH} 'coyote' deletes the Mid tone associated with *duse*^{MH} 'lazy'. In Chapters 10 and 11 we describe more instances of the spreading of Low tones in certain syntactic contexts.

In this section we have shown two very important factors in tonal association in MXY: one, the constituent structure; and two, the underlying tones. We have seen that although certain tonal patterns are prohibited in given contexts, for example that floating High tones do not associate with Mid toned adjectives, this prohibition of the association of floating High tones can be overridden by the presence of a Low tone.

7.4 OTHER FACTORS

We now turn to look at another context in which the syntactic relationship between morphemes can result in different surface tonal patterns.

The surface tones of Group 3 enclitics reveal a situation where the surface tone of the enclitic is determined by the syntactic relationship between the enclitic and its host. Consider the data in (7.42) and (7.43). We see that the only difference in the surface tone is found on the enclitic: in (7.42) it is Low, and in (7.43) it is Mid.

7.42 Surface tone pattern for the phrase 'My dog sees somebody'

	<i>n^já[?]á</i>	<i>já[?]áⁿ</i>	<i>ínáⁿ</i>	<i>nìⁿ</i>
H	<i>n^já[?]á^M</i>	<i>já[?]á^{nMH}</i>	<i>iná^{nML}</i>	<i>nì^{n(L)}</i>
IPFV	see	OBJ	dog	I

My dog sees somebody.

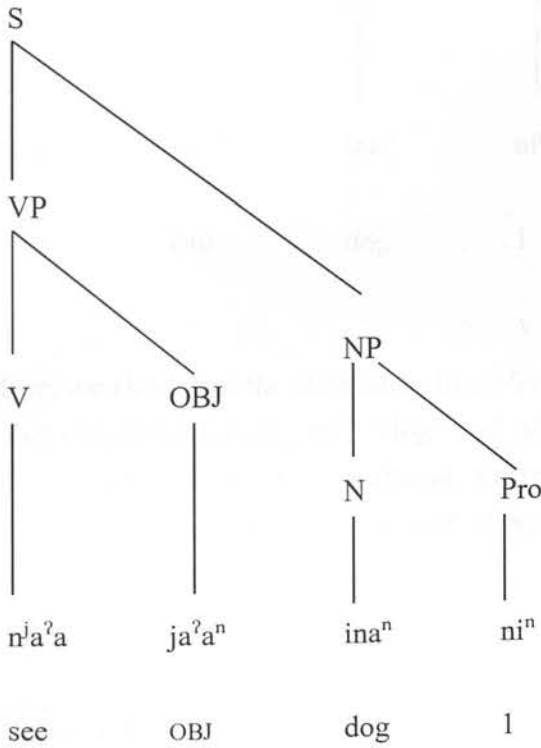
7.43 Surface tone pattern for the phrase 'The dog sees me'

	n ^j ā [?] á	ja [?] á ⁿ	iná ⁿ	nī ⁿ
H	n ^j a [?] a ^M	ja [?] a ^{nMH}	ina ^{nML}	ni ^{n(L)}
IPFV	see	OBJ	dog	I

The dog sees me.

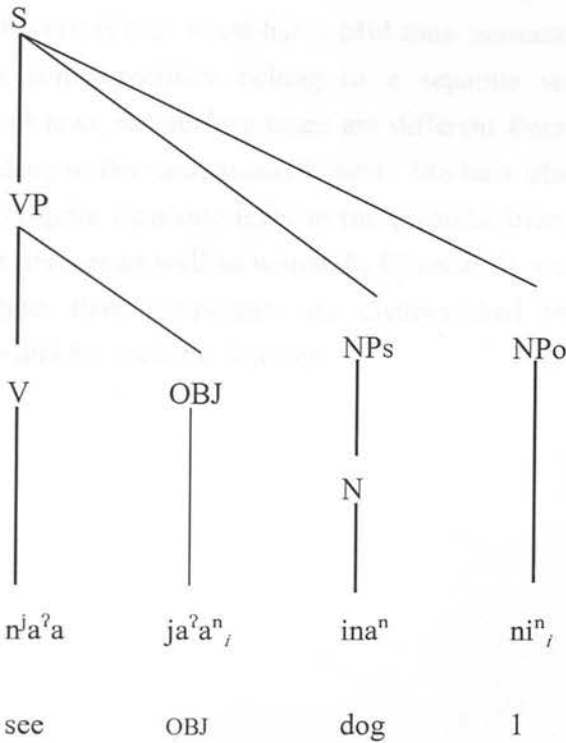
In (7.43), the floating Low tone sponsored by *ina^{nML}* 'dog' is prevented from associating with the enclitic; instead a default Mid tone is inserted. Although the morphemes are identical in (7.42) and (7.43), crucially the syntactic structure is different. First we look at the structure of (7.42). In this case the noun *ina^{nML}* 'dog' and the enclitic *ni^{n(L)}* I form a genitival noun phrase. The incorporated object *ja[?]a^{nMH}* denotes a separate entity; it is not co-referential with any other participant in the phrase.

7.44 Tree structure for the phrase 'My dog sees somebody'



On the other hand, the syntactic structure of the sentence given in (7.43) is different in that the enclitic is a separate argument of the sentence and is co-referential with the incorporated object *jaʔa^{nMH}*.

7.45 Tree structure for the sentence 'The dog sees me'



Therefore, we claim that the differences in surface tone in (7.42) and (7.43) are due to the fact that in the former, *ina^{ML}* 'dog' and *ni^L* 'I' form a phrase: that is, in the syntactic structure they form a constituent, whereas in the latter they belong to two separate syntactic arguments. The role of syntactic constituents is further discussed in Chapters 10 and 11.

7.5 CONCLUSION

In this chapter we have presented evidence to show some characteristic features of MXY tonal association. First, in the case of the enclitics, we see that as a result of alignment restrictions, the tones of most enclitics do not associate with their sponsoring morpheme. This then results in the tones of the enclitics associating

with some morpheme to the right, usually the following morpheme. We also have shown that both Low tones and High tones will spread under certain conditions so that in the surface form there are multiple adjacent moras associated with the same tone.

In this chapter, we have also documented that in compounds and noun phrases, the floating High tones of the first word are often prevented from associating with the second word if that word has a Mid tone associated with it. It was also noted that when some enclitics belong to a separate sentential argument from its phonological host, the surface tones are different from when both the host and the enclitic belong to the same prosodic unit. We have also presented data which show that there is more than one level in the prosodic hierarchy in MXY; that is, there are at least phrases as well as words. In Chapter 10, we return to this topic and give data to show that compounds are distinguished from phrases by their tonal association and by acoustic features.

CHAPTER 8

HIGH TONE PREFIXES

8.1. INTRODUCTION

The verbal morphology of MXY is extremely complex, in part due to the fact that the tones sponsored by most verbal prefixes do not associate with the prefix itself but usually with the verb root or stem. In this chapter we present an analysis to account for the fact that in MXY, the floating High tones sponsored by verbal prefixes do not always associate with the same tone bearing unit. This phenomenon is illustrated in (8.1), where different verbal forms are given with *kítí*^{MH} ‘animal’ as the subject.

8.1. Verbal forms

verb	<i>ǔte</i> ^{MH} ‘swim’	<i>tʃítu</i> ^{MH} ‘fill’	<i>kási</i> ^{MH} ‘eat’
a) irrealis	<i>ǔtē kítí</i>	<i>tʃítū kítí</i>	<i>kāsí kítí</i>
b) progressive	<i>tā- ǔté kítí</i>	<i>tā- tʃítú kítí</i>	<i>tā- sēsí kítí</i>
c) counterfactual	<i>nīⁿ- ǔté láná</i>	<i>nīⁿ- tʃítú láná</i>	<i>nīⁿ- sēsí láná</i>
d) subjunctive	<i>nāⁿ-ǔté kítí</i>	<i>nāⁿ- tʃítū kítí</i>	<i>nāⁿ- kāsí kítí</i>
e) imperfective	<i>ǔté kítí</i>	<i>tʃítū kítí</i>	<i>sēsí kítí</i>

First note that all three verbs have the same underlying tones, Mid High, and the same surface tones in the irrealis. For all three verbs and five verbal forms, the floating High tone sponsored by the verb root associates with the second mora of *kítí*^{MH} ‘animal’. Each verb prefix in (8.1b), (8.1c), (8.1d), and (8.1e) sponsors a floating High tone. As we recall from previous chapters, the prefix indicating imperfective consists of a floating High tone.

However, the floating High tones don’t always associate with the same moras. First we look at the surface tones of *ǔte*^{MH} ‘swim’ given in the first column of (8.1). We see that for all forms, except the irrealis, there is a High tone associated with the second mora of the verb root. On the other hand, in columns two and

three, we see that it is only in the progressive and counterfactual forms that there is a High tone associated at the right edge of the verb. The verb *kasɪ*^{MH} in the third column shows that the presence or absence of a High tone does not correlate with the modal/aspectual difference of the verb forms: for example, the subjunctive is a modal form, and has surface Mid tones on the verb; the imperfective is an aspectual form, and it also has Mid tones in the surface form. In 8.1 a comparison of the surface tones of the verb *ɟɪtu*^{MH} ‘fill’ and *kasɪ*^{MH} ‘eat’ shows that the tonal differences are the same for verbs which show segmental changes between the irrealis and the imperfective and those which do not.

The aim of this chapter is to account for the differences in the locus of association of the floating High tones. We posit that some verbs have what we will call ‘secondary’ stems in addition ‘primary’ stems. These stems are differentiated by the fact that in the case of primary stems, in the surface forms the tones sponsored by the verb root are associated at the right edge of the stem. In the case of secondary stems, on the other hand, the Low tones sponsored by the verb roots with underlying Low or Low High tone melodies become floating tones; and for verbs which sponsor either a Mid or Mid High tone pattern, the Mid tones are deleted altogether, and the High tone sponsored by the verbal prefix skips the verb and associates with the following mora. Note that not all Mid or Mid High tone verbs have separate secondary stems. For example the verb *ɔute*^{MH} ‘swim’ only has a primary stem. There is only one verb root that is attested to sponsor a High Low tone sequence, so it is eliminated from this discussion.

In this chapter we limit the discussion to the behaviour of four verbal prefixes: *∅*^H- ‘imperfective’ (which no longer has CV segments and is realised as a floating High tone, as discussed in Chapter 2); *na*^H- ‘subjunctive’; *ta*^H- ‘progressive’; and *ni*^H- ‘counterfactual’. The data are also limited to monomorphemic verb roots. We show that the locus of the association of the floating High tone sponsored by these prefixes is dependent on three factors: one, the underlying tones of the verb root; two, the stem with which the prefix associates; and three, the floating High tone’s preference to align at the right, although in some forms the presence of a Low tone prevents this association.

First we describe the association of the floating High tones for the different verb patterns; then we account for the differences in association patterns found on some verbs by positing that the progressive and the counterfactual prefixes associate with primary stems, and the imperfective and the subjunctive prefixes associate with secondary stems. Finally we show that these data enable us to

classify verbs into nine groups based on their underlying tones and the locus of the association of these four verbal prefixes.

8.2. ASSOCIATION OF PREFIXAL HIGH TONES

In this section we describe the association patterns of the floating High tones sponsored by the four verbal prefixes under discussion, namely \emptyset^H - ‘imperfective’, na^H - ‘subjunctive’, ta^H - ‘progressive’ and ni^H - ‘counterfactual’. We look at the surface tones exhibited by the different groups of verbs when they follow these four prefixes. From this descriptive data, we see the justification for positing primary and secondary stems.

8.2.1. Verbs with underlying Low Mid tones

First we look at verbs which have an underlying Low Mid tone melody. These are the only verbs in which the floating High tones always associate with the initial mora. We use the verbs $ni^?i^{LM}$ ‘tremble’ and $kusi^{LM}$ ‘bury’ to illustrate these verbal forms. In each case we use the noun $kiti^{MH}$ ‘animal’ as the subject. In (8.2), we see that the floating High tone of all four prefixes associates with the initial mora of the verbs.

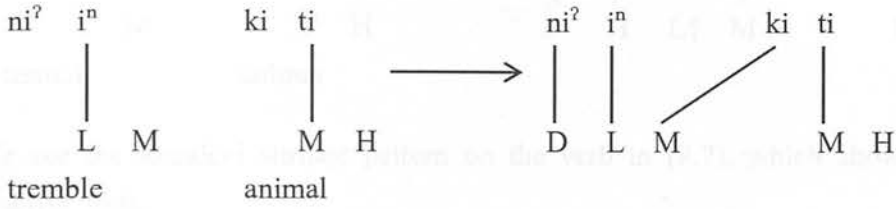
8.2. Surface tones of the verbs $ni^?i^{LM}$ ‘tremble’ and $kusi^{LM}$ ‘bury’

irrealis	$ni^{\uparrow n} kiti$	$kusi kiti$
progressive	$t\bar{a}- ni^{\uparrow n} \uparrow kiti$	$t\bar{a}- kusi \uparrow kiti$
counterfactual	$n\bar{i}^n- ni^{\uparrow n} \uparrow kiti$	$n\bar{i}^n- kusi \uparrow kiti$
subjunctive	$n\bar{a}^n- ni^{\uparrow n} \uparrow kiti$	$n\bar{a}^n- kusi \uparrow kiti$
imperfective	$ni^{\uparrow n} \uparrow kiti$	$kusi \uparrow kiti$

We now turn to examine the tonal association pattern for each prefix using the verb $ni^?i^{LM}$ ‘tremble’ as illustrative. In (8.3), we show that in the irrealis form the Low tone sponsored by the verb root $ni^?i^{LM}$ ‘tremble’ is associated at the right edge of the verb root, thus the Mid tone does not associate with the verb root itself,

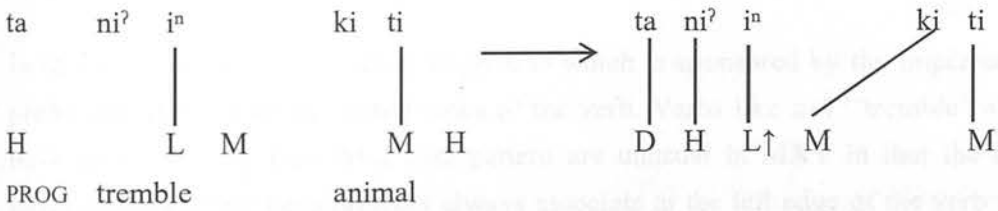
but rather with *kiti^{MH}* ‘animal’. A default Mid tone is inserted to provide a tone for the initial mora of the utterance.

8.3. Derivation of the surface form of *ni[?]iⁿ kitⁱ* ‘the animal will tremble’



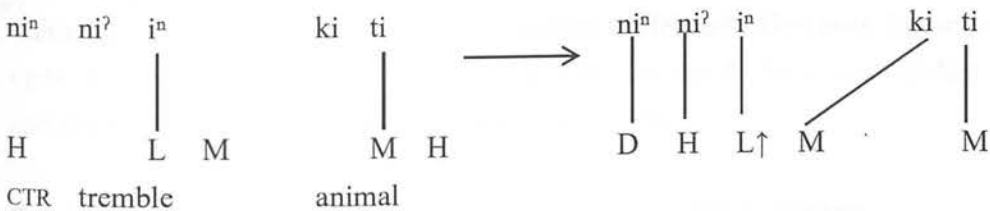
The progressive form is illustrated in (8.4). Again we see that the floating High tone sponsored by the prefix associates with the initial mora of the verb. As has already been shown in Chapter 6 Section 6.4.3, a Low tone in the sequence High Low Mid is raised, indicated by L↑ in the right-hand side of the diagram.

8.4. Derivation of *tā-ni[?]iⁿ kitⁱ* ‘the animal keeps on trembling’



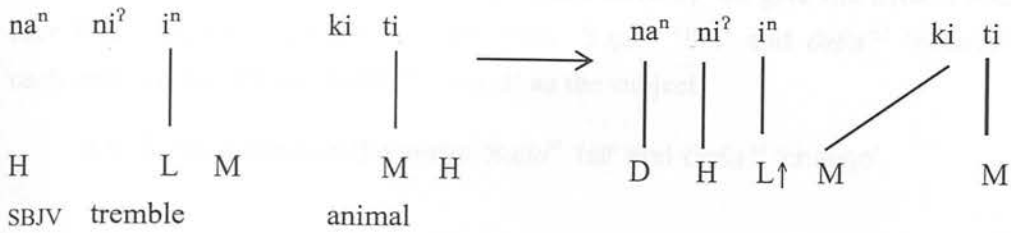
The counterfactual form is given in (8.5), where we see the identical surface tonal pattern as that of the progressive.

8.5. Derivation of *niⁿ-ni[?]iⁿ kitⁱ* ‘the animal tremble might have trembled’



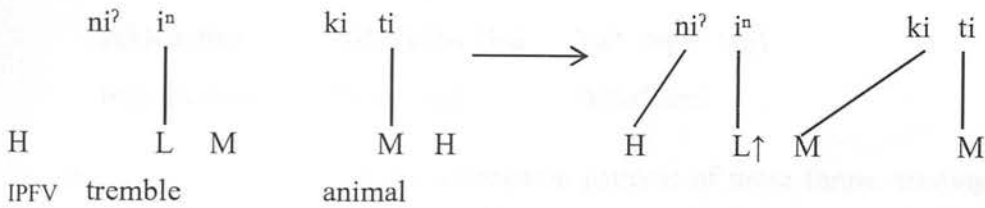
In (8.6), we see that the High tone sponsored by the subjunctive prefix *na^(H)*- associates with the initial mora of the verb.

8.6. Derivation of *nāⁿ-ni^ʔ kīīⁿ* 'may the animal tremble'



We see the identical surface pattern on the verb in (8.7), which shows the imperfective form.

8.7. Derivation of *ni^ʔ kīīⁿ* 'the animal is trembling'



In (8.7), we see that the floating High tone which is sponsored by the imperfective prefix associates with the initial mora of the verb. Verbs like *ni^ʔiⁿ* 'tremble' which have an underlying Low Mid tone pattern are unusual in MXY in that the High tones sponsored by these prefixes always associate at the left edge of the verb root. For most cases in MXY, the floating High tones sponsored by prefixes align at the right edge of the verb stem, unless there is a Low tone associated with the second mora. Verbs with underlying Low Mid are also unusual in that they do not have secondary stems – that is, forms in which the Low tone occurs as a floating tone. As floating High tones do delete Mid tones, it would seem that Mid tones are less stable than Low tones in that Low tones cannot be deleted. However, in the case of verbs with a Low High underlying pattern, these verbs do have a secondary stem and the High tone is deleted in these secondary stems.

8.2.2. Verbs with an initial Mid tone in their tone melody

We now turn to verbs in which the floating High tones of these four prefixes associate at the right edge of the verb root. These verbs belong to three separate classes: Mid, Mid High and Mid Low, although they all have an underlying Mid tone as the initial element in their tone melodies. We look at each of these patterns in turn before comparing the forms of all three tone patterns below.

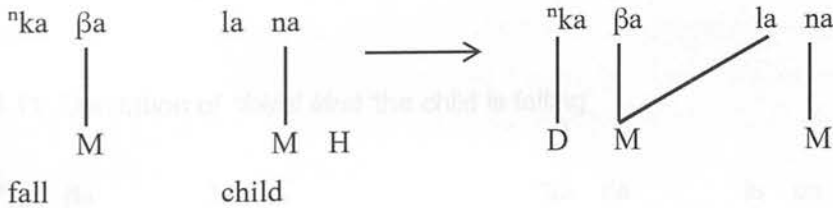
First we look at verbs which have a Mid tone in their underlying form. There are very few verbs which belong to this class. In (8.8), we give the irrealis and the four forms under discussion for the verbs ${}^nka\beta a^M$ 'fall' and $\delta a\beta a^M$ 'change'. In each case we use the noun $lan\bar{a}^{MH}$ 'child' as the subject.

8.8. Surface tones of the verbs ${}^nka\beta a^M$ 'fall' and $\delta a\beta a^M$ 'change'

irrealis	${}^nk\bar{a}\beta\bar{a} lan\bar{a}$	$\delta\bar{a}\beta\bar{a}^n lan\bar{a}$
progressive	$t\bar{a}- {}^nk\bar{a}\beta\acute{a} lan\acute{a}$	$t\bar{a}- \delta\bar{a}\beta\acute{a}^n lan\acute{a}$
counterfactual	$n\bar{i}^n- {}^nk\bar{a}\beta\acute{a} lan\acute{a}$	$n\bar{i}^n- \delta\bar{a}\beta\acute{a}^n lan\acute{a}$
subjunctive	$n\bar{a}^n- {}^nk\bar{a}\beta\acute{a} lan\acute{a}$	$n\bar{a}^n- \delta\bar{a}\beta\acute{a}^n lan\acute{a}$
imperfective	${}^nk\bar{a}\beta\acute{a} lan\acute{a}$	$\delta\bar{a}\beta\acute{a}^n lan\acute{a}$

We now turn to look at the association patterns of these forms, starting with the irrealis of ${}^nka\beta a^M$ 'fall', shown in (8.9).

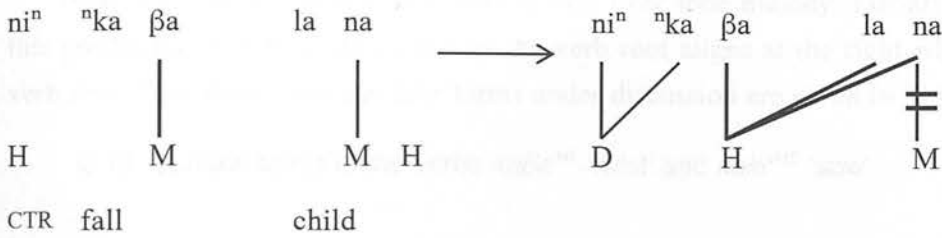
8.9. Derivation of ${}^nk\bar{a}\beta\bar{a} lan\bar{a}$ 'the child will fall'



In (8.9) we see that the Mid tone which is associated at the right edge of the verb spreads to the initial mora of the noun. A default tone is inserted to provide a tone for the initial toneless mora.

In (8.10), we give an example of the surface tones of the verb ${}^nka\beta a^M$ 'fall' with the counterfactual prefix.

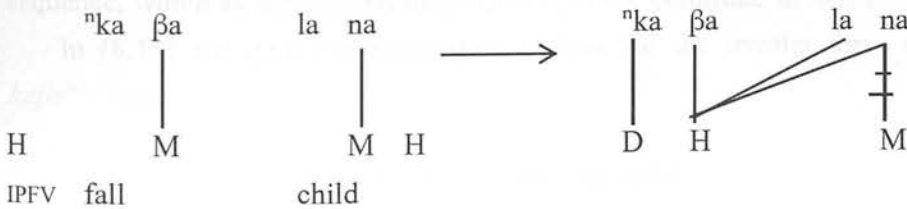
8.10. Derivation of *niⁿ-ⁿkaβa lána* ‘the child might have fallen’



In this example, we see that the High tone sponsored by the prefix deletes the Mid tone associated with the second mora of the verb root. This High tone then spreads to both moras of *lána^{MH}* ‘child’. In this case there are two toneless initial moras, *niⁿ*- ‘counterfactual’ and the initial syllable of the verb root. Although there is no way of determining whether one or two default tones are inserted, we assume that one is inserted and spread to both moras, as in MXY there seems to be a preference to spread tones rather than insert ones. By positing that the inserted default tone is linked with both the counterfactual prefix and the initial mora of the verb root, only one default tone is inserted.

In (8.11), we see the floating High tone of the prefix associates at the right edge of the verb root. A default Mid tone is inserted to provide a tone for the initial mora of the verb root. This results in a Mid High tone surface tone pattern on the verb.

8.11. Derivation of *ⁿkaβa lána* ‘the child is falling’



Note that in both (8.10) and in (8.11), the floating High tones of the prefixes associate with the second TBU of the verb root and then spread to both moras of *lána^{MH}* ‘child’. The result of this process is that *lána^{MH}* is pronounced with a High tone on each mora. Recall that words which are Mid or Mid High underlyingly never have the surface form of High Mid. In fact, all four prefixes – progressive, counterfactual, subjunctive and imperfective – have the same association patterns as

shown in (8.10) and (8.11); that is, the High tone of the prefix associates at the right edge of the verb and spreads to both moras of the noun subject.

Next we look at verbs which have a Mid Low tone melody. For all verbs of this group, the Mid tone sponsored by the verb root aligns at the right edge of the verb root. The irrealis and the four forms under discussion are given in (8.12).

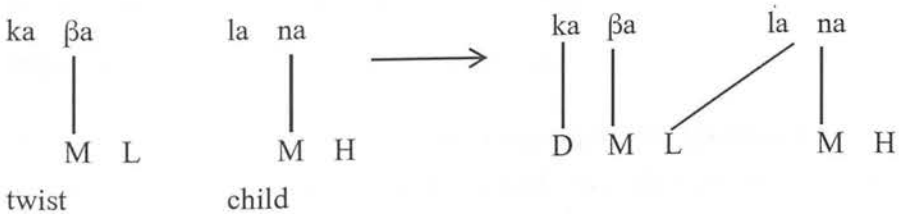
8.12. Surface tones of the verbs *kaβa^{ML}* 'twist' and *kaki^{ML}* 'sow'

irrealis	kāβā lànā	kākí ⁿ lànā
progressive	tā- kāβá là↑nā	tā- sēkí ⁿ là↑nā
counterfactual	nī ⁿ - kāβá là↑nā	nī ⁿ - sēkí ⁿ là↑nā
subjunctive	nā ⁿ - kāβá là↑nā	nā ⁿ - kākí ⁿ là↑nā
imperfective	kāβá là↑nā	sēkí ⁿ là↑nā

In (8.12) we see that the High tones of the progressive, counterfactual, subjunctive and imperfective associate at the right edge of the verb but do not spread to the noun. We claim that although the floating High tone deletes the Mid tone sponsored by the verb, the Low tone sponsored by the verb remains. This Low tone is apparent in the surface form of the irrealis where it associates with the initial mora of *lana^{MH}* 'child'. However in the other forms this Low tone is raised to its allotone, Mid, on the initial mora of *lana^{MH}* as it forms part of a High Low Mid sequence, which as we showed in Chapter 6, is not permitted in MXY.

In (8.13) we give the association pattern for the irrealis form of the verb *kaβa^{ML}* 'twist'.

8.13. Derivation of *kāβā lànā* 'the child will twist'

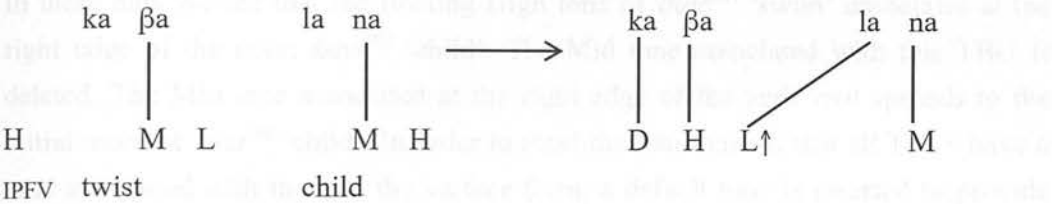


In (8.13) we see that the Low tone sponsored by the verb root associates with the initial mora of *lana^{MH}* 'child'. Again the Mid tone sponsored by the verb is

associated at the right edge of the verb root. Note that the Mid tone sponsored by *lana^{MH}* ‘child’ is also aligned at the right edge of the sponsoring morpheme.

We now turn to the imperfective form of *kaβa^{ML}* ‘twist’. In (8.14) we see that the floating High tone that marks the imperfective is associated at the right edge of the verb.

8.14. Derivation of *kāβá lānā* ‘the child is twisting’



In (8.14) the Low tone sponsored by the root associates with the initial mora of *lana^{MH}* ‘child’. This Low tone is raised as it forms part of a High Low Mid sequence.

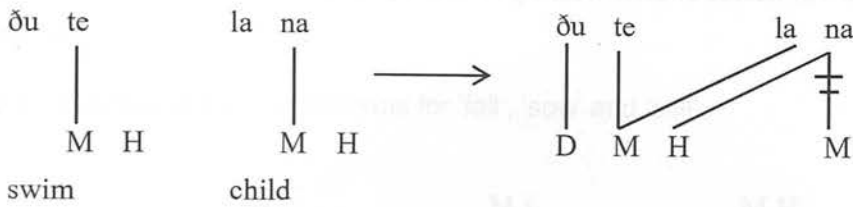
We now turn to look at the third class of verbs in which the floating High tone sponsored by the four verbal prefixes all associate at the right edge of the verb. These verbs have a Mid High underlying tone pattern. The irrealis and the four forms of *δute^{MH}* ‘swim’ and *δiko^{MH}* ‘sell’ are given in (8.15).

8.15. Surface tones of *δute^{MH}* ‘swim’ and *δiko^{MH}* ‘sell’

irrealis	<i>δūtē lānā</i>	<i>δīkō lānā</i>
progressive	tā- <i>δūté láná</i>	tā- <i>δīkó láná</i>
counterfactual	nī ⁿ - <i>δūté láná</i>	nī ⁿ - <i>δīkó láná</i>
subjunctive	nā ⁿ - <i>δūté láná</i>	nā ⁿ - <i>δīkó láná</i>
imperfective	<i>δūté láná</i>	<i>δīkó láná</i>

In (8.15), we see that in the irrealis, the floating High tone sponsored by the verb root associates at the right edge of *lana^{MH}* ‘child’. We also see that for the other forms, the floating High tone of the prefix is associated at the right edge of the verb and that both moras of the noun are High. The association pattern for the irrealis is given in (8.16).

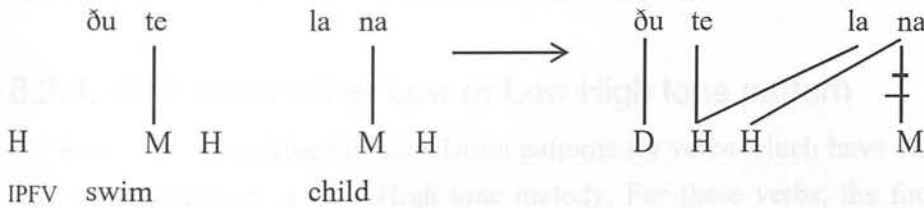
8.16. Derivation of *ǫūtē lānā* ‘the child will swim’



In these data we see that the floating High tone of *ǫute^{MH}* ‘swim’ associates at the right edge of the noun *lana^{MH}* ‘child’. The Mid tone associated with this TBU is deleted. The Mid tone associated at the right edge of the verb root spreads to the initial mora of *lana^{MH}* ‘child’. In order to meet the requirement that all TBUs have a tone associated with them in the surface form, a default tone is inserted to provide a tone for the initial mora of the utterance.

We give the association pattern for the imperfective of the verb *ǫute^{MH}* ‘swim’ in (8.17).

8.17. Derivation of *ǫūtē lānā* ‘the child is swimming’



In (8.17) we see that the floating High tone sponsored by *ǫute^{MH}* ‘swim’ associates with the rightmost mora of *lana^{MH}*. We assume this association pattern based on the fact that in the irrealis, as shown in (8.16), the floating High tone sponsored by the verb root associates with the second mora of *lana^{MH}* ‘child’. The floating High tone sponsored by the imperfective prefix associates at the right edge of the verb deleting the Mid tone. This final High spreads to the initial mora of *lana^{MH}* ‘child’. This association pattern is similar to that which was described in Chapter 6, in which it was shown that High tones spread to words which already have a High tone associated with them.

In summary we can say that for verbs which in their underlying form have a Mid tone associated at the right edge, the floating High tones of these four prefixes delete the underlying Mid tone and associate with the final TBU of the verb. The differences in the underlying tone melodies of these three groups of verbs are seen

in the irrealis forms and in the surface tones of the subject, as shown in (8.18). Note that where Low tones in the sequence High Low Mid is raised to Mid this is indicated by ↑.

8.18. Comparison of verbal forms for 'fall', 'sow' and 'sell'

	M	M L	M H
irrealis	ⁿ kāβā lānā	kākí ⁿ là ⁿ nā	ōikō lānā
progressive	tā- ⁿ kāβá láná	tā- sēkí ⁿ là [↑] nā	tā- òikó láná
counterfactual	nī ⁿ - ⁿ kāβá láná	nī ⁿ - sēkí ⁿ là [↑] nā	nī ⁿ - òikó láná
subjunctive	nā ⁿ - ⁿ kāβá láná	nā ⁿ - kākí ⁿ là [↑] nā	nā ⁿ - òikó láná
imperfective	ⁿ kāβá láná	sēkí ⁿ là [↑] nā	òikó láná

In the data in (8.18) we see that the High tone sponsored by the four prefixes under consideration associate with the second mora of the verb.

8.2.3. Verbs with either Low or Low High tone pattern

We now turn to examine the association patterns for verbs which have either a Low tone underlyingly or a Low High tone melody. For these verbs, the four prefixes under discussion divide into two groups, according to the resultant surface tones: the progressive and counterfactual belong to one group, and the imperfective and the subjunctive belong to another group. We also show that verbs with these tones patterns have two stems: one which occurs with the progressive and counterfactual, and the other with the imperfective and subjunctive.

We first look at verbs which have a Low tone in their underlying tone melody. In order to see clearly the difference as to the locus of the association of the floating High tones, in (8.19) we present the surface tones of two verbs when they co-occur with each of the four prefixes under analysis. The verb *kođo^l* 'water' is one of the verbs which shows a segmental change in the initial consonant of the verb root; that is, the imperfective form has /s/ root initial rather than /k/. We also give the surface forms of *ka²a^α* 'say' which show no segmental changes.

8.19. Surface tones of the verb *koðɔ* 'water' and of *kaʔa* 'say'¹

irrealis	kōðò lànā	kāʔà ⁿ lànā
progressive	tā- sóðò↑ là↑nā	tā- káʔà↑ ⁿ là↑nā
counterfactual	nī ⁿ - sóðò↑ là↑nā	nī ⁿ - káʔà↑ ⁿ là↑nā
subjunctive	nā ⁿ - kōðó là↑nā	nā ⁿ - kāʔá ⁿ là↑nā
imperfective	sōðó là↑nā	kāʔá ⁿ là↑nā

We now examine the data in (8.19) in detail. First we see that in the case of the subjunctive and the imperfective, the floating High tone is associated with the second mora of the verb root. However in the case of the counterfactual and the progressive, it is associated with the initial mora of the verb. The question therefore is how to account for these differences. An initial hypothesis might be that the locus of association is determined by whether the verb form is aspectual or modal. However, the progressive and the counterfactual forms have a floating High tone associated with the same mora; the former is a modal category, whereas the latter is aspectual. An alternative hypothesis could be whether the verb stem is the /k/ or /s/ form. Again, this hypothesis is not substantiated by the data; the subjunctive, which co-occurs with the /k/ form and the imperfective, which co-occurs with the /s/ form, have the floating High tone associated with the same mora.

In order to account for the data in (8.19), we posit that some verbs have allomorphs of the irrealis and realis stems. We call these allomorphs 'secondary stems', giving a secondary irrealis stem and a secondary realis stem for verbs which show alternations between /k/ and /s/. In (8.19), the progressive and the counterfactual forms use the primary stems. In these forms, the tones sponsored by the verb root are aligned at the right edge, just as we saw in Chapter 6 for nouns. However, in the case of the subjunctive and the imperfective, we see that the High tone sponsored by the prefix is associated with the second mora, and the Low tone sponsored by the verb root is associated with the initial mora of the noun. Therefore we posit that verbs with underlying Low or Low High tone melodies have both primary and secondary stems. In the verbal forms which use the secondary stem, the Low tone becomes a floating tone. Note that in the case of verbs with a Low High tone melody the High tone is deleted. As we will see in

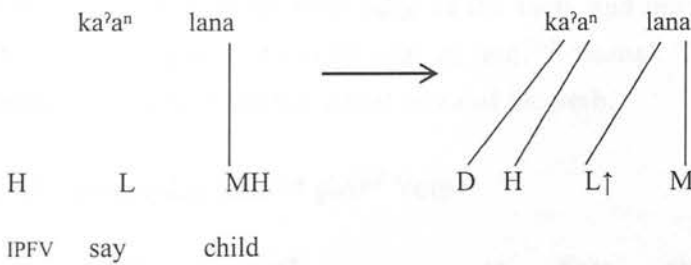
¹ Note that the imperfective of this verb is [sōðo].

Section 8.2.4, there are some verbs with Mid or Mid High tone melodies which have both primary and secondary stems and some that do not. The secondary stems of these verbs are characterised by the absence of the Mid tone sponsored by the verb root. Note that in the case of verbs with Mid High tone melodies, the floating High tone remains even though the Mid tone is deleted. We return to the discussion of primary and secondary stems in Section 8.2.4, once we have discussed the various verb groups.

We now look at data which illustrate the importance of this division. In (8.19), we see that the Low tone sponsored by these verbs is associated with the second mora, as it is in the irrealis. However, in the case of the subjunctive and imperfective forms, the Low tone sponsored by the verb root associates with the initial syllable of *lana*^{MH} ‘child’.

In (8.20) we present the processes which result in the surface form on the imperfective of the verb *ka²a^{HL}*.

8.20. Floating Low tone of the secondary stem



The child is saying.

Here we see that the High tone which marks the imperfective associates at the right edge of *ka²a^{HL}* ‘say’. The Low tone sponsored by the verb associates with the initial mora of *lana*^{MH} ‘child’. We claim that it is the secondary realis stem which forms the base for the imperfective. For verbs with a Low tone in their underlying tone melodies, this Low tone occurs as a floating tone in verbal forms which co-occur with the secondary stem, as indicated by the lack of an association line in the diagram.

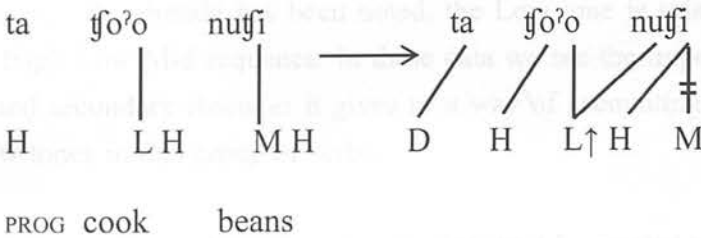
We now look at verbs which have a Low High tone melody. An example is given in (8.21). Note that in this case we have the same groupings as we saw in (8.19) for verbs which have a Low tone in their underlying tone melody. By positing that the subjunctive and the imperfective associate with the secondary stems, then we can account for the differences in the location of the floating High tone in these two forms and that of the progressive and counterfactual.

8.21. Surface tones of the verb $f\acute{o}^{\circ}d^{LH}$ 'cook'

irrealis	$f\acute{o}^{\circ}d\acute{o} n\acute{u}t\acute{f}\acute{i}$
progressive	$t\acute{a}- f\acute{o}^{\circ}d\acute{o}\uparrow n\acute{u}\uparrow t\acute{f}\acute{i}$
counterfactual	$n\acute{i}^n- f\acute{o}^{\circ}d\acute{o}\uparrow n\acute{u}\uparrow t\acute{f}\acute{i}$
subjunctive	$n\acute{a}^n- f\acute{o}^{\circ}d\acute{o} n\acute{u}\uparrow t\acute{f}\acute{i}$
imperfective	$f\acute{o}^{\circ}d\acute{o} n\acute{u}\uparrow t\acute{f}\acute{i}$

In examining these forms there are two issues: 1) The locus of the association of the tones sponsored by the verb root - that is, the Low tone and the floating High tone; and 2) the locus of the association of the floating High tone sponsored by the prefixes. First we answer these two questions with regard to the progressive and counterfactual forms. In (8.22) we show the tonal association pattern for the progressive form. We see that in the surface form, the Low tone sponsored by the verb root is associated at the right edge of the verb, and the floating High tone of the verb root associates at the right edge of $n\acute{u}t\acute{f}\acute{i}^{MH}$ 'beans'. The floating High tone of the prefix associates with the initial mora of the verb.

8.22. Progressive form of $f\acute{o}^{\circ}d^{LH}$ 'cook'



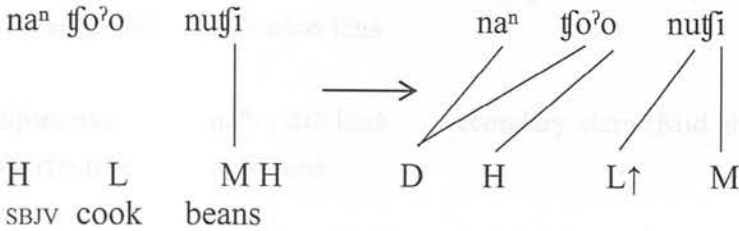
The beans are in the process of cooking.

Note that as these associations form a High Low High sequence, in the surface form the Low tone is raised to Mid.² Also note that even though the Low tone is linked to two moras, it still is raised on both moras. More research is needed to better define the contexts in which multiply-linked Low tones are raised.

² See Chapter 7 for acoustic data which shows that Low tones in the sequence High Low High are raised to Mid. In Chapter 10, we show that this process only occurs across prosodic boundaries.

We now turn to answer the two questions posed above with regard to the imperfective and subjunctive forms. In (8.23), we show the association patterns for the subjunctive.

8.23. Secondary stem of a Low High verb



May the beans be cooked.

In (8.23), we give as the underlying form the secondary stem of *ʃo'o* 'cook'. This verb sponsors a Low High tone melody, but in the secondary stems, the Low occurs as a floating tone and the High tone has been deleted. In the surface form the floating High tone sponsored by the verbal prefix associates at the right edge of the verb stem. The Low tone sponsored by the verb stem associates with the initial mora of *nufi*^{MH} 'beans'. Note that the floating High tone sponsored by the verb root is present in the counterfactual forms and progressive forms, associated at the right edge of *nufi*^{MH} 'beans' as seen in (8.21), as these verbal forms associate with the primary stems. As already has been noted, the Low tone is raised to Mid as it is part of a High Low Mid sequence. In these data we see the importance of positing primary and secondary stems as it gives us a way of accounting for the behaviour of the Low tones in this group of verbs.

8.2.4. Verbs whose Mid tones are deleted in certain forms

We now turn to two other groups of verbs in which it is important to distinguish between primary and secondary stems: that is, verbs which sponsor either a Mid or a Mid High tone melody. In these cases we see that the locus of association of the floating High tone forms the same groupings as we saw for Low and Low High tone verbs; that is, the surface patterns of the imperfective and subjunctive forms are the same as each other, but differ from the progressive and counterfactual. In (8.24), we give the five forms of the verb *noto*^M 'wake'.

8.24. Surface forms of the verb *noto*^M 'wake'

irrealis	nōtō lānā	
progressive	tā- nōtó láná	primary stem (Mid present)
counterfactual	nī ⁿ - nōtó láná	
subjunctive	nā ⁿ - nōtō láná	secondary stem (Mid absent)
imperfective	nōtō láná	

First we note that the floating High tones of the prefix in the case of the progressive and counterfactual associate with the second mora of the verb. We claim that the verb stems in these instances are primary stems, and so the Mid tone is present. However, in the case of the subjunctive and the imperfective forms, which co-occur with the secondary stem, we see that the floating High tone sponsored by the verb prefix doesn't associate with the verb root, but with the initial mora of the noun. We claim that the Mid tones associated with these forms is in fact the default tone, rather than the underlying Mid tone sponsored by the verb root. Therefore in the progressive and counterfactual form, we claim that the underlying Mid tone is associated at the right edge, and deleted by the floating High tone, just as we saw for nouns in Chapter 6. However, in the case of the subjunctive and imperfective, we claim that there is no Mid tone associated with the stem.

We see the same surface pattern on the primary and secondary stems of verbs with an underlying Mid High tone pattern as we saw in (8.24) for verbs that have only a Mid tone. In (8.25), we show the surface forms of the verb *kas*^{MH}.

8.25. Surface tones of the verb *kasi*^{MH} ‘eat’

irrealis	kāsī láná	
progressive	tā- sēsí láná	primary stem (Mid present)
counterfactual	nī ⁿ - sēsí láná	Default associated with prefix and first mora of the verb.
subjunctive	nā ⁿ - kāsī láná	secondary stem (Mid absent)
imperfective	sēsí láná	Default associated with prefix and both moras of the verb.

In (8.25), in the progressive and counterfactual forms, we see that the floating High tone associates with the final mora of the verb stem. However, for the subjunctive and imperfective forms, the floating High tones of the prefix do not associate with the verb *kasi*^{MH} ‘eat’, but rather associate with the subject. We note that the surface tonal association patterns are identical to those found on the verb *noto*^M ‘wake’ given in (8.24). In other words, the loci of the association of the floating High tones of the prefixes do not seem to be defined by the presence or absence of a floating High tone sponsored by the verb. However, whether a prefix associates with a primary or a secondary stem does determine the location of the floating High tone sponsored by the prefix. A summary of these data is given in (8.26) where the data in (8.24) and (8.25) are compared with (8.8) and (8.15) above. Note that we use the progressive and the subjunctive to illustrate the different tonal phenomena.

8.26. Association of floating High tones in Mid and Mid High verbs

	Group 1 (Mid tones retained)		Group 2 (Mid tones deleted)	
	Mid	Mid High	Mid	Mid High
Irrealis	nkāβā lánā	ǒūtē láná	nōtō lánā	kāsī láná
Progressive	tā- ⁿ kāβá láná	tā- ǒúté láná	tā- nōtó láná	tā- sēsí láná
Subjunctive	nā ⁿ - ⁿ kāβá láná	nā ⁿ - ǒúté láná	nā ⁿ - nōtō láná	nā ⁿ - kāsī láná

In (8.26), in Group 1 we give examples of verbs which do not show the allomorphic changes and therefore only have primary stems. We see that the High

tone sponsored by the prefixes associates with the second mora of the verb stem. For Group 2 verbs, the High tones sponsored by the prefix differ as to the mora with which they associate. In the case of the progressive, which co-occurs with the primary stem, the High tone associates with the second mora of the verb stem. On the other hand, in the case of the subjunctive, the floating High tone skips the verb stem, which has no tones associated with it and links with the first mora of the subject. Note that for this Group of verbs, the floating High tone sponsored by some verb roots is retained even when the Mid tone is deleted.

As the two surface tonal patterns are evidenced in both groups, then it cannot be attributed to the presence or absence of a floating High tone in the underlying form. Instead we posit that the verbs *noto^M* ‘wake’ and *kasi^H* ‘eat’ do not have a Mid tone in their secondary stems. Therefore we posit the categories of primary and secondary stems as a means of explaining these data; that is, both the secondary irrealis and secondary realis stems of *kasi^H* only sponsor floating High tones.

In addition to the data presented here, evidence for this claim comes from the surface tonal phenomena of phrases consisting of a noun which has been fronted and a verb. Consider the data in (8.27) and (8.28).

8.27. Primary irrealis stem

βílù kàsì

cat eat

It's the CAT that will eat.

8.28. Secondary irrealis stem

βílù nàⁿ kàsì

cat SBJV eat

May the CAT eat.

In (8.27) we see that the tones of *kasi^{MH}* are Low Mid, whereas in (8.28) the tones of *kasi^{MH}* are Low Low. Note that in this case the surface tone of the subjunctive prefix is also Low. To account for these differences we posit that in (8.27) the Mid tone sponsored by the verb *kasi^{MH}* is associated at the right edge of the verb root. We posit that in (8.28) the Mid tone of the verb root is not present, so the Low tone of βílù ‘cat’ spreads to provide tones for all of the following three moras. We claim that *kasi^{MH}* ‘eat’ is one of the group of verbs which has separate secondary forms of both the irrealis and the realis stems. The characteristic of these

secondary forms in the case of Mid or Mid High verbs is that the Mid tone is not present in the underlying form of the verb stem.

8.3. ACCOUNT OF TONAL ASSOCIATION

We now turn to look at further evidence for positing that some verbs have secondary stems. Evidence for this claim comes from comparing the association of the floating High tones of the four prefixes under discussion on verbs with differing underlying tones.

First we look at the floating High tones sponsored by these four prefixes. Recall that these four prefixes can be divided into two groups according to whether they associate with the primary or secondary stems: in the first group are the prefixes *ta^H*- 'progressive' and *ni^H*- 'counterfactual', and in the second group are the prefixes \emptyset^H - 'imperfective' and *na^H*- 'subjunctive'. The differences between the primary and secondary stems are manifested by the loci of association of the floating High tones sponsored by these prefixes. In (8.29), we list the mora with which these floating High tones associate according to the underlying tones of the verb root.

8.29. Syllable of association of the floating High tone of verbal prefixes

	Underlying tone of the irrealis	Progressive Counterfactual	Subjunctive Imperfective
Group A	Low Mid	initial	initial
	Mid	second	second
	Mid High	second	second
	Mid Low	second	second
Group B	Low	initial	second
	Low High	initial	second
	Mid	second	floating tone
	Mid High	second	floating tone

In (8.29), we divide the verb roots into two groups. In Group A are the verbs in which the floating High tones of the four prefixes under discussion all associate

with the same TBU; in the case of verbs with a Low Mid pattern underlyingly this is the initial TBU, and in the case of those with a Mid tone as the initial element, the floating High tones all associate with the second TBU, deleting the Mid tone as was shown in (8.17) above. For verbs in Group A we posit that there is no distinction between primary and secondary stems. In Group B, we see that the surface tone patterns are different for each of the two groups of prefixes. We posit that in the case of these verbs, there is a difference between primary and secondary stems.

The value of positing primary and secondary stems is best seen in examining the differences between the Mid and Mid High verbs which belong to Group A and those which belong to Group B. The comparison of their surface forms is given in (8.30). In this table we indicate an inserted default tone by a D to differentiate it from the underlying Mid tones. When a default tone is associated with two moras, we write two Ds, even though we posit that it is one default tone associated with the two moras.

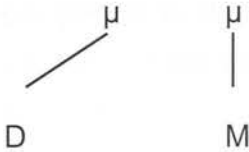
8.30. Comparison of the surface tone patterns of Mid and Mid High verbs

		Primary stems		Secondary stems	
		Irrealis	Progressive Counterfactual	Subjunctive Imperfective	
Group A	a)	D M	D H	D H	
	b)	D M (H)	D H	D H	
Group B	c)	D M	D H	D D (H)	
	d)	D M (H)	D H	D D (H)	

In (8.30a) and b) which give the surface tones of Group A verbs, we see that the surface forms of the verbs are identical; that is, the floating High tone from the morpheme to the left is aligned at the right edge of the verb root. We posit that in the underlying form there is a Mid tone associated at the right edge of the verb stem in all cases. We claim that the floating High tone of these prefixes associates with the second mora and deletes the Mid tone that was associated there. However, in (8.30c) and d) which give the surface patterns of Group 2 verbs, we see that the floating High tone of the prefixes associates with the second mora of the verb stem for the progressive and counterfactual forms, giving surface forms identical to those of Group A. We claim that there is an underlying Mid tone present in these forms

which is deleted by the floating High tone of the prefix. On the other hand, for the imperfective and the subjunctive of Group B verbs, we claim that the Mid tone associated with the second mora in the underlying form is deleted. In these cases the floating High tones sponsored by the prefixes skip both moras of the stems and usually associate with the following morpheme. As the subjunctive prefix associates with the irrealis verb stem, and the imperfective associates with the realis, then we posit that there are allomorphs of both these stems. We posit that in these cases there are no Mid tones associated with the secondary verb stem. In (8.31), we give the association patterns for the irrealis of verbs which have an underlying Mid tone. For these verbs there are no differences in the irrealis whether verbs belong to Group A or Group B.

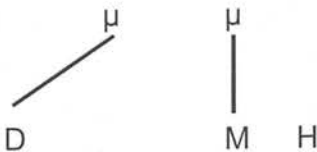
8.31. Tonal association for the irrealis of verbs with an underlying Mid tone



Here we see that the Mid tone sponsored by the verb aligns at the right edge, and a default tone is inserted to provide a tone for the initial mora.

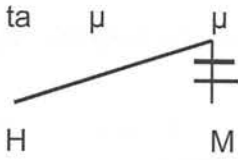
In (8.32), we show that the association of tones for the irrealis form of verbs with an underlying Mid High tone melody is similar. Note that the High tone sponsored by the verb is left unassociated as rising contours on a single mora are prohibited.

8.32. Tonal association for the irrealis of verbs with underlying Mid High tone



We now turn to the surface forms for Mid or Mid High verbs when they follow a prefix which has a floating High tone. In (8.33), we have the association pattern for the progressive form of both Group A and Group B verbs with underlying Mid tones.

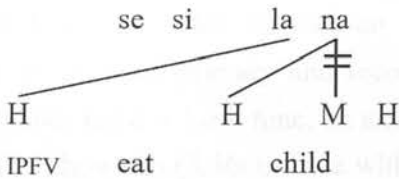
8.33. Association of the floating High tone of the progressive



Here we see that the floating High tone of the progressive prefix deletes the Mid tone associated at the right edge. We claim that the progressive and the counterfactual prefixes associate with the primary stems - that is, stems with which the underlying tones are associated.

We posit that Mid or Mid High verbs in which the floating High tone of all four prefixes associates with the same mora only have primary stems. However, in the case of Group B verbs which have a Mid or a Mid High tone melody, there are no Mid tones present in the secondary stems. This is seen by the fact that the floating High tone of the prefixes skips the secondary verb stem entirely. An example is given in (8.34).

8.34. Floating High tone skips secondary verb stem



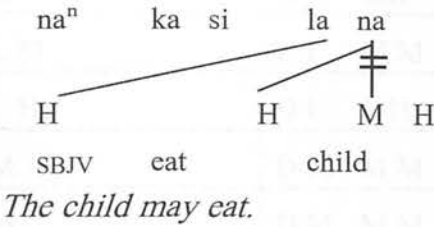
The child is eating.

First we note that the floating High tone of the prefix associates with the initial mora of *lana*^{MH} 'child'. The floating High tone sponsored by the verb associates at the right edge of *lana*^{MH} 'child'. The behaviour of the floating High tone of the imperfective suggests two factors about the secondary stems of these verbs: one, there are no tones associated with the verb stem, even though there is a floating High tone sponsored by that stem; and two, floating High tones do not associate with stems that are unspecified for tone. So as there are no tones associated with the primary realis stem *sesi* 'eat', the floating High tone does not associate with it but with the initial mora of *lana*^{MH}.

In the example in (8.35), we see that the primary irrealis stem of *kasi*^{MH} 'eat' has no tone associated with it, although it does sponsor a floating High tone in its

underlying form. We see that in the subjunctive form the floating High tone of the prefix skips both moras of the primary irrealis stem.

8.35. Association of the floating High tone of the subjunctive



We therefore conclude from these data that there are some Mid or Mid High verbs whose secondary stems have no tones associated with them, although they may sponsor a floating High tone. These verbs then contrast with the verbs in (8.30a) and (8.30b) for which we posit that there is an underlying Mid tone.

Based on the tonal phenomena described above, we posit that verb roots in MXY are divided into 9 classes, based on the underlying tones and the surface tones of the imperfective. We now look at the differences in surface tonal phenomena for these nine groups as shown in (8.36). We include the tones found on a noun subject that has the underlying tones MH, for example *kit^{MH}* ‘animal’ as floating tones are often realised on the following morpheme. We indicate verb groups which have primary and secondary stems with an asterisk. These include those which have a Low tone, as shown in (8.36a), those with a Low High tone pattern as shown in (8.36c), those with a Mid tone in (8.36d) and those with a Mid High tone pattern in (8.36g). Again we indicate inserted default tones with D.

8.36. MXY verb classes

	Underlying tones of verb root	Surface tones of the irrealis and the subject	Surface tones of the imperfective and the subject
a	L*	D L LM	D H L↑ M
b	L M	D L MM	H L↑ MM
c	L H*	D L LH	D H L↑ M
d	M *	D M MM	D D HH
e	M	D M MM	D H HH
f	M L	D M LM	D H L↑ M
g	M H *	D M MH	D D HH
h	M H	D M MH	D H HH
i	H L	D H L↑ M	H H L↑ M

First we note that in the irrealis, all classes of verbs have a default tone associated with the initial mora of the verb. The tones sponsored by the verb root align at the right edge of the verb. In the cases where there is a second tone in the tone pattern, then this tone associates with the noun which is the subject. So in the irrealis in (8.36c), the floating High tone sponsored by the verb root is associated with the subject. A similar pattern is seen in (8.36g) and (8.36h) where the floating High tones sponsored by these verb roots associate with the second mora of the subject. In (8.36b) we see that the floating High tone of the imperfective and the subjunctive associates with the initial mora of the verb roots. Floating High tones always associate with the initial mora of verbs which sponsor a Low Mid tone melody. The benefit of positing primary and secondary stems is seen when we compare (8.36d) with (8.36e) and also when we compare (8.36g) with (8.36h). Although the verbs in each pair have the same underlying tones, there is a difference in the surface tones of the imperfective. We claim that the difference in forms is due to the presence of an underlying Mid tone in the primary realis stem in (8.36e) and (8.36h). We also see that the Low tone sponsored by the verb root in (8.36a) and (8.36c) occurs as a floating tone in forms which co-occur with the secondary stem. Note that the Low tone sponsored by verbs with an underlying Low Mid pattern does not become a floating tone. We also see in the data in (8.36b), (8.36h), and (8.36i) that some verb roots and stems have two underlying

tones in all their forms, whereas some, such as those in (8.36c) and (8.36g) lose an underlying tone in the subjunctive and imperfective forms.

8.4. THEORETICAL ISSUES

The theoretical implications of the data presented in the chapter will be described in greater length in Chapter 10. However, here we draw the reader's attention to three issues which arise from the data presented in this chapter.

8.4.1. Association of High tone

We have described how the locus of the association of floating High tones varies according to the underlying tones of the verb root, which prefix sponsors them, and whether the verb in question has a separate secondary stem. We have noted that for some verbs all four prefixes associate with the second mora; for others there is a two-way split: the tones sponsored by the progressive and counterfactual associating with one mora, and the imperfective and subjunctive with another. For another group of verbs, these floating High tones always associate with the initial mora. Or put more succinctly, the floating High tones do not always associate with the same mora. The question then is, what determines the locus of the association. It cannot be the stressed syllable – we show in the next chapter that the initial syllable shows increased duration. Instead we posit that these High tones prefer to align at the right edge of the verb root, but in some cases, other factors, such as the preservation of Low tones, take precedence.

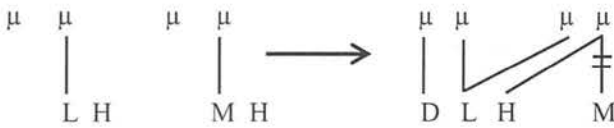
8.4.2. Preservation of tones

Within some phonological frameworks it is claimed that certain tones, usually but not always High, will be preserved in favour of others (Hyman 2001). However, in the data shown above, it seems that it is not that one tone is favoured over the rest. For example, in underlying tone patterns which have an initial Mid, this Mid tone is usually deleted, as shown in (8.12) above. However, the Mid tone of a Low Mid tone melody is preserved as shown in (8.2), but the High tone of a Low High melody is deleted in some forms, shown in (8.21). Clearly which tone is preserved is not a matter of a simple ranked listing.

8.4.3. Linear association of tones

It is usual to consider that tones will associate one-to-one and left-to-right, although as pointed out by Yip (Yip 2002), there are cases where these conventions do not apply. In MXY, both in this chapter and in Chapters 6 and 7, we have seen cases where a floating High tone skips moras. For example, in (8.37), we see that in the surface form the Low tone sponsored by the first word in the phrase spreads to the initial mora of the second word, and the floating High tone sponsored by the initial word associates at the right edge of the second word deleting the Mid tone associated with that mora.

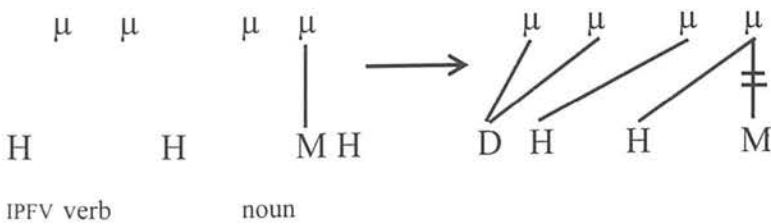
8.37. Example of Low spread and floating High tone association



Or put in slightly different terms, the floating High tone sponsored by the first element of the phrase skips the initial mora of the second element and associates at the right edge. If association were strictly one-to-one and left-to-right, we would have expected the floating High tone to associate with the initial mora of the second word of the phrase.

Another example comes from the data presented in this chapter, that of secondary verb stems that only sponsor a floating High tone. The association pattern is given in (8.38).

8.38. Verbs with only a floating High tone



Note that even though the verb sponsors a High tone, this High tone does not associate with the verb in the surface form; instead it associates at the right edge of the noun which is the subject of the sentence. The floating High tone sponsored by the imperfective prefix skips the mora of the verb root entirely and associates with

the initial mora of the noun. A default tone is inserted to provide tones for the moras of the verb root.

This skipping of moras by floating High tones provides an interesting scenario when we consider which syllable is stressed. As we will show in Chapter 9, it is the first syllable of disyllabic words. Thus we see that floating High tones in MXY skip stressed syllables. The theoretical implications will be further discussed in Chapters 10 and 11.

9.2. DEFINITION OF STRESS

We have seen that the concept of stress is used in different ways in the literature. In this section, we will define stress in a way that is consistent with the rest of the book.

Stress is a property of a syllable, not of a word. It is a relative phenomenon relative to the syllable. It is a property of a syllable that is 'stronger' than others. In nuclear structure theory, it is the syllable that is 'stronger' than others, where the stronger syllable is determined by its length.

Stress is a dynamic stress, the acoustic prominence of a particular syllable. Dynamic stress relates to features such as increased duration and intensity which make prominent syllables, or the centralization of vowels, which in some languages is a feature of the syllable that is the strongest syllable.

The third concept of stress, the location of a prominent-related International Phonetic Alphabet (IPA) symbol, is considered to be part of the syllable structure. It is a property of the word.

Stress is a property of a syllable, not of a word. It is a relative phenomenon relative to the syllable. It is a property of a syllable that is 'stronger' than others. In nuclear structure theory, it is the syllable that is 'stronger' than others, where the stronger syllable is determined by its length.

9.3. STRESS AND TONE

As we have seen, stress is a property of a syllable, not of a word. It is a relative phenomenon relative to the syllable. It is a property of a syllable that is 'stronger' than others. In nuclear structure theory, it is the syllable that is 'stronger' than others, where the stronger syllable is determined by its length.

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CHAPTER 9

PROSODIC PROMINENCE

9.1. INTRODUCTION

Having looked at the association patterns for the floating High tones of four verbal prefixes, in this chapter we examine further data to see whether there is any correlation between High toned moras and word stress. In order to do this, first, we examine data to show the initial syllable of roots show increased duration. Secondly, we look at the effects of focus on the relative duration of the two syllables of disyllabic words.

9.2. DEFINITION OF STRESS

We start by defining what is meant by stress. Ladd (2008) points out the need to distinguish between three facets of stress.

The first facet is ‘metrical strength’: that is, abstract prominence relations, or the perception that some syllables are ‘stronger’ than others. In metrical structure theory, syllables are parsed into binary feet, where the stronger syllable is determined by the language.

The second is ‘dynamic stress’, the acoustic prominence of a particular syllable. ‘Dynamic stress’ relates to features such as increased duration and intensity which mark prominent syllables, or the centralisation of vowels, which in some languages is a feature of the non-prominent syllable.

The third is ‘pitch accent’, the location of prominence-related intonational events. Pitch accent – that is, changes in F₀ – is considered to be part of the intonational features of the utterance, rather than a property of the word.

In this chapter we limit our discussion to describing durational differences between the two syllables of roots. We show that in most contexts the initial syllable shows increased duration, although this can be lost in certain contexts.

9.3. INVESTIGATING LEXICAL STRESS IN MXY

As was outlined in Chapter 3, previous analyses of Mixtec stress claim that the initial syllable of disyllabic words shows stress by having increased duration (e.g., Alexander, 1986), while Pankratz and Pike (1967) claim that there is a correlation between High tones and word stress. These claims were made, however, without

the benefit of recorded acoustic data. In this section we look at experimental data to verify whether the initial syllable of disyllabic words shows increased duration and intensity in MXY. Details of the methodology used in gathering these data were given in Chapter 6.

9.3.1. Experiment 1: Methodology

The first experiment was designed to measure the differences in duration and intensity between the vowels of the two syllables of disyllabic nouns in information focus. Eleven mono-morphemic nouns were chosen which could realistically be the object of the verbs *see^{nM}* ‘to buy’ or *điko^{MH}* ‘to sell’. Each noun was placed with each verb in three prompt sentences, the difference between the sentences being the enclitic which is the subject. Data from four participants were used in the analysis, each participant contributing 66 utterances to the data set. Examples of the utterances analysed are given below in (9.1). The target words are highlighted in grey.

9.1. Sample utterances for experiment 1

- a) $n\bar{i}^n$ - $s\bar{e}\bar{e}^n$ $\acute{d}\acute{a}$ $\acute{d}\acute{i}t\acute{a}$ $k\acute{a}j\acute{i}\uparrow n\bar{i}^n$
 $n\bar{i}^n(L)$ - see^{nM} $\acute{d}a^{HL}$ $\acute{d}\acute{i}t\acute{a}^{LH}$ $kaj\bar{i}^L n\bar{i}^{nM}$
 PFV buy 1HON tortilla day before yesterday
I bought tortillas the day before yesterday.

- b) $n\bar{i}^n$ - $s\bar{e}\bar{e}^n$ $n\bar{o}$ $\acute{d}\acute{i}t\acute{a}$ $k\acute{a}j\acute{i}\uparrow n\bar{i}^n$
 $n\bar{i}^n(L)$ - see^{nM} $no^{(H)}$ $\acute{d}\acute{i}t\acute{a}^{LH}$ $kaj\bar{i}^L n\bar{i}^{nM}$
 PFV buy 1INCL tortilla day before yesterday
We bought tortillas the day before yesterday.

- c) $n\bar{i}^n$ - $s\bar{e}\bar{e}^n$ $s\bar{i}$ $\delta\acute{i}t\grave{a}$ $k\acute{a}j\grave{i}\uparrow n\bar{i}^n$
 $n\bar{i}^n(L)$ - $se\bar{e}^{nM}$ $si^{(H)}$ $\delta\acute{i}t\grave{a}^{LH}$ $kaj\bar{i}^L n\bar{i}^{nM}$
 PFV buy 3G tortilla day before yesterday
They bought tortillas the day before yesterday.

In these utterances we see that the tone on the initial syllable of $\delta\acute{i}t\grave{a}^{LH}$ 'tortilla' is not always the same. In (9.1a) it is Mid, and in (9.1b) and (9.1c) it is High. These differences enable us to compare acoustic features of different tones in identical environments.

With the target words segmented in Praat, several measures were taken. A Praat script was used to measure the mean duration, intensity and F0 of the vowels.¹ The VOT in the case of the plosives was considered part of the consonant.

9.3.2. Experiment 1: Analysis

We now turn to look at the results of this experiment. First we compare the measurements of duration for the vowel in each syllable and for each speaker. The table in (9.2) shows the mean and the standard deviation for the duration of the vowel of each syllable.

9.2. Mean duration of each syllable

Syllable	Mean in seconds	N	Std. Deviation
1	0.106	264	0.026
2	0.086	264	0.027

To ascertain whether these differences in duration are statistically significant, a repeated measures ANOVA was run using Speaker and Syllable as the factors. The duration of the vowel in the initial syllable of nouns is greater than that of the second syllable, $F(1,3) = 13.5$, $p = 0.03$. This finding agrees with the observations of previous impressionistic studies which claim that the initial syllable shows increased duration relative to the second syllable.

We now turn to analyse the mean intensity of the vowels. In (9.3), we give the mean intensity for different vowels in the first and second syllables of disyllabic nouns. For each vowel the intensity is greater in the initial syllable. We see that the vowel /i/ shows the smallest mean intensity.

¹ My thanks to Mike Bennett and Bert Remijsen for their help in developing these scripts.

9.3. Comparison of mean intensity of vowels

Vowel	Syllable	Mean Intensity (dB)	Std. Deviation	Number
i	1	73.78	8.11	144
	2	71.92	7.74	169
a	1	74.43	9.13	24
	2	70.92	9.27	71
u	1	74.84	7.92	96
	2	70.67	8.2	24

In (9.4) we give the mean intensity for different tones in the first and second syllables of disyllabic nouns. As Low tone only occurs in the second syllable there is only one measurement for Low. We see for Mid and High that there is greater intensity in the initial syllable.

9.4. Comparison of the mean intensity of the different tone levels

Tone	Syllable	Mean Intensity (dB)	Std. Deviation	Number
L	2	71.004	7.97	130
M	1	73.29	8.08	105
	2	71.62	8.7	88
H	1	74.84	8.11	159
	2	72.91	7.84	46

In order to test whether these differences shown in (9.3) and (9.4) are statistically significant, a repeated measures ANOVA was run. The factors were Speaker, Syllable, Vowel, and Tone. The results show that there was a significant main effect for Syllable, with greater intensity in the initial syllable than in the second syllable, $F(1,3) = 17.07, p = 0.03$. There were no main effects for Tone or Vowel.

The results in this section show that for this data set, the vowel in the initial syllable showed both greater duration and greater intensity relative to the vowel in the second syllable.

9.4. PROSODIC PROMINENCE

We now turn to look in more detail at the issue of prosodic prominence. First we look at the definition of focus, as there are different ways in which the term is used. We say, following Ladd (2008), that an entity is in focus when it is the most informative part of the sentence. Ladd (2008) distinguishes between narrow focus (on a single word) as opposed to broad focus (on a larger constituent). In this chapter we look at words which are in narrow focus.

In order to distinguish between two different kinds of narrow focus, we adopt the terms 'information focus' and 'contrastive focus' from Gundel and Fretheim (2006). Under their definition, 'information focus' is the main predication expressed by a sentence and corresponds to the questioned position of the relevant implicit or explicit question. For example, in the conversational exchange in (9.5), Sarah expresses the information focus that identifies the person who bought the cakes. In this case the questioned position is the subject of the verb *bought*, as is shown in the utterance contributed by person A in (9.5).

9.5. Focus in the answer to a content question

Who bought the cakes?

SARAH bought the cakes.

There are times when attention is brought to a constituent because the speaker thinks the addressee's attention is focussed elsewhere and the speaker wishes that to change, so that implicitly or explicitly there is a contrast in the utterance. Gundel and Fretheim (2006) refer to this as contrastive focus.

9.6. Implicit contrastive focus

It was the NEIGHBOUR'S cat that killed the parrot.

In the sentence in (9.6), there is the implicit contrast between the neighbour's cat and some other cat. The important point to note here is that the contrasts may be left implicit, as in this example. Or the contrast may be made explicit, as is shown in (9.7).

9.7. Explicit contrastive focus

I didn't buy TOMATOES, but I did buy LETTUCE.

Languages vary as to how or whether they distinguish between these two types of focus, whether by prosodic cues alone, or whether by syntactic cues as well. In MXY, nouns which are in contrastive focus usually occur before the verb. This is a movement from its canonical position which provides the listener with the information that this noun is in focus.

In this experiment we look at how focus is indicated. In order to do this, we construct a set of materials in which three nouns occur under different focus conditions: firstly, Information Focus (where the noun is part of the answer to a content question); secondly, where the verb in the sentence is in Contrastive Focus (which in turn results in the noun not being in focus, as discussed below); and thirdly, when the noun is in Contrastive Focus. In this last condition, the noun occurs pre-verb, whereas under the other two conditions, the noun occurs in its canonical position after the verb. As well as measuring duration of vowels in the nouns, we also examine the duration of vowels in the verbs.

9.4.1. Experiment 2: Methodology

This experiment was designed to compare acoustic features of nouns under three different focus conditions. We also consider the durational differences between the two syllables of the verb under these conditions to ascertain whether the differences in the duration of the nouns are reflected in differences in the duration of the verbs. For this experiment, both question and answer were recorded. One person read the question; the participant read the answer. In this analysis we look only at the recorded answers and measure the duration and intensity of the vowels of the nouns and the verb *ɔiko*^{MH} 'to sell'. In this data set an additional speaker recorded the utterances, a woman in her 60's, identified by the initials SM.

We now describe each of the three conditions in turn. The first condition puts the target noun in Information Focus (IF). In this condition, the question is a content question: either 'What did you buy the day before yesterday?' or 'What did you sell the day before yesterday?' Examples of these questions are given in (9.8).

9.8. Forms of questions which put the noun in Information Focus

- a) What did you sell?

Nāi ⁿ kùú	há	nì ⁿ -	ðikō	-ní ⁿ	kājìní ⁿ
nai ^{nLH} -kuu ^M	ha ^(LH)	ni ^{n(L)} -	ðiko ^{MH}	-ní ^{nHL}	kaji ^L ni ^{nM}
what	COMP	PFV	sell	2HON	day before yesterday

b) What did you buy?

Nāi ⁿ kùú	há	nì ⁿ -	sēcē ⁿ	-ní ⁿ	kājìní ⁿ
nai ^{nLH} -kuu ^M	ha ^(LH)	ni ^{n(L)} -	sec ^{nM}	-ní ^{nHL}	kaji ^L ni ^{nM}
what	COMP	PFV	buy	2HON	day before yesterday

These questions were also asked using the non-honorific form of the 2nd person pronoun as shown in (9.8 c and d).

c) What did you sell?

Nāi ⁿ kùú	há	nì ⁿ -	ðikō	-nó ⁿ	kājìní ⁿ
nai ^{nLH} -kuu ^M	ha ^(LH)	ni ^{n(L)} -	ðiko ^{MH}	-no ^{n(L)}	kaji ^L ni ^{nM}
what	COMP	PFV	sell	2	day before yesterday

d) What did you buy?

Nāi ⁿ kùú	há	nì ⁿ -	sēcē ⁿ	-nō ⁿ	kājìní ⁿ
nai ^{nLM} -kuu ^M	ha ^(LH)	ni ^{n(L)}	sec ^{nM}	-no ^{n(L)}	kaji ^L ni ^{nM}
what	COMP	PFV	buy	2	day before yesterday

There are two options for the response to these questions: one using the honorific form of the first person pronoun and the other using the non-honorific form. All possible options were used. In (9.9) we give examples of the answers for the questions in the Information Focus condition. Note that the target word is highlighted in grey.

9.9. Forms of the answers for Information Focus

a) Answer with the honorific pronoun form with the verb 'to sell'

nì ⁿ -	ðikō	-ðá	kì↑tī	kājìní ⁿ
ni ^{n(L)} -	ðiko ^{MH}	-ða ^{HL}	kiti ^{MH}	kaji ^L ni ^{nM}
PFV	sell	1HON	animal	day before yesterday

I sold animals the day before yesterday.

b) Answer with the non-honorific form with the verb 'to sell'

nìⁿ- ðìkō -níⁿ kì↑tī kājìníⁿ

ni^{n(L)}- ðìkò^{MH} -ní^{n(L)} kiti^{MH} kaji^Lni^{nM}

PFV sell 1 animal day before yesterday

I sold animals the day before yesterday.

c) Answer with the honorific pronoun form with the verb 'to buy'

nìⁿ- sēēⁿ -ðá kì↑tī kājìníⁿ

ni^{n(L)}- sēē^{nM} -ðá^{HL} kiti^{MH} kaji^Lni^{nM}

PFV buy 1HON animal day before yesterday

I bought animals the day before yesterday.

d) Answer with the non-honorific form with the verb 'to buy'

nì ⁿ -	sēē ⁿ	-nī ⁿ	kìtī	kājìní ⁿ
ni ^{n(L)} -	sce ^{nM}	-ni ^{n(L)}	kiti ^{MH}	kaji ^L ni ^{nM}
PFV	buy	1	animal	day before yesterday

I bought animals the day before yesterday.

Note that in (9.9d) the tone of the initial syllable of *kiti* is Low, resulting in a Low Mid tone pattern. Thus we see that by using more than one enclitic, we obtain different surface tone patterns on *kiti*^{MH} 'animal'. In (9.9a, b and c), the pattern was Mid Mid.

Condition 2 is where the verb is in Contrastive Focus (CF Verb); the verb is 'sell' or 'buy'. This means that the noun is not in focus. In (9.10), we give a question and answer pair from this data set.

9.10. Contrastive Focus on verb

A: Did you sell animals the day before yesterday?

nì ⁿ -	ðikō	-nī ⁿ	kì↑tī	kājìní ⁿ	-ā
ni ^{n(L)} -	ðiko ^{MH}	-ni ^{nHL}	kiti ^{MH}	kaji ^L ni ^{nM}	-a
PFV	sell	2HON	animal	day before yesterday	Q

B: No, because I BOUGHT animals the day before yesterday.

jā ² ā ⁿ	tī	nī ⁿ -	sēē ⁿ	-ðá	kì↑tī	kājìní ⁿ
ja ² a ^{nL}	tī ^(M)	ni ^{n(L)} -	sce ^{nM}	-ðā ^{HL}	kiti ^{MH}	kaji ^L ni ^{nM}
no	because	PFV	buy	1HON	animal	day before yesterday

In this condition the surface tones of the nouns are identical to those in the Information Focus condition. Again the different forms of first person are used.

Condition 3 is where the noun is fronted (CF Noun); fronting a noun indicates contrastive focus. Examples of the question and answer materials used to elicit the nouns in this condition are given in (9.11).

9.11. Contrastive Focus on nouns

A: Did you sell sheep the day before yesterday?

nīⁿ- ðikō -nīⁿ tʃĩkàtʃĩ kájì↑nīⁿ -ā
 ni^{n(L)}- ðiko^{MH} -ni^{nHL} tʃi^(H)- ka^Ltʃi^{MH} kaji^Lni^{nM} -a
 PFV sell 2HON sheep day before yesterday Q

B: No, because I sold ANIMALS the day before yesterday.

jā^ʔāⁿ tʃĩ kītī nīⁿ- ðì↑kō -ðá kājìniⁿ
 ja^ʔa^{nL} tʃi^(M) kiti^{MH} ni^{n(L)}- ðiko^{MH} -ða^{HL} kaji^Lni^{nM}
 no because animal PFV sell 1HON day before yesterday

A summary of the three conditions is given in (9.12).

9.12. Summary of the three conditions used in experiment 2

IF	Information Focus	The target nouns and verbs are part of the answer to a content question.
CF Verb	Contrastive Focus on the Verb	The verb is in contrastive focus (nouns are not in focus).
CF Noun	Contrastive Focus on the Noun	The noun in focus is fronted.

9.4.2. Experiment 2: Analysis

Recordings from 5 speakers were used in the analysis for Experiment 2. Measurements of duration and intensity were made of the vowels in the target nouns and verbs.

Let us first consider the durational data of the vowels of the nouns. The means and standard deviations are given in (9.13) for each syllable under the three experimental conditions. We see that the duration of the vowel in the first syllable varies under the three conditions, but there is very little difference in the duration of the vowel of the second syllable in the three conditions.

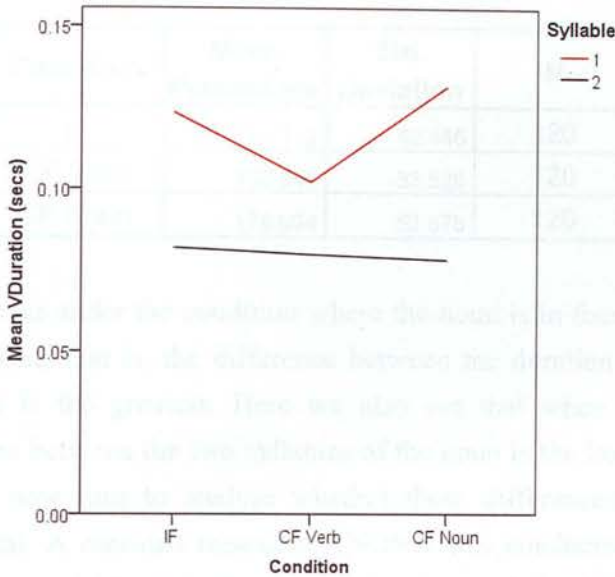
9.13. Durational means and standard deviation for the vowels of the nouns

CONDITION	SYLLABLE 1		SYLLABLE 2	
	Mean (secs)	Std. Deviation	Mean (secs)	Std. Deviation
IF	0.124	0.027	0.081	0.019
CF Verb	0.102	0.021	0.08	0.018
CF Noun	0.132	0.022	0.078	0.016

A repeated measures ANOVA was conducted with the following factors: Speaker, Syllable (first or second syllable), and Focus Condition (conditions IF, CF Verb and CF Noun, as described above). The results of the RM-ANOVA show that there is a significant difference in duration between the first and second syllables: $F(1,4) = 22.83, p = 0.01$, the initial syllable showing increased duration. There was no main effect for Condition.

The ANOVA also showed that there was an interaction between the factors Syllable and Condition, $F(2, 8) = 7, p = 0.02$. We now look at the interaction between Syllable and Condition. In (9.14) we see that although there is relatively little variation in the duration of the second syllable, the difference in duration between the two syllables is greatest when the noun is in Contrastive Focus. When the verb is in Contrastive Focus, then the difference is least.

9.14. Interaction between Syllable and Condition for nouns



In (9.14), we see that there is very little difference in the mean duration of the second syllable under the three focus conditions (the black line representing the mean duration of the vowels in syllable 2 is almost horizontal). Thus we see that durational differences between the three conditions come from the longer duration of the initial syllable relative to the second syllable, rather than both syllables showing increased duration. This insight is investigated further below.

Having observed that the differences in duration under the three conditions are manifest on the initial syllable, we now turn to examine these data from a slightly different standpoint. Rather than taking the mean of the duration of each of the two syllables, we now examine the difference in duration between the vowels of both syllables of the nouns. We calculate the percentage that syllable one is of syllable two and use this as the dependent variable, called 'Percentage'. The greater the value of the factor 'Percentage', the greater the difference in duration. In (9.15), we give the means of Percentage for each condition.

9.15. Comparison of mean Percentage, looking at nouns

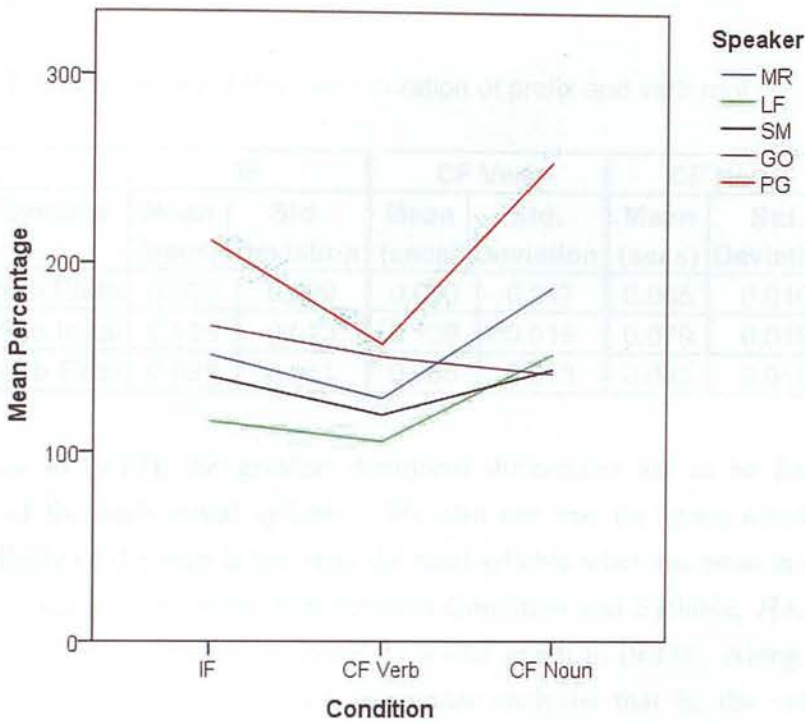
Condition	Mean Percentage	Std. Deviation	N
IF	157.112	42.446	120
CF Verb	132.347	33.526	120
CF Noun	176.094	53.678	120

We see that under the condition where the noun is in focus, the mean Percentage is the greatest; that is, the difference between the duration of the vowels in the two syllables is the greatest. Here we also see that when the verb is in focus the difference between the two syllables of the noun is the least.

We now turn to analyse whether these differences in mean Percentage are significant. A repeated measures ANOVA was conducted using Percentage as the dependent variable, with the factors Speaker and Condition. The results show that there is a significant difference in the percentage that the second syllable is of the first syllable under the three conditions, $F(2,8) = 5.39, p = 0.03$.

This data is also presented as a line graph in (9.16) where we show the differences per speaker.

9.16. Syllable 1 expressed as a percentage of syllable 2 for nouns



In (9.16), we see that for four of the five speakers, the percentage that syllable one is of syllable two is the least when the verb is in Contrastive Focus. Also for the same four speakers the percentage is the greatest when the noun is in Contrastive Focus. For speaker GO, the percentage is less when the noun is in Contrastive Focus in comparison to when the noun is in Information Focus.

Having looked at what is happening to the duration of the syllables of the nouns, we now turn to see what happens to the duration of the verbs under these three conditions. In order to do this, we work with a subset of the data, choosing the verb *ðiko*^{MH} ‘sell’ as it is disyllabic. To control for the possible confounding factor of different vowels, we only use data with the noun *kiti*^{MH} as it has the same vowel /i/ as the initial syllable of the verb root under analysis. This subset includes 4 utterances from each of the 5 participants in this experiment.

We ran another repeated measures ANOVA with the factors Condition (three conditions: IF, CF Noun, and CF Verb, as described above in (9.12)), and Syllable (verb prefix, root initial syllable, or root final syllable). There were significant main effects for both Condition $F(2,8) = 9.0, p < 0.001$, and Syllable $F(2,8) = 16.0, p < 0.001$. In (9.17), we give the mean and standard deviations for the duration of

the vowel in the verb prefix *niʔ(L)*-, the initial syllable of the verb root, and the root final syllable.

9.17. Comparisons of the mean duration of prefix and verb root

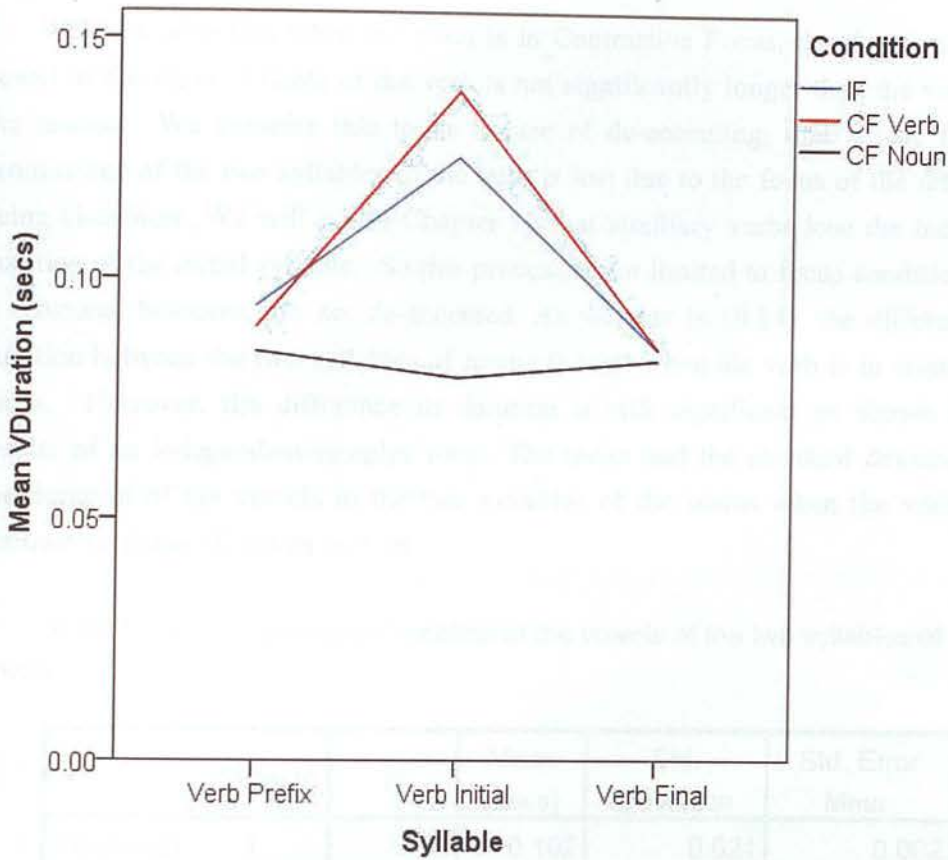
Syllable	IF		CF Verb		CF Noun	
	Mean (secs)	Std. Deviation	Mean (secs)	Std. Deviation	Mean (secs)	Std. Deviation
Verb Prefix	0.094	0.020	0.090	0.017	0.085	0.010
Verb Initial	0.125	0.023	0.139	0.016	0.079	0.019
Verb Final	0.085	0.011	0.085	0.013	0.083	0.010

As we see in (9.17), the greatest durational differences are to be found in the duration of the verb initial syllable. We also see that the mean duration of the initial syllable of the verb is less than the final syllable when the noun is in focus.

There was also an interaction between Condition and Syllable, $F(4,16) = 20$, $p < 0.001$. This interaction is shown by a line graph in (9.18). Along the *x*-axis we have the three syllables which are under analysis: that is, the verbal prefix *niʔ(L)*- ‘perfective’, the initial syllable of the verb root, and the final syllable of the verb root. The *y*-axis displays the mean duration of the vowel in each syllable. The three lines represent the three different conditions under which these syllables are being measured.

First we notice that in the Contrastive Focus on Noun condition (shown by the black line), there is very little variation between the mean duration of the vowel in any of the three syllables (prefix, verb initial, verb final). In the Contrastive Focus on Verb condition (red line) vowel duration is longest in the initial syllable of the verb, relative to the vowels in both the prefix and the second syllable of the verb. In the condition where the noun is in Information Focus (blue line), the duration of the vowel is considerably greater in the initial syllable of the verb relative to the final syllable of the verb, but the difference is not as great as when the verb is in Contrastive Focus. Note that the mean duration for vowels in the prefix and root-final syllables varies little under the three conditions.

9.18. Interaction between Condition and Syllable for verbs



The fact that the mean duration of the second syllable of the verb is greater than the first, as reported in (9.17) and the graph in (9.18), calls into question a blanket analysis that the initial syllable is always of greater duration than the second. An independent samples *t*-test was run to compare the durations of the vowels of the two syllables of the verb root in the CF Noun condition. The results show that the difference is not significant, $t(38)=0.78$, $p=0.44$. On the other hand, for the other two conditions the differences are significant: for Information Focus the verb-initial syllable is significantly longer than the verb-final syllable $t(38)=7.07$, $p<0.001$; and also for Contrastive Focus Verb, the verb-initial syllable is significantly longer than the verb-final syllable, $t(38)=11.85$, $p<0.001$.² So we conclude that when

² The differences between the duration of the first and second syllable could have been attributed to the differences in vowel quality; that is, the vowel of the initial syllable is /i/ and the second is /o/. However, as the differences in duration are significant under both the Information Focus and

the noun is in Contrastive Focus, the durational differences between the two syllables of verb roots can be reduced to the point where they are no longer statistically significant.

We have seen that when the noun is in Contrastive Focus, the duration of the vowel of the initial syllable of the verb is not significantly longer than the vowel of the second. We consider this to be a case of de-accenting; that is, the relative prominence of the two syllables of the verb is lost due to the focus of the utterance being elsewhere. We will see in Chapter 10 that auxiliary verbs lose the increased duration of the initial syllable. So this process is not limited to focus conditions.

Nouns, however, are not de-accented. As we saw in (9.14), the difference in duration between the two syllables of nouns is least when the verb is in contrastive focus. However, the difference in duration is still significant as shown in the results of an independent-samples *t*-test. The mean and the standard deviation for the duration of the vowels in the two syllables of the nouns when the verb is in contrastive focus are given in 9.19.

9.19. Mean and Standard Deviation of the vowels of the two syllables of nouns

	Syllable	N	Mean (secs)	Std. Deviation	Std. Error Mean
VDuration	1	120	0.102	0.021	0.002
	2	120	0.08	0.018	0.002

These differences are shown to be significant, $t(238) = 8.8$, $p < 0.001$.

We now turn to look at differences in intensity under the three conditions of this experiment. Let us first consider intensity of the two syllables of the nouns. We conducted a repeated measures ANOVA using Vowel Intensity as the dependent variable, and Speaker, Condition and Syllable as the independent factors. There was a marginally significant main effect for the factor Syllable, $F(1,4) = 7.05$, $p = 0.056$. In (9.20), we give the mean intensity per syllable.

Contrastive Verb Focus, we conclude that although vowel quality does affect vowel duration, the differences in duration can be attributed to the conditions under review.

9.20. Comparison of mean intensity of the nouns under the three focus conditions

Condition	Syllable	Mean(dB)	N	Std. Deviation
IF	1	74.897	120	9.994
	2	73.828	120	10.182
CF Verb	1	73.732	120	10.967
	2	72.523	120	11.145
CF Noun	1	79.127	118	7.907
	2	78.959	118	7.856

Thus it would seem that the acoustic cue most consistently used to mark the initial syllable as prominent is that of duration.

9.5. CONCLUSION

The research documented in this chapter shows that the initial syllables of disyllabic words usually show greater duration than the second syllable. This coincides with the impressionistic data of Alexander, Pike and others. We have also shown that increased duration has a number of functions in MXY, including as a cue of focus.

For MXY, we have presented data to show that prosodic cues are used to indicate Information Focus. On the other hand, in contrastive focus, both prosodic and syntactic cues are available: nouns which are in contrastive focus are fronted, as well as having increased duration on the initial syllable. When verbs are in contrastive focus, only prosodic cues are used (verbs are not usually placed elsewhere than at the beginning of an utterance unless the noun is fronted, or there is an adverb). In the experiments described in this chapter, we have seen how MXY makes use of increased duration and increased intensity in order to signal focus.

In Experiment 1 we saw that the duration of initial syllables of disyllabic nouns was significantly greater than the second syllable. We did not find that there was a significant relationship between any given tone and increased duration. This

experiment also showed that initial syllables have greater intensity than the second syllables.

Experiment 2 shows that the difference in duration between the initial and second syllable is exploited as a cue for focus. In these data, intensity did not seem to play a significant role.

Of particular interest in these results is that when the noun is in contrastive focus the difference in duration of the syllables of the verb is no longer significant. We consider this to be an example of de-accenting. Further research is needed to discover if there are contexts in which nouns or other parts of speech may be de-accented.

However, although the initial syllable usually shows increased duration, there is no tendency for High tones to associate with the syllable.

10.1 SUPPLEMENTAL EVIDENCE

In Chapter 3, we saw that the initial mora of bimoraic words usually shows increased duration, although under certain focus conditions. In this section we look at the duration of the initial mora of words in various conditions. We examine words composed of two moras, and compare the duration of initial moras with the duration of the second mora. We present the data from the experiment in Chapter 3, and also from a new experiment.

10.1.1 INITIAL MORAS OF BIMORAIC WORDS

The first experiment in this section is a replication of the experiment in Chapter 3. The experiment was designed to test the hypothesis that the initial mora of bimoraic words shows increased duration when the word is in contrastive focus. The experiment was conducted with 20 native speakers of English. The words used were 'cat' and 'dog', which are bimoraic words. The words were presented in four conditions: contrastive focus, non-focus, and two other conditions. The results of the experiment are shown in Figure 10.1. The figure shows that the initial mora of bimoraic words shows increased duration when the word is in contrastive focus.

CHAPTER 10

PROSODIC AND TONAL PHENOMENA IN MULTI-MORPHEMIC CONSTITUENTS

In previous chapters we have alluded to the importance of prosodic structure for tonal association. In this chapter we present evidence to show how both the underlying tones and the prosodic structure have to be taken into consideration when describing how the underlying tones relate to the surface tones. Of particular interest are processes which only occur within certain prosodic domains compared to those which can occur across different kinds of prosodic boundaries. The first step is to present evidence for prosodic structure in MXY. We show that there are both multi-morphemic words and compounds in MXY which can be differentiated from phrases by durational and tonal phenomena. We then turn to examine phonological processes which occur within certain kinds of prosodic phrases. The chapter is divided into two main sections: the first section examines durational evidence, first to substantiate the claim that there are verbal compounds, and secondly, to show that it is only the initial syllable of a verb root that may be stressed and never verbal prefixes; in the second section, we contrast tonal association which occurs in words, phrases and across phrase boundaries.

10.1. DURATIONAL EVIDENCE

In Chapter 9, we saw that the initial mora of bimoraic words usually shows increased duration, except under certain focus conditions. In this section we look at the duration of the syllables found in multi-morphemic words; first we examine compound verbs; then we compare the duration of verbal prefixes with the syllables of the verb root. This section takes forward the discussion presented in Chapter 2, Section 2.4.2 where we argued that verbal morphemes are best considered prefixes rather than proclitics.

10.1.1. Compounds or phrases

The data in this section from MXY are presented against the background of research done by K Pike on MIG, continuing the discussion begun in Chapter 2. He claims (Pike 1949) that for MIG Mixtec there are no compounds, as shown in Section 2.4.3. However, in this section we present evidence that in MXY, compounds are distinguished from phrases by the location of stress. In Section

10.2.1 we show that phrases and compounds are also differentiated by tonal phenomena and syntactic features. We limit our discussion in this section to compounds which consist of two verb roots, the first of which we refer to as the ‘auxiliary’ and the second verb as the ‘main’ verb, because, as we will show, it is the initial syllable of the second verb of the compound which is stressed. The data set used for this experiment provides different prosodic contexts for three verbs. One of these verbs *kene*^M ‘appear’ is used both as a main verb – that is, when it does not form part of a compound – and as a verbal auxiliary, when it is the first item in the compound. The other two verbs *kojo*^M ‘pour’ and *naβa*^M ‘fly’ can either occur as the main verb or co-occur as the second element in a compound – that is, as the main verb, along with *kene*^M ‘appear’ as the auxiliary. Sample utterances are given in (10.1), (10.2) and (10.3).

10.1. *kene*ⁿ ‘appear’ as the main verb

tē	nī ⁿ	kènē ⁿ	kītī
te ^(M)	ni ^{n(L)}	kene ^{nM}	kiti ^{MH}
and	PFV	appear	animal

and the animal appeared

10.2. *kene*ⁿ as the auxiliary verb and *naβa* ‘fly’ as the main verb

tē	nī ⁿ	kènē ⁿ	nāβā	kītī
te ^(M)	ni ^{n(L)}	kene ^{nM}	naβa ^M	kiti ^{MH}
and	PFV	appear	fly	animal

and the animal came flying out

10.3. *naβa* as the main verb

tē	nī ⁿ	nàβā	kītī
te ^(M)	ni ^{n(L)}	naβa ^M	kiti ^{MH}
and	PFV	fly	animal

and the animal flew

Using a Praat script, we measured the duration of the syllables under consideration. As with other experiments, the VOT in the case of plosives was considered as part of the consonant.¹ In (10.4), we give the factors, in addition to Speaker, under consideration.

10.4. Factors used in this experiment

Verb Phrase Type	Auxiliary verb plus main verb Main verb
Syllable	First syllable auxiliary verb Secondary syllable auxiliary verb First syllable main verb Secondary syllable main verb

The first factor we consider Verb Phrase Type. This factor allows us to compare the duration of verbs when they are part of a compound verb phrase consisting of an auxiliary verb and the main verb, and when they are the main verb. The other factor is that of Syllable: first we have the two syllables of the auxiliary verb *kene*TM ‘appear’, labelled ‘Aux’; secondly we have the two syllables of *kojo*^M ‘pour’, *naβa*^M ‘fly’ *kaβa*^{ML} ‘twist’, labelled ‘Main’. These latter three verbs can only occur as main verbs. The verb *kene*TM ‘appear’ occurs both as the auxiliary, and a main verb. Note that all words used in this experiment have the same syllable structure of CVCV.

In (10.5), we give the number of syllables produced by each speaker, as well as the number of syllables in each Verb Phrase Type and Syllable.

¹ Recall that this decision was made as not all the data comprise plosives. By not including the VOT of plosives, then we can compare the duration of vowels which follow plosives as well as other categories, such as nasal consonants.

10.5. Number of syllables for each factor

	Value Label	Number of syllables
Speaker	MR	88
	LF	84
	PO	80
	PG	80
Verb Phrase Type	Compound	196
	Verb	136
Syllable	Aux1	49
	Aux2	49
	Main1	117
	Main2	117

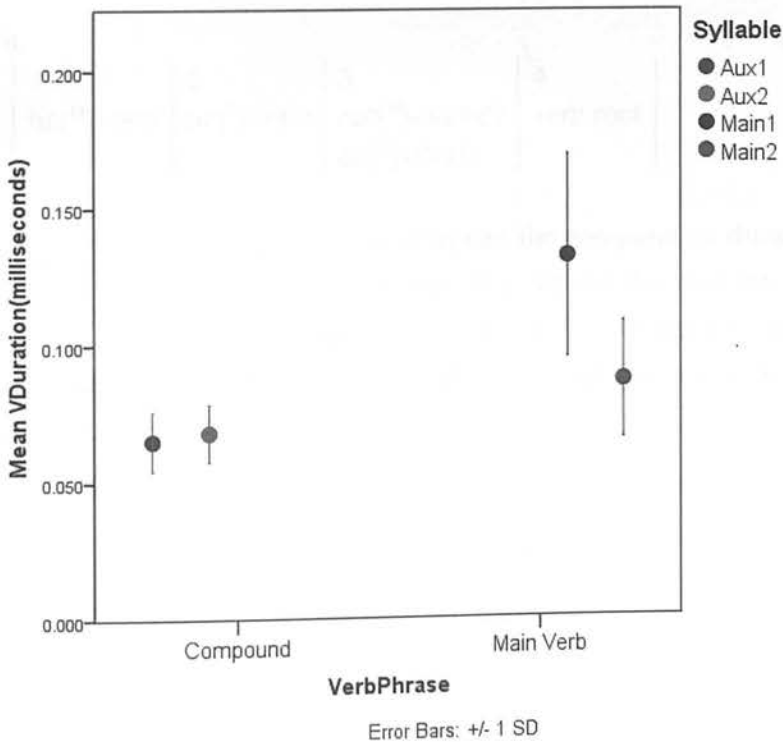
To ascertain which of these factors affect duration, we ran a repeated measures ANOVA using Speaker, Verb Phrase Type and Syllable as factors. There were significant differences in duration for both Verb Phrase Type and for Syllable, using the Bonferroni adjustment: Verb Phrase Type, $F(1,3) = 10.25$, $p = 0.05$, and Syllable, $F(3,9) = 6.23$, $p=0.01$. In (10.6), we give the difference in the mean duration of the syllables being examined. Note that there is no significant difference between the first and second syllable of the auxiliary verb, and that the initial syllable of the Main Verb shows the greatest durations.

10.6. Comparison of duration in seconds of the four syllables

Syllable(1)	Syllable(2)	Mean Difference (1-2)	Std. Error	Value of <i>p</i>
Aux1	Aux2	-0.003	0.003	1.0
	Main1	-0.067	0.004	<0.001
	Main2	-0.022	0.004	<0.001
Aux2	Aux1	0.003	0.003	1.0
	Main1	-0.064	0.004	<0.001
	Main2	-0.019	0.004	<0.001
Main1	Aux1	0.067	0.004	<0.001
	Aux2	0.064	0.004	<0.001
	Main2	0.045	0.004	<0.001
Main2	Aux1	0.022	0.004	<0.001
	Aux2	0.019	0.004	<0.001
	Main1	-0.045	0.004	<0.001

The comparative duration of the syllables of *kene*TM 'appear', are shown in the graph in (10.7). Note that the blue and red bars represent the syllables of *kene*TM 'appear' when it occurs as the first element of a compound, whereas the black and green bars show the comparative duration when it is the main verb.

10.7. Comparison of the duration of the syllables of *kene*TM 'appear'



In this section we have shown that in compounds consisting of two verbal roots it is the initial syllable of the second root which shows increased duration. We also note that there is no significant difference in duration of the two syllables of the auxiliary verb.

10.1.2. Verbal prefixes

In the previous section we saw how the initial root in a compound loses the increased duration of its initial syllable. We now turn to look at evidence to show that in MXY prefixes are not stressed, even when there are two or more present; that is, they are not parsed into binary feet. This in turn provides evidence that in MXY only the main verb roots are parsed, stress occurring on the initial syllable of the foot.

One problem in this research is that verbal prefixes have different vowels, so we are not comparing like with like. However, keeping this in mind, there is still good reason to posit that multiple prefixes are not parsed into feet.

We now turn to the data to substantiate the claim that only roots are parsed. In this data set, we examine the durational difference of verbs roots which co-occur with either of two derivational prefixes: $\delta a^{(H)}$ - 'causative' or $na^{(M)}$ - 'repetitive', and optionally the perfective prefix or both the perfect and perfective prefixes. The relative order of these prefixes is given in (10.8).

10.8.

1	2	3	4
ha ^(M) - PRF	ni ^(L) - PFV	na ^(M) - REPET δa ^(H) - CAUS	verb root

For the purposes of this experiment we compare the comparative duration of each prefix with the two syllables of the verb root. Note that in this data set, there are no occurrences of both $na^{(M)}$ - 'repetitive' and $\delta a^{(H)}$ - 'causative' in the same utterances. Sample utterances are given in (10.9) to (10.12). Again the entire data set is given in Appendix C.

10.9.

tē kītì nùtē
 te^(M) kiti^L nute^{MH}
 and boil water
and the water will boil

10.10.

tē hā- nīⁿ- ðà- kītí nùⁿ↑ nù↑tjí
 te^(M) ha^(M)- ni^{n(L)}- ða^(H)- kiti^(L) nu^{n(H)} nufjí^{MH}
 and PRF PFV CAUS boil 3F beans
and she has already boiled the beans

10.11.

tē ðīkō núⁿ nùtjí
 te^(M) ðiko^{MH} nu^{n(H)} nufjí^{MH}
 and sell 3F beans
and she will sell beans

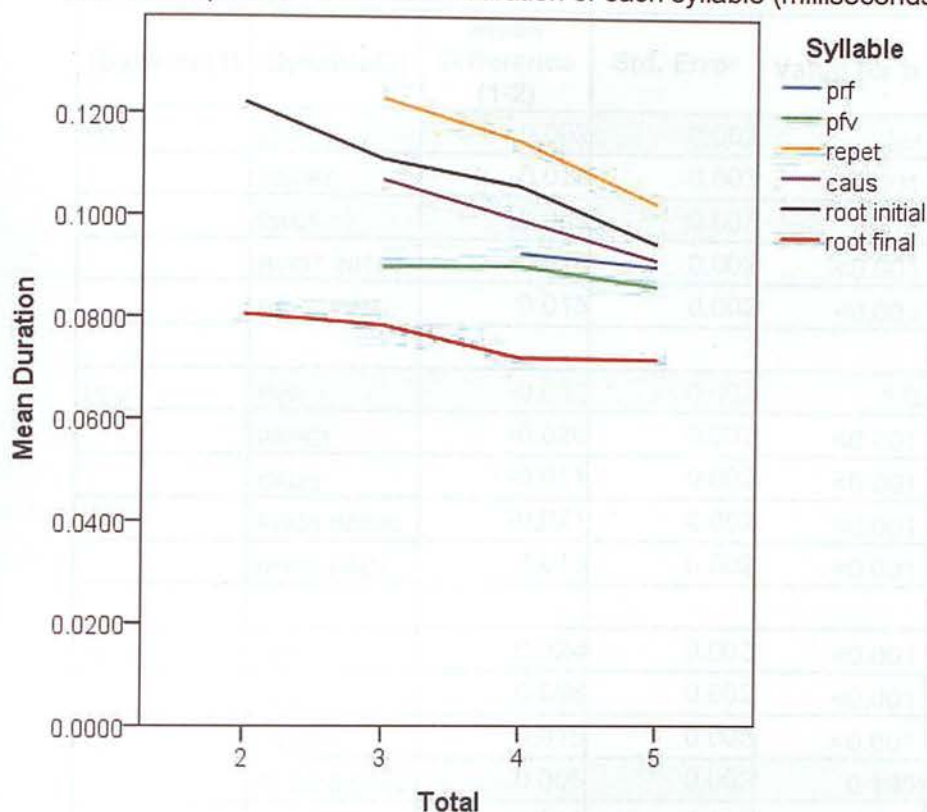
10.12.

tē hā- nīⁿ- nàⁿ- ðīkō núⁿ kíðì↑
 te^(M) ha^(M)- ni^{n(L)}- na^{n(M)}- ðiko^{MH} nu^{n(H)} kiðì^{LM}
 and PRF PFV REPET sell 3F cooking pot
and she has already sold the cooking pot

We ran a Repeated Measures ANOVA with the following factors: Speaker; Syllable – that is, which prefix or syllable of the verb root; Total – that is, the total number of syllables in the verb phrase; and Vowel. The differences in duration under the factor Syllable are shown to be significant, $F(4,12) = 9, p < 0.001$. The factor Total was also significant, $F(3,9) = 13.22, p < 0.001$. The factor Vowel was not shown to be significant.² There was an interaction between the factors Syllable and Total. This result is displayed in the line graph in (10.13).

² Although the result that the factor Vowel is not significant, multiple comparisons of the duration of vowels do show significant differences. The reason for these contradictory results are yet to be ascertained.

10.13. Comparison of the mean duration of each syllable (milliseconds)



Note that in this graph we see that for each of the syllables measured, whether they be the syllables of the verb root or the verbal prefixes, as the number of prefixes increases, there is a decrease in the duration of each syllable. We also note that the root initial syllable is always longer than the root final syllable. Although the graph shows that the repetitive marker has a greater mean duration than the initial syllable of the verb root, this difference is not significant as is shown in (10.14), ($p = 0.195$). The rows which give results which are not statistically significant are shaded for ease of comparison. Note that the root final syllable has significantly shorter duration than all the prefixes as well as the root initial syllable. We also see that the causative marker is significantly shorter than the root initial syllable, although the difference between the repetitive marker and the root initial syllable is not significant.

10.14. Comparison of the difference in duration of each syllable

(Syllable(1))	Syllable(2)	Mean Difference (1-2)	Std. Error	Value for p
PRF	PFV	0.002	0.002	1.0
	REPET	-0.024	0.003	<0.001
	CAUS	-0.009	0.003	0.013
	ROOT INITIAL	-0.019	0.002	<0.001
	ROOT FINAL	0.015	0.002	<0.001
PFV	PRF	-0.002	0.002	1.0
	REPET	-0.026	0.002	<0.001
	CAUS	-0.011	0.002	<0.001
	ROOT INITIAL	-0.021	0.002	<0.001
	ROOT FINAL	0.013	0.002	<0.001
REPET	PRF	0.024	0.003	<0.001
	PFV	0.026	0.002	<0.001
	CAUS	0.015	0.003	<0.001
	ROOT INITIAL	0.005	0.002	0.195
	ROOT FINAL	0.039	0.002	<0.001
CAUS	PRF	0.009	0.003	0.013
	PFV	0.011	0.002	<0.001
	REPET	-0.015	0.003	<0.001
	ROOT INITIAL	-0.010	0.002	<0.001
	ROOT FINAL	0.024	0.002	<0.001
ROOT INITIAL	PRF	0.019	0.002	<0.001
	PFV	0.021	0.002	<0.001
	REPET	-0.005	0.002	0.195
	CAUS	0.010	0.002	<0.001
	ROOT FINAL	0.034	0.001	<0.001
ROOT FINAL	PRF	-0.015	0.002	<0.001
	PFV	-0.013	0.002	<0.001
	REPET	-0.039	0.002	<0.001
	CAUS	-0.024	0.002	<0.001
	ROOT INITIAL	-0.034	0.001	<0.001

These results are preliminary in that certain co-occurrences did not occur; for example, there are no data in which the repetitive and causative marker co-occur, so the relative duration is unknown at this point. Nevertheless, given that there is a decrease in duration as the number of prefixes increases, and in these data there is no evidence of alternating longer and shorter prefixes, we tentatively conclude that multiple prefixes are not parsed into feet, and that it is only the initial syllable of the root which shows significant increased duration. This evidence confirms our analysis that derivational morphemes as well as those which mark aspectual and modal categories are best considered prefixes.

These findings contribute phonological evidence to the claim given in Chapter 2, Section 2.4.2 where we presented syntactic evidence for analysing verbal morphemes as prefixes. In that chapter, syntactic evidence was given for this claim. Below in Section 10.2.3, we show how the association of the tones sponsored by verbal prefixes differs from those sponsored by words, providing evidence from a third area of investigation that verbal morphemes are best analysed as prefixes.

10.2. PROSODIC STRUCTURE AND DOMAINS

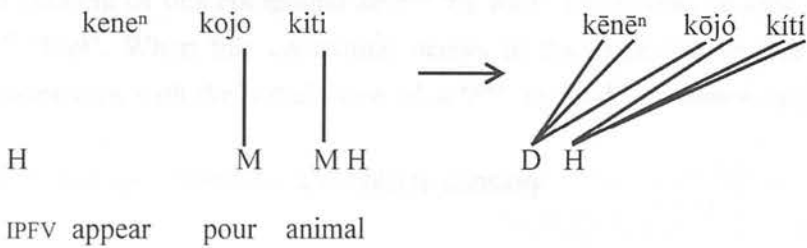
In the previous section we showed evidence for the existence of verbal compounds by comparing the duration of the two syllables of verb roots, both when they are the only verb in the utterance and when they co-occur with another verb forming a compound. We also looked at the comparative duration of verbal prefixes and the syllables of verb roots and saw that it is only the initial syllables of verb roots which show increased duration. When two verb roots occur as a compound, it is the initial syllable of the second root which shows increased duration.

Having established the existence of compounds, we now look at corroborating evidence from tonal association which clearly shows that in MXY any description of tonal association needs to make reference not only to the underlying tones of the morphemes discussed, but also to their syntactic relationship. We now present evidence, first from the tonal association patterns in each of these two contexts, and then from other contexts in which certain tonal patterns are only found within phrases.

10.2.1. Compounds

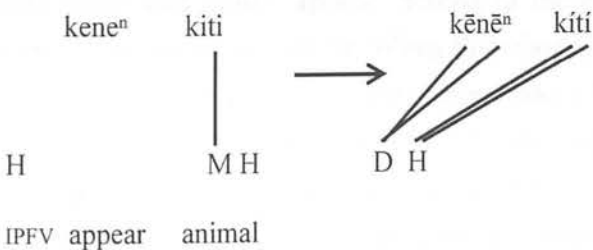
First we look at ways in which tonal association in some verbal compounds differs from that of phrases. These differences are most clearly seen in verbs which have underlying Mid tones. In the case of some compound verbs, the floating High tone of the imperfective skips the first root and aligns with the second mora of the second root as shown in (10.15). Note that the Mid tones associated with *kojo*^M ‘pour’ and *kiti*^{MH} ‘animal’ are deleted by the floating High tone of the imperfective, and so are not represented in the right hand side of the diagram.

10.15. Floating High tone associates with the second mora of the second root
The animal is rushing out.



The verb *kene*^M ‘appear’ is one of the group of Mid tone verbs which has a separate secondary stem; that is, the Mid tone is absent in certain aspectual and modal forms as was shown in Chapter 8. In the imperfective form, the floating High tone associates with the initial mora of the following word as is shown in (10.16).

10.16. Imperfective of the verb *kene*ⁿ

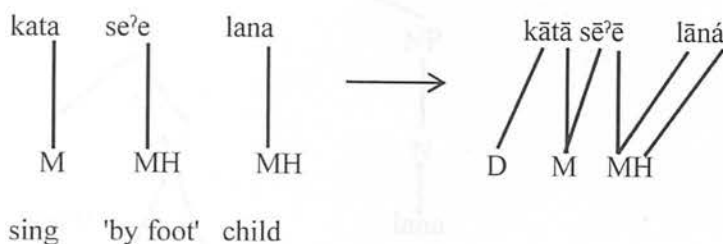


The animal appears.

Other compounds manifest slightly different behaviour in that the floating High tone of the imperfective associates with the initial mora of the second element, as

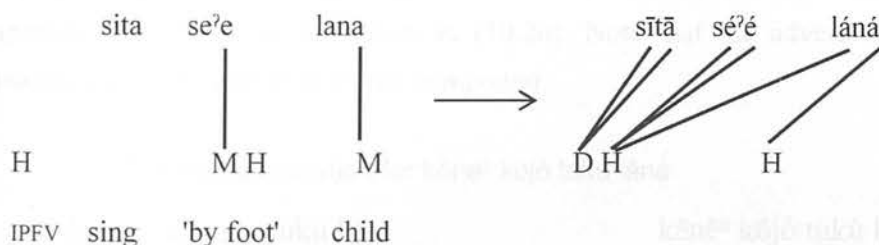
illustrated by the compound *kata^M-se^{ʔe}^{MH}* 'to dance'. In (10.17), we give the irrealis form.

10.17. Tonal association for 'the child will dance'



The second element of this compound *se^{ʔe}^{MH}* 'by foot' differs only in tone from the word *se^{ʔe}^{LH}* 'foot'. When this compound occurs in the imperfective, the floating High tone associates with the initial mora of *se^{ʔe}^{MH}* 'by foot', as shown in (10.18).

10.18. Tonal association for 'the child is dancing'

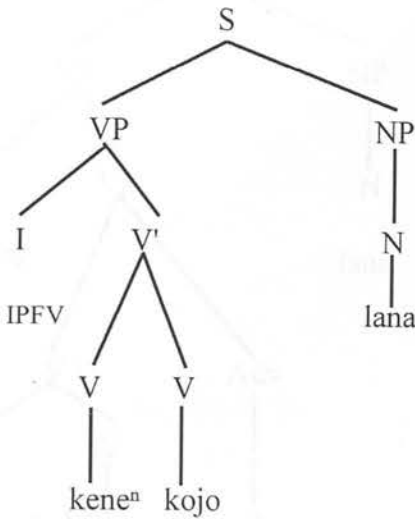


Note that in this case the floating High tone is associated with both moras of *se^{ʔe}^{MH}* 'by foot'. The verb *kata^M* 'sing' has the secondary toneless realis stem *sita*.

Both *sita* 'sing' and *keneⁿ* 'appear' belong to the class of verbs which loses their Mid tone in the secondary stems. When this class of verb occurs as the initial element of the compound, and the second element has a Mid tone associated at the right edge, the floating High tone which marks the imperfective associates with either both moras or the second mora, but in the data used for this thesis, it never occurs as a floating tone following the second element of the compound. The proposed syntactic structure for compounds is given in (10.19), using *keneⁿ kojo* 'appear in a rush'.³

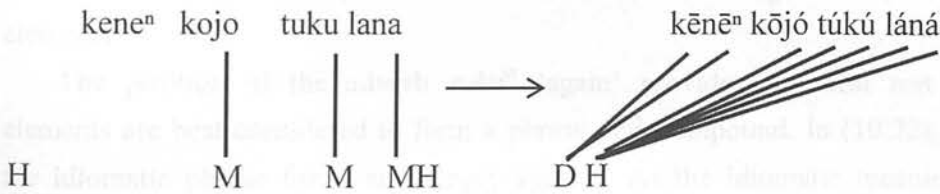
³ Note that we do not posit an underlying order of constituents and subsequent movement to the surface order. There are a number of ways to account for the word order of VSO languages in a theoretical framework which assumes that the verb and the object form a constituent. However, we have found no evidence in MXY that the verb and the object form a constituent.

10.19. Syntactic structure of *keneⁿ kojo* 'appear in a rush'



If the compound verb is modified by an adverb, such as *tuku^M* 'again', then the floating High tone associated with the second element of the verbal compound spreads to both moras as shown in (10.20). Note that the adverb *tuku^M* 'again' occurs after both elements of the compound.

10.20. Tonal association for *kēnēⁿ kōjō túkú láná*

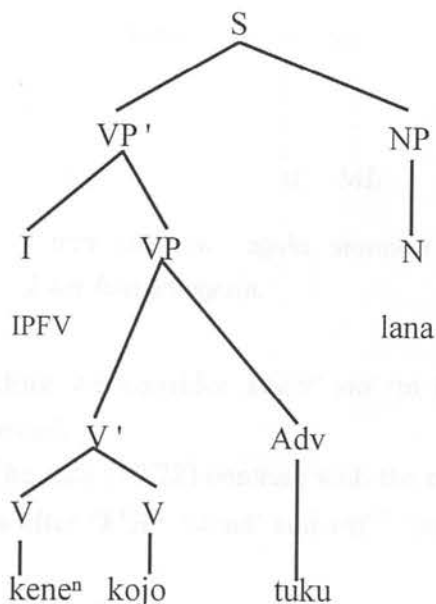


IPFV appear pour again child

The child appears in a rush again.

Note that in these data the floating High tone sponsored by the imperfective prefix is associated iteratively with five moras. These data also show how High tones spread across word and phrase boundaries. From a syntactic point of view, these data highlight that in MXY syntactic constituent boundaries are no barrier to the spread of tones. The syntactic structure of the utterance is given in (10.21).

10.21. Syntactic structure for *kēnēⁿ kōjō tūkú láná*

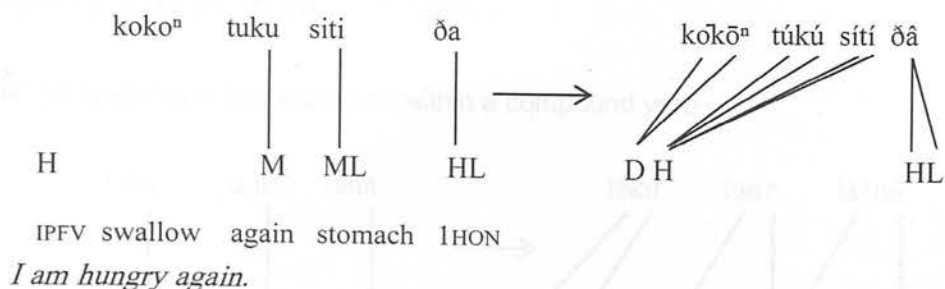


The child is appearing in a rush again.

So far we have seen how the floating High tone which marks the imperfective associates with one or both of the moras of the second element of the compound, assuming that the second element sponsors a Mid tone. However, these verbs are identified as compounds by the fact that the adverb *tuku^M* ‘again’ occurs after both elements.

The position of the adverb *tuku^M* ‘again’ provides a useful test whether elements are best considered to form a phrase or a compound. In (10.22), we give the idiomatic phrase for ‘I am hungry again’. As the idiomatic meaning is not exactly transparent from the literal meaning ‘my stomach is swallowing again’, we might consider that this is a compound. However, as we see in (10.22) the adverb *tuku^M* ‘again’ occurs between *kokoⁿ* ‘swallow’ and *sit^{ML}* ‘stomach’.

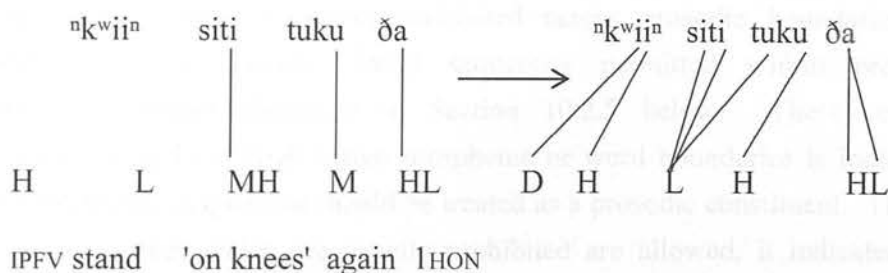
10.22. The occurrence of *tuku*^M 'again' between the verb and the subject



Therefore we consider *kokoⁿ siti* 'to be hungry' to be a phrase, rather than a compound.

The data (10.22) contrast with the compound in (10.23) in which *tuku*^M 'again' occurs after *ⁿk^{wii}ⁿ* 'stand' and *siti*^{MH} 'on knees'.

10.23. The occurrence of *tuku*^M 'again' following a compound verb

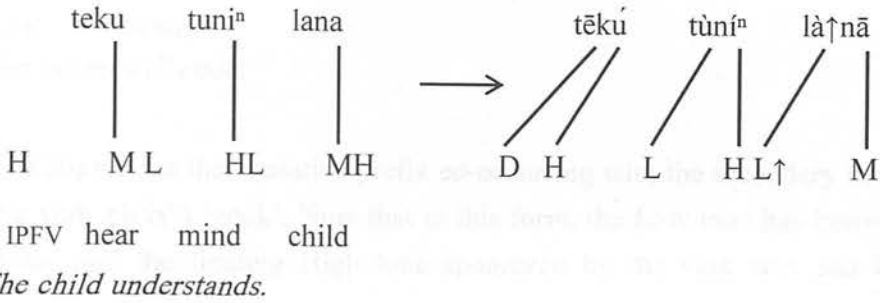


So we consider *ⁿk^{wii}ⁿ-siti* 'to kneel' to be a compound. In these data we also see the spread of the floating Low tone of the secondary stem of *ⁿk^{wii}ⁿ* to both moras of *siti*^{MH} 'on knees'. Note that the second element of the compound *siti*^{MH} 'on knees' is derived from *siti*^{LH} 'knee' but the tones are different, just as we saw for the compound *kata-se²e* 'dance' in (10.18) in which *se²e* has the underlying tones Mid High, although the noun from which it is derived, has a Low High tone melody. We examine the spread of Low tones in Section 10.2.5.

Another feature of compound verbs is that the sequence High Low High is permitted within compounds, whereas it is not permitted across prosodic

boundaries.⁴ This is seen in compounds such as *teku^{ML}-tuni^{HL}* ‘understand’. The imperfective is given in (10.24).

10.24. High Low High sequence within a compound verb



Note that the sequence High Low High is formed across the morpheme boundary of the two roots of the compound verb *teku^{ML}-tuni^{HL}* ‘understand’. In this case, the floating Low tone of *teku^{ML}* ‘hear’ associates with the initial mora of *tuniⁿ* ‘mind’. Thus we see that tone sequences prohibited across prosodic boundaries are permitted within compounds. Tonal sequences permitted within prosodic boundaries are further discussed in Section 10.2.5 below. Therefore, the occurrence of High Low High across morpheme or word boundaries is indicative that the morphemes in question should be treated as a prosodic constituent. That is, when tone sequences which are usually prohibited are allowed, it indicates that there is a tighter connection between the morphemes, such as in a compound.

10.2.2. Derived Verbs

We now present some basic facts about one type of derived verb that consists of a verb plus the causative marker, which has a floating High tone. This information serves as the background to some of the tonal phenomena which will be described in Section 10.2.3. In this section we show that the factors governing the association of floating High tones are different from those described for compound verbs. First we look at some basic facts about causative verbs. In (10.25) and (10.26), we give the irrealis of the verb *fɔ²ɔ^{1H}* ‘cook’ and then the irrealis of the causative form. Note that the irrealis of this verb sponsors a Low High tone melody.

⁴ This contrasts with the sequence High Low Mid which is neither permitted within compounds nor across morpheme or phrase boundaries.

10.25. Irrealis of the verb $f\acute{o}^{\text{LH}}$ 'cook'

$f\acute{o}^{\text{LH}}$	$n\acute{u}t\acute{i}$
$f\acute{o}^{\text{LH}}$	$n\acute{u}t\acute{i}^{\text{MH}}$
cook	beans

The beans will cook.

In (10.26) we see the causative prefix co-occurring with the secondary irrealis stem of the verb $f\acute{o}^{\text{LH}}$ 'cook'. Note that in this form, the Low tone has become a floating tone, and the floating High tone sponsored by the verb root has been deleted.

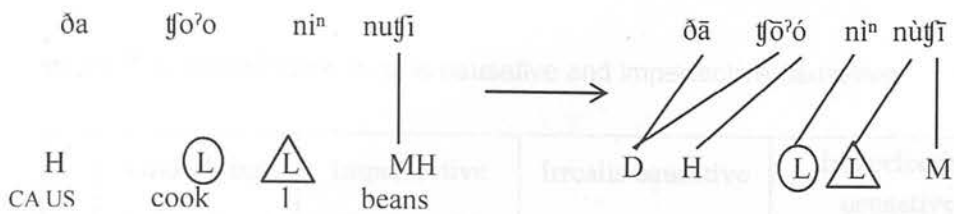
10.26. Irrealis of the causative verb $f\acute{o}^{\text{LH}}$ 'cook'

$\acute{o}a-$	$f\acute{o}^{\text{LH}}$	$n\acute{i}^{\text{L}}$	$n\acute{u}t\acute{i}$
$\acute{o}a^{\text{H}}-$	$f\acute{o}^{\text{LH}}$	$n\acute{i}^{\text{L}}$	$n\acute{u}t\acute{i}^{\text{MH}}$
caus-	cook	1	beans

I will cook the beans.

The tonal association for the data in (10.26) is given in (10.27). By positing that the causative prefix, like the imperfective and the subjunctive, associates with the secondary stem of verbs, then we can account for the lack of a High tone associated with the verb stem, as we have already shown that the floating High tones of Low High verbs are not present in the secondary stems. (See Chapter 8 for a detailed description.) In (10.27), the Low tone sponsored by the verb is enclosed in a circle on both sides of the diagram and the Low tone sponsored by the enclitic is enclosed in a triangle.

10.27. Tonal association for a causative verb with an underlying Low High

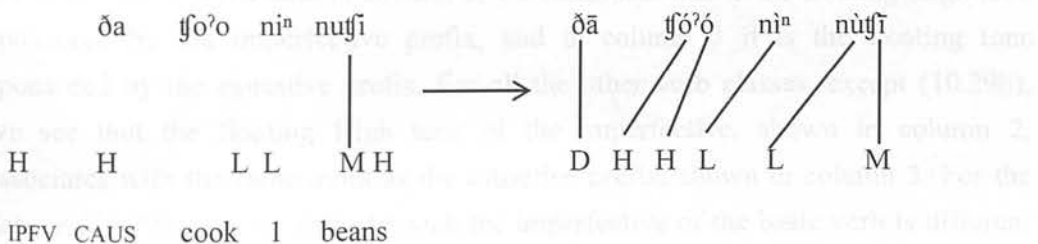


I will cook the beans.

Here we see that the floating High tone sponsored by the causative prefix associates with the second mora of the verb stem, just as we saw for the floating High tones sponsored by the imperfective and the subjunctive prefixes. In the surface form, the Low tone sponsored by *ʃo'ʔo* 'cook', enclosed in a circle, associates with the enclitic *ni*^(L), and the Low tone sponsored by the enclitic, enclosed in a triangle, associates with the initial mora of *nuʃi*^{MH} 'beans'.

The causative prefix can be further prefixed for aspect and mood. For example in (10.28) we give the tonal association for the imperfective of the verb *ʃo'ʔo* 'cook' whose irrealis form is shown in (10.27) above.

10.28. Tonal association for the phrase 'I am cooking beans'



In (10.28), the floating High tone of the imperfective marker associates with the initial mora of the verb stem, and not with the causative marker. The floating High tone sponsored by the causative marker, skips the initial mora of the verb stem and associates with the second mora of the verb stem. The floating Low tone sponsored by the verb stem associates with the enclitic *ni*^(L).

The causative forms of verbs provide further evidence for the existence of secondary stems. In (10.29), we give the underlying tone and the irrealis of the basic verb roots followed by a bimoraic noun with a Mid High tone melody as subject. In columns three and four, we give the irrealis and imperfective forms of

causative verbs. As was our custom in Chapter 8, verb patterns which have secondary stems are indicated with an asterisk.

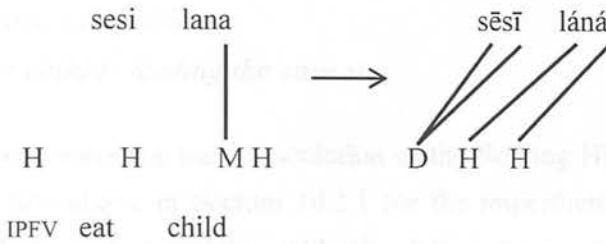
10.29. The imperfective, irrealis causative and imperfective causative

	Underlying tones of root	Imperfective (basic verb)	Irrealis causative	Imperfective causative
a)	L*	M H L↑ M	M- M H L↑ M	M- H H L↑ M
b)	L M	H L↑ M M	M- H L↑ M M	M- H L↑ M M
c)	L H*	M H L↑ M	M- M H L↑ M	M- H H L↑ M
d)	M *	M M H H	M- M M H H	M- H H H H
e)	M	M H H H	M- M H H H	M- H H H H
f)	M L	M H L↑ M	M- M H L↑ M	M- H H L↑ M
g)	M H *	M M H H	M- M M H H	M- H H H H
h)	M H	M H H H	M- M M H H	M- H H H H

First we look at the forms in (10.29a). By comparing the data in columns 2 and 3, we see that in both cases, there is a High tone associated with the second mora of the verb root. For the data in column 2, we claim that this is the floating High tone sponsored by the imperfective prefix, and in column 3 it is the floating tone sponsored by the causative prefix. For all the other verb classes, except (10.29h), we see that the floating High tone of the imperfective, shown in column 2, associates with the same mora as the causative prefix, shown in column 3. For the data in (10.29h), we see that although the imperfective of the basic verb is different from (10.29g), the irrealis and the imperfective causatives are identical, as shown in columns 3 and 4; that is, the difference between Mid High verbs that only have primary stems and those which also have secondary stems has been neutralised in the causative forms. We now turn to look at the data in column 4. Here we see that in all cases the floating High tone sponsored by the imperfective associates with the initial root of the verb stem. We also notice that the floating High tone of the imperfective associates with stems that already have the High tone associated with the second mora, for example in (10.29a).

The surface tones of the imperfective causative provide more insight into the behaviour of floating High tones. Consider the data in (10.30) to (10.32), the verb being chosen from the type indicated in (10.29g) above.

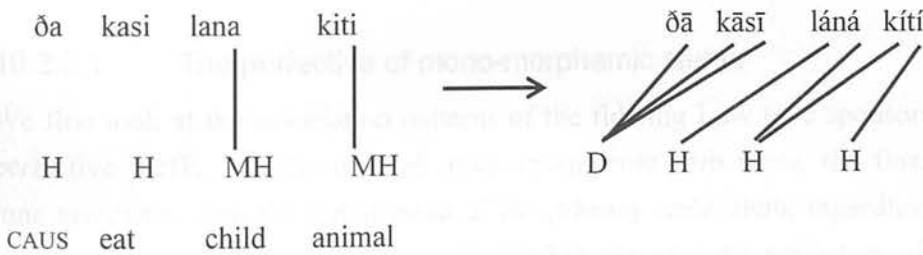
10.30. Imperfective of *sesi*^(H) 'eat' with *lana*^{MH} 'child'



The child is eating.

In these data we see that the floating tone of the imperfective associates with the initial mora of *lana*^{MH} 'child'. The floating tone sponsored by the verb stem associates at the right edge of the noun. In the case of the irrealis causative which uses the secondary irrealis stem, the floating High tone sponsored by the causative marker associates with the initial mora of *lana*^{MH} 'child' as shown in (10.31).

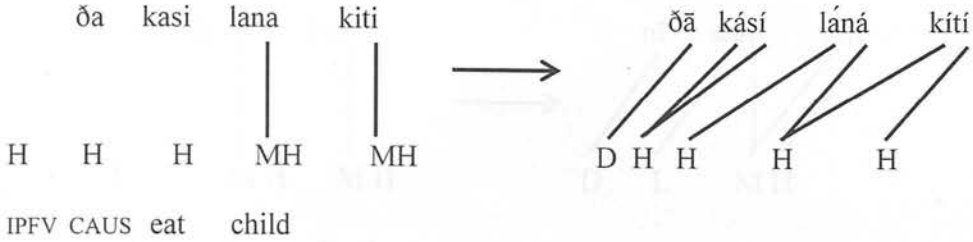
10.31. Irrealis causative



The child will feed the animals.

However, the floating High tone of the imperfective associates with the initial mora of the verb root as shown in (10.32).

10.32. Imperfective causative



The child is feeding the animals.

In some ways the tonal association of the floating High tone is similar to that which we saw above in Section 10.2.1 for the imperfective of ‘dance’ in that the floating High tone associates with the initial mora of the second morpheme. However, unlike some compounds, the floating High tone of the imperfective never associates with the second mora of the verb root of causative verbs. We further discuss the issue of the association of floating High tones in Chapter 11.

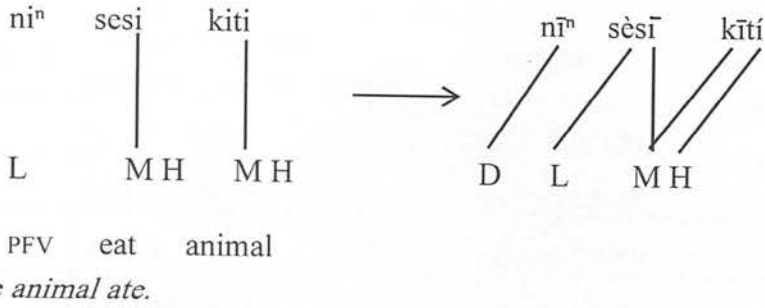
10.2.3. Low tone association

We now turn to look at the behaviour of the Low tone sponsored by the perfective marker in three contexts: mono-morphemic verb roots, causative verbs and compound verbs. We show that Low tones spread to provide tones for toneless TBUs in ways which are not permitted in other contexts, such as the noun phrase.

10.2.3.1 The perfective of mono-morphemic stems

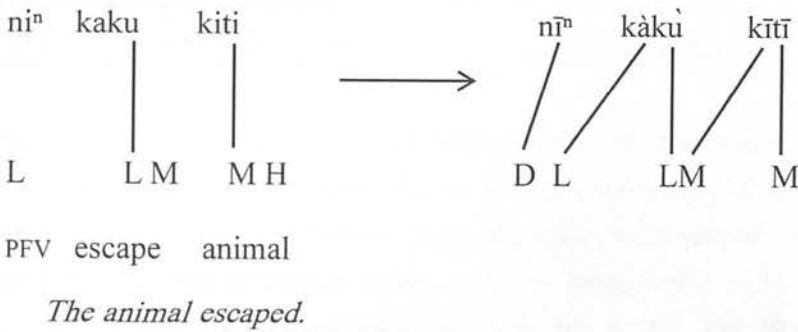
We first look at the association patterns of the floating Low tone sponsored by the perfective prefix. In the case of mono-morphemic verb roots, the floating Low tone associates with the initial mora of the primary realis stem, regardless of what tone is associated at the right edge. In (10.33), we give the perfective of the verb *kasi*^{MH} ‘eat’. This verb is one which shows segmental alternation between a /k/ initial irrealis stem and an /s/ realis stem. We see that the surface tones on the verb stem are Low Mid.

10.33. Mid tone verb



In (10.34), we see that the Low tone of the perfective prefix associates with a verb which has a Low tone associated at the right edge.⁵

10.34. Low tone verb



Recall that in Chapter 6 we showed that floating Low tones did not associate with nouns with which there already was a Low tone associated at the right edge. The differences in association rules between verbs and nouns again show that in MXY when describing tonal phenomenon, the context has to be stipulated. We return to this theme in Chapter 11.

The perfective prefix co-occurs with the primary realis stem; that is, the underlying tones of the verb root are associated at the right edge, and in the case of verbs which show consonantal alternation, the realis form has /s/ initial. Examples are given in (10.35). Note that the tones given on the subject assume a noun which has Mid tones in the underlying form.

⁵ In this context, the Low tone of the perfective is phonetically raised slightly. In other contexts this phonetic alternation does not occur. Acoustic data are required to ascertain what the differences in F0 are, and further analysis is needed to be able to determine the contexts in which the process of raising occurs.

10.35. Tones of the perfective form

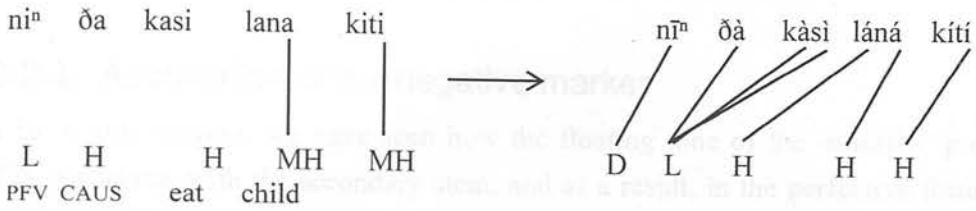
	Underlying	Surface tones of the perfective and the subject	Example	
a)	L*	M L L LM	nĩ ⁿ - kà [?] à ⁿ lànā	say
b)	L M	M L L MM	nĩ ⁿ -kikù lànā	sew
c)	L H*	M L L LH	nĩ ⁿ - nì [?] ĩ ⁿ làná	find
d)	M *	M L M MM	nĩ ⁿ - kèè lànā	go out
e)	M	M L M MM	nĩ ⁿ - ⁿ kòjō lànā	fall
f)	M L	M L M LM	nĩ ⁿ - tèkū lànā	hear
g)	M H *	M L M MH	nĩ ⁿ - sèsí làná	eat
h)	M H	M L M MH	nĩ ⁿ - òtè làná	swim
i)	H L	M L H LM	nĩ ⁿ -sàβí là ⁿ ā	tire

In these data we see three important phenomena: one, the underlying tones of the verb root are aligned at the right edge of the verb stem; two, there is no difference in surface tone patterns between verbs that only have primary stems and those which have separate secondary stems – that is, those indicated by an asterisk; and three, that unlike the phenomenon we saw for nouns, the floating Low tone sponsored by the perfective prefix does associate with roots that have a Low tone, whereas floating Low tones sponsored by nouns do not associate with other nouns which already have a Low tone.

10.2.3.2. The perfective of causative verbs

In the case of mono-morphemic verbs, the Low tone of the perfective only associates with the initial mora of the verb stem, while the underlying tone sponsored by the verb root is associated at the right edge. However, the facts are different for causative verbs, as these are formed from the secondary irrealis stem, as was shown above. In (10.36), we give the perfective of the causative verb *ǎa^(H)-kasĩ^(H)* ‘feed’.

10.36. Perfective of the causative verb 'feed'



The child fed the animals.

In (10.36), the Low tone of the perfective prefix associates with the mora of the causative prefix as well as both moras of the verb stem, as no tones are associated underlyingly with these moras. The floating High tone sponsored by the causative prefix associates with the initial mora of the noun *lana*^{MH} 'child'. The floating High tone sponsored by the verb stem associates at the right edge of the noun *lana*^{MH} 'child'. That is, once again tones are seen to skip moras.

In (10.37), we give the surface tone patterns for the imperfective of the basic verb, the irrealis causative and the perfective causative; again the two final moras represent a bimoraic noun which sponsors a Mid High tone melody.

10.37. The perfective of causative verb classes

	Underlying	Imperfective of basic verb	Irrealis causative ǎa ^(H) -	Perfective causative ni ^{n(L)} - ǎa ^(H) -
a	L*	M H L↑ M	M- M H L↑ M	M- L- L H L↑ M
b	L M	H L↑ M M	M- H L↑ M M	M- L- H L↑ M M
c	L H*	M H L↑ M	M- M H L↑ M	M- L- L H L↑ M
d	M *	M M H H	M- M M H H	M- L- L L H H
e	M	M H H H	M- M H H H	M- L- L H H H
f	M L	M H L↑ M	M- M H L↑ M	M- L- L H L↑ M
g	M H *	M M H H	M- M M H H	M- L- L L H H
h	M H	M H H H	M- M M H H	M- L- L L H H

Verbs with the underlying tones High Low have been omitted as in the data used for this thesis, they are not found with the causative prefix. We also see that the surface tone patterns for the causative forms are the same for both groups of Mid

High verbs. In Section 10.2.5 below, we show other contexts in which Low tones are linked to multiple moras within a prosodic domain.

10.2.4. Association of the negative marker

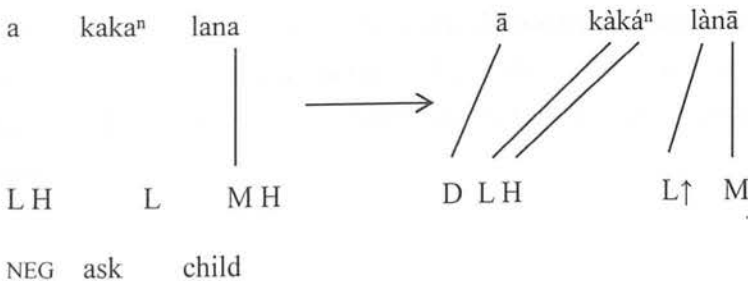
So far in this chapter, we have seen how the floating tone of the causative prefix $\delta a^{(H)}$ - associates with the secondary stem, and as a result, in the perfective form of causative verbs, Low tones are sometimes multiply-linked. In all these data, the tones sponsored by the verbal prefix do not associate with the prefix itself, but with some morpheme to the right.

We now look at the association patterns for the tones of the negative marker $a^{(LH)}$ - ‘negative’. Note that although this morpheme has only one mora, it sponsors two tones. Again we look at the surface tones of three classes of verbs when prefixed by the negative marker: mono-morphemic verbs, derived verbs and compound verbs. However, we show that for one class of verbs, Low Mid verbs, the Low tone sponsored by the negative marker actually associates with the marker itself. Thus we demonstrate that although tones sponsored by verbal prefixes usually occur as floating tones, there are environments where they do associate with their sponsoring morpheme.

10.2.4.1. Negative mono-morphemic verbs

The most common association pattern is for the Low tone of the negative marker to associate with the initial mora of the verb stem and the High tone with the second mora. In (10.38), we give the negative form of the verb $kaka^{(L)}$ ‘to ask’. Note that as the negative marker occurs with the secondary stem, then the Low tone sponsored by the verb root occurs as a floating tone.

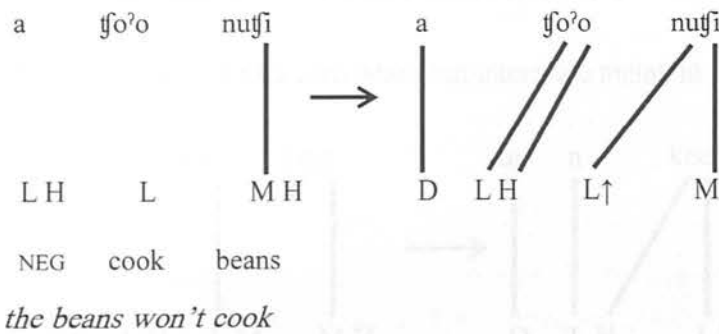
10.38. Negative of Low tone verb in the phrase ‘the child won’t ask’



We see that the Low tone sponsored by the negative prefix associates with the initial mora of the verb stem. The floating High tone of the prefix associates at the right edge, the presence of the floating Low preventing further movement to the right. The Low tone which is sponsored by the verb associates with the initial mora of the noun, forming the sequence High Low Mid. Recall that in this environment, the Low tone in a High Low Mid sequence is raised to Mid, as discussed in Chapter 7.

We now turn to look at a verb whose root sponsors a Low High pattern. However, recall that the secondary stem of this class of verb sponsors only a floating Low. An example is given in (10.39). Note that the surface tones of this class of verbs are the same as those which only sponsor a Low as shown in (10.38), as the floating High tone sponsored by the verb root is not present in forms which co-occur with the secondary stem.

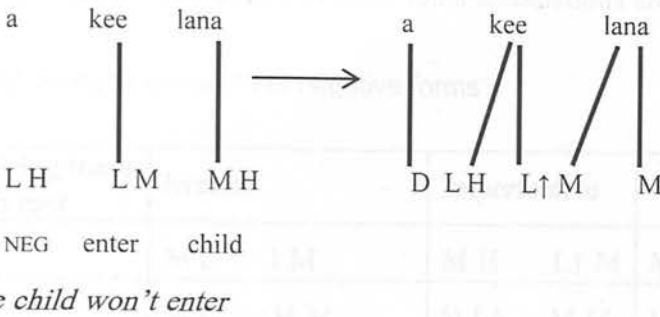
10.39. Negative of a Low High verb in the phrase *ā- tʃo'ó nuṭi tʃi*



In (10.39), we see that the surface tones of the verb stem are again Low High due to the tones from the negative prefix and that the floating High tone of the prefix aligns at the right edge of the verb stem.

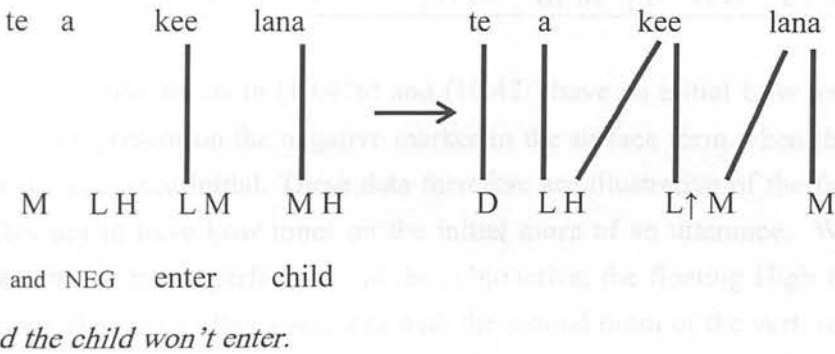
However, as we have already seen, not all underlying Low tones become floating tones. For example, Low Mid verbs do not have a separate secondary stem. The elicitation for the negative form of the verb *kec^{LM}* 'enter' is given in (10.40). Note that in the surface form, the Low tone of the negative prefix is left unassociated.

10.40. Low Mid verb \bar{a} - kèè † lānā



However, when these negative forms occur other than utterance initial, the Low tone of the negative prefix associates with the negative prefix itself as is shown in (10.41). Whether the floating Mid tone sponsored by te^M 'and' is lost and a default inserted or the floating Mid tone sponsored te^M 'and' associates with its sponsoring morpheme, cannot be ascertained from these data.

10.41. Negative Low Mid verb when not utterance initial $t\bar{e}$ à- kèè † lānā



So in these data we see an example where although the tones of the negative prefix usually associate with the morphemes to the right, there are contexts in which the Low tone of the negative does associate with the negative marker. This occurs as we showed in (10.41) above with verbs which sponsor a Low Mid tone melody. In these cases the tones sponsored by the verb are associated at the right edge, so that the floating High tone of the negative marker associates with the initial mora of the verb. The Low tone sponsored by the negative marker associates with the negative marker.

By positing that some verbs – that is, those with Low or Low High underlying tones, as well as some verbs with Mid or Mid High tones melodies – have

secondary stems, we can account for the fact that the floating High tone of the negative marker is associated with the same mora as the floating High tone of the imperfective marker. The details of these tonal associations are given in (10.42).

10.42. Surface tones of the negative forms

	Underlying tones of verb root	Irrealis	Imperfective	Negative
a	L*	M L L M	M H L↑ M	M- L H L↑ M
b	LM	M L M M	H L↑ M M	L- H L↑ M M
c	L H*	M L L H	M H L↑ M	M- L H L↑ M
d	M*	M M M M	M M H H	M- L L H H
e	M	M M M M	M H H H	M- L H H H
f	M L	M M L M	M H L↑ M	M- L H L↑ M
g	M H*	M M M H	M M H H	M- L L H H
h	M H	M M M H	M H H H	M- L H H H
i	H L	M H L↑ M	H H L↑ M	L- H H L↑ M

Although the negative forms in (10.42b) and (10.42i) have an initial Low tone, the Low tone is only present on the negative marker in the surface form when the verb does not occur utterance initial. These data therefore are illustrative of the fact that MXY prefers not to have Low tones on the initial mora of an utterance. We also note, as we saw for the imperfective and the subjunctive, the floating High tone of the negative marker most often associates with the second mora of the verb root.

The association of the underlying tones which results in the surface forms lends itself to analysis within an Optimality theory framework as some 'rules' are not hard and fast. Take for example the tendency in MXY that the tones sponsored by verbal prefixes do not associate with the prefix itself, but occur as floating tones. Although this is usually the case, we have seen that the Low tone sponsored by the negative marker does associate with the negative marker, when the verb occurs other than utterance initial and the underlying tones of the verb are Low Mid. The phenomenon can be seen as part of the preference in MXY to preserve underlying tones; that is, tones present in the underlying form tend to be present in the surface form, unless there is some other constraint which is more highly ranked. In (10.41), we could claim that although it is preferred not to have the Low and

High tones associated with the negative marker, it is better to have the Low tone present in the surface form rather than delete it entirely, hence in this context the Low does associate with its sponsoring morpheme.

10.2.4.2. Negative causative verbs

When examining the negative of causative verbs, we see that the floating High tone sponsored by the negative prefix associates with the same mora that the floating High tone of the imperfective does. In (10.43) we give the negative causative form for the verb groups, except the High Low verbs. Again, the two final moras represent a bimoraic noun which sponsors a Mid High tone melody.

10.43. The negative of causative verb classes

	Underlying	Imperfective	Irrealis causative	Negative causative
a	L*	M H L↑ M	M- M H L↑ M	M- L- H H L↑ M
b	L M	H L↑ M M	M- H L↑ M M	M- L- H L↑ M M
c	L H*	M H L↑ M	M- M H L↑ M	M- L- H H L↑ M
d	M *	M M H H	M- M M H H	M- L- H H H H
e	M	M H H H	M- M H H H	M- L- H H H H
f	M L	M H L↑ M	M- M H L↑ M	M- L- H H L↑ M
g	M H *	M M H H	M- M M H H	M- L- H H H H
h	M H	M H H H	M- M M H H	M- L- H H H H

We see from this table that the locus of the association of the floating High sponsored by the negative marker is usually the same mora as the imperfective marker. Without positing secondary stems for some underlying patterns, it would be difficult to succinctly describe the association pattern of the tones of these morphemes.

Having presented the details of the association patterns of the causative, the perfective and the negative prefixes, we give further evidence for considering that these morphemes are prefixes. As already has been shown, the pattern High Low High only occurs within constituents, as we show in (10.24) above where the sequence High Low High occurs within a verbal compound. High Low High is also permitted across verbal prefixes and roots, just as we saw for compounds. First

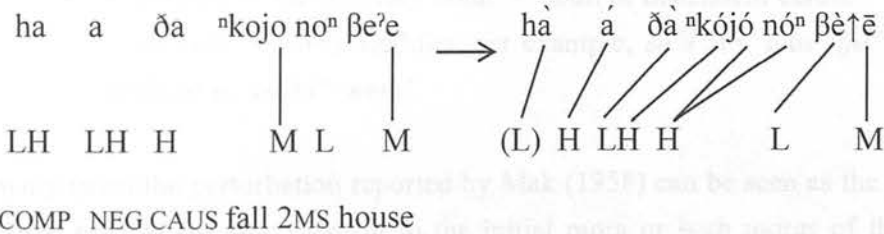
we give the entire utterance in (10.44), and then we show the association of underlying to surface tones in (10.45).

10.44. High Low High sequence across verbal prefixes and root

	k ^w ĩní ⁿ	nì ⁿ	hà	á	ǎà	ˀkójó	nó ⁿ	βè↑ē
H	L	L	LH	LH	H	M	L	M
IPFV	want	1	COMP	NEG	CAUS	fall	2MS	house
	<i>I want you to not knock over the house.</i>							

Note that the sequence High Low High is formed by the surface tones of the negative marker, the causative marker and the verb root. It is impossible to tell whether the Low tone associated with the complementiser is that sponsored by the 1st person pronoun, or the complementiser itself. The association diagram is given in (10.45) for the second part of the utterance, with the assumption that the Low tone associated with the complementiser is sponsored by the enclitic.

10.45. High Low High sequence across verbal prefixes and root



In these data we see that the sequence High Low High is permitted across verbal prefixes and verb stems. Therefore, these data highlight the fact that tonal association patterns are not always the same. In Chapter 7 we documented how the Low tones of High Low High sequences were raised to Mid. The data used in that case usually comprised a verb, followed by the enclitic subject, and a noun as the object. Note that the syntactic structure is different from the data in (10.45) in which we have two prefixes followed by a verb root. This surface tonal pattern, combined with the durational data given in Section 10.1.2, and the ways in which association patterns for tones sponsored by verbal morphemes as shown in Section 10.2.2, together provide convincing evidence that the verb root plus the prefixes form a constituent.

10.2.5. Low tone spread

We now turn to look at other data in which morphemes with identical tone patterns have different surface tonal patterns depending on the syntactic relationship between the two morphemes that are adjacent to one another. To illustrate this phenomenon, we look at how Low spread differs according to the context. Specifically we show that Low tones spread within prosodic domains in ways in which they do not across prosodic domain boundaries.

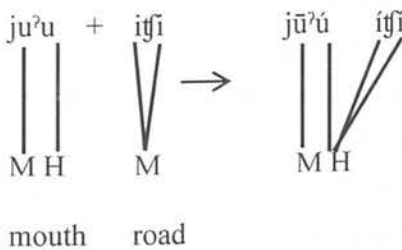
In Section 10.2.2 we saw how the Low tone of the perfective marker spread to provide tones for morphemes that either didn't have a tone associated with them, as is the case for some verb stems, or the tones sponsored by the morphemes occur as floating tones, for example as in the case of the causative marker $\delta a^{(H)}$.

In Chapter 3, we have already seen that Mak (Mak 1958) noted that in MIE perturbation only occurred in what she referred to as special sequences:

- noun + descriptive adjective
- head nouns + noun or (rarely) verb acting as a descriptive modifier
- locational or introductory noun + noun or dependent clause
- head verb + noun modifier, for example, $sà'á$ 'do' plus $tijū^n$ 'work' is realised as $sàtíjū^n$ 'work'

In many cases the perturbation reported by Mak (1958) can be seen as the spread of the final tone of the first element to the initial mora or both moras of the second element as shown in (10.46). Note that the final High tone of $jū'ú$ 'mouth' deletes the Mid tone of $íťí$ 'road'.

10.46. Spread of final tone within a special sequence in MIE



edge of the road

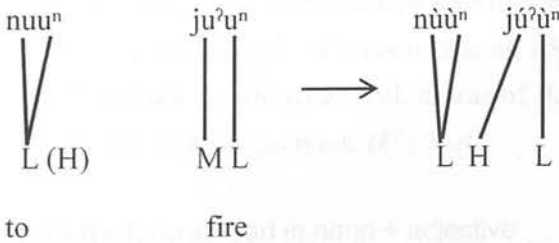
Mak also notes that in some cases a High tone is evident in the surface form of the phrase where no High tone is attested in the isolation form as is shown in (10.47).

10.47. Low + Mid Low becomes Low High Low in MIE

nùùⁿ jū[?]ùⁿ nùùⁿ jù[?]ùⁿ
 to fire
to the fire

Given that the word *nuu*^{LH} ‘face’ has a floating High tone in MXY as well as in other varieties, we posit that this word has a floating High tone in MIE. From the data given by Mak, we claim that it is only in special sequences that floating High tones become evident in the surface form. Thus the tonal association would be as given in (10.48).

10.48. Association of floating High tone in a special sequence in MIE



to the fire

Mak (1953) notes that numeral plus noun does not constitute a special sequence. We note also that it is unclear from her data whether genitival phrases are to be considered a special sequence or not.

Unlike the varieties documented by Mak in which floating High tones are only evident in certain prosodic domains, in MXY there are prosodic domains which are characterised by a prohibition on the association of the floating High tone with the second element in the phrase in certain tonal contexts. For this phenomenon to occur, the first element must sponsor a floating High tone; and two, the second element sponsor a Mid or Mid High tone sequence or is a verb which sponsors either of these tone patterns and has a separate secondary stem in which the Mid tone is absent. When the first element sponsors a Low High tone melody and the

second a Mid or Mid High tone sequence or is a verb whose Mid tone is absent, then in these syntactic phrases, the Low tone spreads, deleting the Mid tone as we saw in Chapter 7.

The most common contexts in which this phenomenon occurs in MXY are given in (10.49). Note that these are similar to the contexts in which Mak (1953 and 1958) documents perturbation in special sequences.

10.49. Low tone spread in MXY

- noun or enclitic + descriptive adjective
- noun + noun which forms a compound
- noun or enclitic + fronted before the verb
- locational noun + noun or dependent clause
- complementiser + dependent clause
- verb + modifying adverb which form a compound

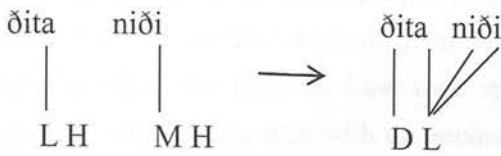
We now give examples of each of these environments in turn in MXY. Most of these examples are taken from the two interlinearised texts given in Appendix D. In (10.50) we give an example of a noun plus an adjective. Note that the final Low tone of *jaja*^{nLH} ‘coyote’ is linked to both moras of *ðuse*^{nMH} ‘lazy’ and a High tone is associated with the relative pronoun *tí*^(H) 3AN.

10.50. Low tone spread in noun + adjective

$\bar{i}i^n$	$t\bar{u}^?u^n$	$j\bar{a}j\bar{a}^n$	$\delta\bar{u}s\bar{e}^n$	$t\acute{i}$
$i:i^{nM}$	$tu^?u^{nLM}$	$jaja^{nLH}$	δuse^{nMH}	$ti^{(H)}$
one	word	coyote	lazy	3AN
<i>a story about a lazy coyote which.....</i>				

The same tonal phenomenon is found in compound nouns as shown in (10.51). Note that in the surface form, there are no High tones.

10.51. Low spread in compound nouns



tortilla corn-on-the-cob

sweet corn tortillas

The absence of floating High tones in these data could suggest that the High tones are deleted. However, in similar contexts where there is a following morpheme, we see the High tone in the surface form. For example in (10.52), we give data to show another context in which Low tone spreads; this time, the noun noo^{LH} 'cane' occurs in an embedded clause.

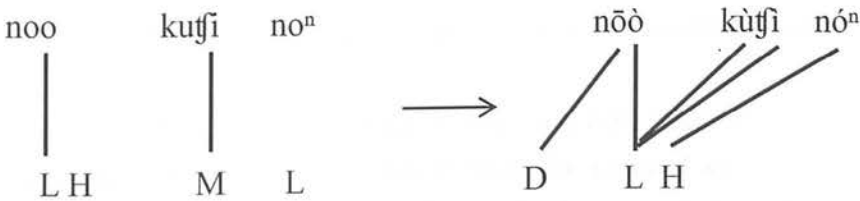
10.52. Noun + embedded clause

$nā^n$ -	$ðā$ -	$kúú^n$	$ní^n$	$ì↑^nkā$	$kà$	$nōò$	$kùtʃì$	$nó^n$
$na^{n(H)}$ -	$ða^{(H)}$	kuu^{nM}	$ni^{n(L)}$	i^nka^{ML}	$-ka^{(L)}$	noo^{LH}	$kutʃi^M$	$no^{n(L)}$
SBJV	CAUS	come down	1	another	more	cane	chew	2MS

I'm going to throw down another piece of cane which you can chew.

Note that in these data there is a High tone associated with the enclitic $no^{n(L)}$ 2MS. As the verb $kutʃi^M$ 'chew' only sponsors a Mid tone, then we conclude that the High tone associated with $no^{n(L)}$ 2MS is the floating High tone sponsored by noo^{LH} 'cane', as shown in the association diagram in (10.53).

10.53. Spread of Low tone of fronted noun to the verb



cane chew 2ms

cane for you to chew

Low tone spread also occurs after the reduced form on *nuu*^{LH} 'face'. The reduced form has an adverbial or prepositional meaning. The English translation can be 'where', 'to', 'at' or 'by' depending on the context. An example is given in (10.54). Note that it is the floating Low tone sponsored by *nu*^{LH} and not the floating High tone which associates with the secondary realis stem of *sesi*^H 'eat'.

10.54. Locational noun + dependent clause

nū ⁿ	sèsì	tí	íté
nu ^{n(LH)}	(H)- sesi ^(H)	ti ^(H)	ite ^{ML}
where	IPFV eat	3AN	grass
<i>where they were eating grass</i>			

The same tonal association pattern is found following the complementiser *ha*^(LH) in that the floating Low tone sponsored by *ha*^(LH) usually associates with the two moras of the following morpheme, and the floating High tone with the second morpheme to the right of *ha*^(LH). The data in (10.55) give three examples of the use of *ha*^(LH) 'complementiser'.

10.55. Low tones following *ha*^(LH) 'complementiser'

ǒó	ǒù†sē ⁿ	só	kùù	há	ǒùkà ⁿ	kà [?] á ⁿ	nò ⁿ
ǒo ^{HL}	ǒuse ^{nMH}	so ^{HL}	(H)- kuu	ha ^(LH)	ǒuka ^{nMH}	(H)- ka [?] a ^{n(L)}	no ^{n(L)}
how	lazy	2MS	IPFV be	COMP	thus	IPFV say	2MS
		EMPH					

hà	á-	nì [?] í ⁿ	nò ⁿ	hà	kàsì	nó ⁿ
ha ^(LH)	a ^{LH-}	nì [?] i ^{n(L)}	no ^{n(L)}	ha ^(LH)	kasi ^{MH}	no ^{n(L)}
COMP	NEG	find	2MS	COMP	eat	2MS

But you are terribly lazy to be saying that you can't find anything to eat,

First we see that the surface tones of *ǒuka*^{nMH} 'thus' are Low following *ha*^(LH). Note that in this case the Low tone also spreads to the initial mora of *ka[?]a^{n(L)}* 'say'. We propose that the Low tone spreads as the floating High tone sponsored by *ǒuka*^{nMH} 'thus' is prevented from associating with *ka[?]a^{n(L)}* due to the presence of the High tone of the imperfective. In Chapter 11 we show more examples in which tones are spread rather than a tone being inserted. In the second example, *ha*^(LH) is

followed by the negative prefix $a^{(LH)}$ -. In this case the floating High tone of $ha^{(LH)}$ associates with the negative marker. In the third example we see that tones of the verb kas^{MH} 'eat' are Low following the complementiser. In these data we also have an example of an enclitic occurring before the verb. Note that in this case the Low tone sponsored by so^{HL} 2MMSEMPH associates with both moras of kuu 'be'.

In the data in (10.55), we saw that in the second two occurrences of $ha^{(LH)}$, it has a Low tone associated with it. As the morpheme to the left sponsors a Low tone, it is impossible to say whether the surface Low tone is sponsored by the morpheme to the left or by $ha^{(LH)}$. However, just as we saw in data for the negative marker, the floating Low tone of the complementiser $ha^{(LH)}$ associates with it if the floating High tone associates with the immediately following morpheme. In (10.56), we see that $ha^{(LH)}$ has a surface Low tone, and that there is a surface High tone associated with io^{LM} 'very'. As $tuku^M$ 'again' sponsors a Mid tone, we conclude that the Low tone associated with $ha^{(LH)}$ complementiser is the Low tone which it sponsors.

10.56. Low tone associated with $ha^{(LH)}$

$tā^?á^n$	$ðè$		$kùðíí-ìní^n$		$tù↑kū$	$hà$	$ìò↑$	$βīī$	
$ta^?a^{nHL}$	$ðe^{(L)}$	(H)-	$ku^{(M)}$ -	$ðii^{(LH)}$	-ini ^{nML}	$tuku^M$	$ha^{(LH)}$	io^{LM}	$βii^M$
also	3MMS	IPFV	be	happy	inside	again	COMP	very	nicely

he also was happy again, because (his sheep were grazing) nicely

The spread of Low tone in these contexts contrasts with other data where there is a prosodic boundary between the morpheme which sponsors a Low High tone melody and that which sponsors a Mid or Mid High melody, for example as shown in (10.57). Note that the Low tone of $jaja^{LH}$ 'coyote' spreads to the initial mora of $ju^?u^{MH}$ 'mouth' and the floating High tone of $jaja^{LH}$ 'coyote' associates at the right edge of $ju^?u^{MH}$ 'mouth'.

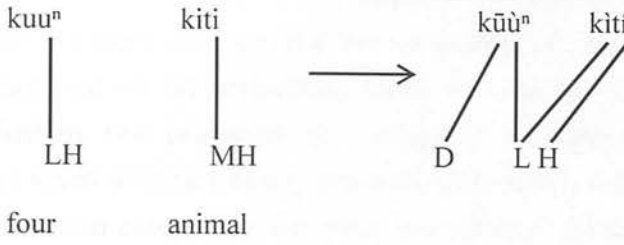
10.57.

$nī^n$ -	$sètū^?à$		$jājà^n$	$jù^?ú$	$tí$
$ni^n^{(L)}$ -	$se^{(M)}$ -	$tu^?a^{LM}$	$jaja^{nLH}$	$ju^?u^{MH}$	$ti^{(H)}$
PFV	make	ready	coyote	mouth	3AN

The coyote got its mouth ready.

In MXY, Low tones of the numeral do not spread to both moras of the noun, for example as shown in (10.58).

10.58. Association of floating High tone and spread of final Low tone

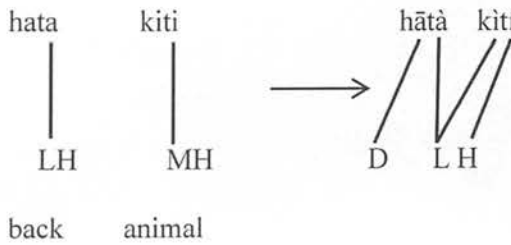


four animals

We see that the floating High tone for *kuu*^{LH} ‘four’ associates with the second mora of *kiti*^{MH} ‘animal’, deleting the Mid tone, and the final Low tone only spreads to the initial syllable.

The spread of Low tones to both moras of Mid or Mid High words does not occur in genitival phrases as shown in 10.59.

10.59. Association of a floating High tone and the spread of a Low tone



the animal's back

We have seen that not all phrases have identical association patterns; that is, in MXY, different phrase types have different association patterns, although the differences are often only apparent when the two morphemes which comprise the phrase have a limited set of underlying tone melodies.

10.3. CONCLUSION

In this chapter we have documented evidence for prosodic structure higher than the word level, including evidence for compounds in MXY. We have seen that the difference in duration of the two syllables of verbs when they are auxiliaries is not significant. We have also seen that the association of tones depends on a number of factors, not just on the underlying tones, but also on the syntactic structure, as exemplified by two processes: the raising of the Low tone in High Low High sequences when it occurs across prosodic boundaries, and the fact that the Low is not raised within compounds nor when the sequence includes verbal prefixes and a verb root. We also saw that in certain phrase types when the initial element in the phrase sponsors a Low High sequence and the second element has a Mid tone associated at the right edge, then the final Low of the first element spreads to both moras of the second element and the floating High skips the second element.

These issues highlight the need to examine MXY tonal association in the light of prosodic structure, given that different surface tone patterns are attested in different structures. These issues and others described in earlier chapters are examined against a theoretical background in Chapter 11.

CHAPTER 11

CONCLUSION AND SUMMARY

In this final chapter we revisit our findings and examine them within the framework of some specific theoretical issues. In the first section we give a brief summary of the tonal association conventions and the metrical structure, including a brief review as to how tonal association and metrical structure might be related; secondly, we look at five processes which govern the association of underlying tones; thirdly, we look at possible interactions between syntax and phonology; in the fourth section we summarise the findings presented in this thesis, indicating areas which call for further investigation; and in the concluding section, we look at areas for on-going study.

11.1. BASIC MXY PHONOLOGY

First we summarise our findings about the association of underlying tones. Secondly we give some of the basic principles on how the underlying tones are associated with the moras to give the surface forms.

11.1.1. Underlying tones

In Chapter 6, we saw that tones sponsored by morphemes in MXY usually align at the right edge of their sponsoring morpheme as shown in (11.1). In a bimoraic morpheme which sponsors two tones, this right alignment often results in a floating tone.

11.1 Underlying tones right aligned for 'tortilla'

ǒita
|
L H

We also saw that there are a few nouns whose tones align at the left edge as shown in (11.2).

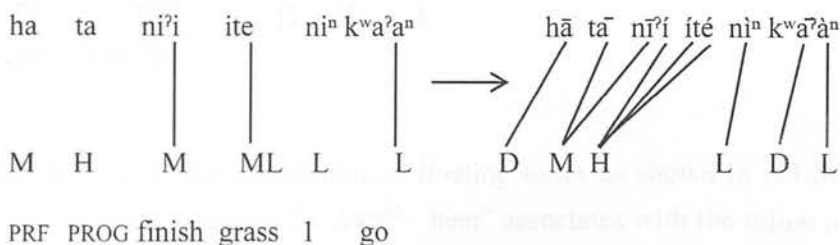
11.2 Left aligned tones for 'cat'

βilu
 | |
 H L

We saw that nouns such as βi^Hlu^L 'cat', in which the first tone of the tone melody is aligned at the left edge, are the exceptions. In fact there are no verbs in MXY whose underlying tones align at the left edge.

We also documented, for example in Chapter 7, that the tones sponsored by most mono-moraic affixes and enclitics occur as floating tones, as shown in (11.3).

11.3 Floating tones sponsored by prefixes and enclitics



My grass is already getting used up (by grazing).

Note that in these data the Mid tone sponsored by the perfect prefix *ha*^(M)- and the High tone sponsored by the progressive prefix *ta*^(H)- do not associate with their sponsoring morphemes, but are realised on other morphemes to the right. Similarly, the Low tone sponsored by the enclitic *ni*^(L) '1st person' is realised on a morpheme to the right. We also see that the Mid tones sponsored by *ni*^ʔ^(M) 'finish' and *ite*^(ML) 'grass' are deleted in the output, but the Low tone sponsored by *ite*^(ML) 'grass' associates with the enclitic *ni*^(L) '1st person'.

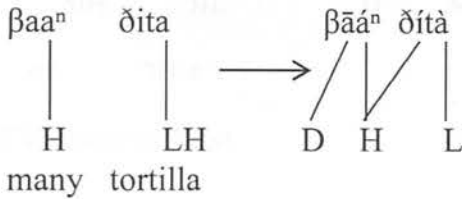
Additional phenomena regarding the complex system of underlying tones will be further discussed in subsequent sections.

11.1.2. The basics of tonal association

As the right alignment of underlying tones leaves the initial mora toneless, we showed three basic phonological processes by which a tone is provided for these toneless TBUs.

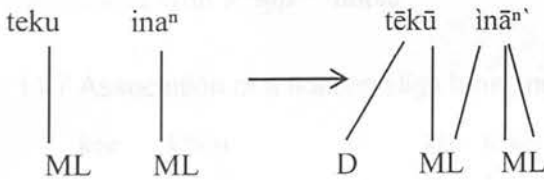
First we saw in Chapter 6 that when the word to the left sponsors only one tone, then that tone will spread to the initial mora of the following word, for example as in (11.4).

11.4 Spread of a final tone in 'many tortillas'



Another process is the association of floating tones as shown in (11.5) where the floating Low tone sponsored by *teku*^{ML} 'hear' associates with the initial mora of *ina*^{ML} 'dog'.

11.5 Association of a floating tone



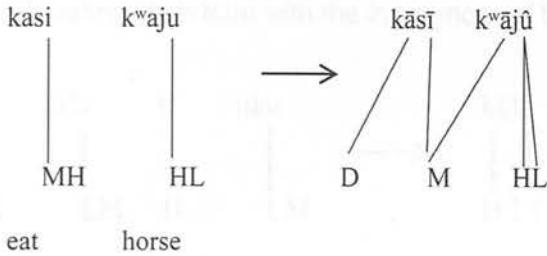
hear dog

the dog will hear

Note that floating Low tones do not associate with nouns that have a Low tone as the initial element in their tone melody. However, as we saw in Chapter 10, the floating Low tone sponsored by the perfective prefix does associate with verb stems which have a Low tone associated at the right edge. So when describing the association patterns of floating tones in MXY, it is necessary to specify the class of words under consideration, and as we describe below in Section 11.2.5, the syntactic relationship between the two adjacent elements.

When considering the tonal association patterns of floating High tones, we also need to specify whether the tone is sponsored by a prefix or a lexical item. For example, in (11.6) the floating High tone sponsored by the verb root – that is, a lexical floating High tone – does not associate with k^waju^{HL} ‘horse’ as this word has a High tone associated with it at the right edge of the noun.

11.6 No association of floating High tone

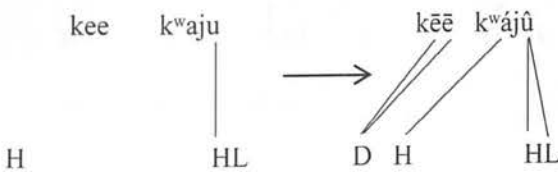


The horse will eat.

We see that the Mid tone associated with the second mora of $kasi^{MH}$ ‘eat’ spreads to the initial mora of k^waju^{HL} ‘horse’, and that the floating High tone sponsored by ‘eat’ is not present in the surface form.

On the other hand, if a floating High tone is sponsored by a verbal prefix, it does associate with a word which already has a High tone associated with it as shown in (11.7). Note that the floating High tone sponsored by the imperfective prefix associates with k^waju^{HL} ‘horse’.

11.7 Association of a floating High tone sponsored by a verbal prefix



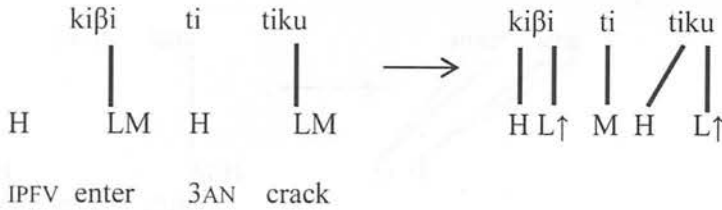
IPFV go out horse

The horse is going out.

These differences in the behaviour of floating High tones make the verbal morphology of MXY very complex. Chapter 8 describes the association phenomena of floating High tones sponsored by verb prefixes. In that chapter, we described how the association of the tones depends on the tones sponsored by the root or stem, as well as which verbal prefix is the sponsor of the floating tone.

Taking the floating High tone sponsored by the imperfective as an example, we see that there are three options for where it can associate: the initial mora of the verb, the second mora of the verb, or it skips the root or stem entirely and becomes a floating tone which associates with the morpheme to the right of the verb root. In example (11.8), we see that the floating High tone of the imperfective prefix associates with the initial mora of *kiβi*^{LM} ‘enter’.

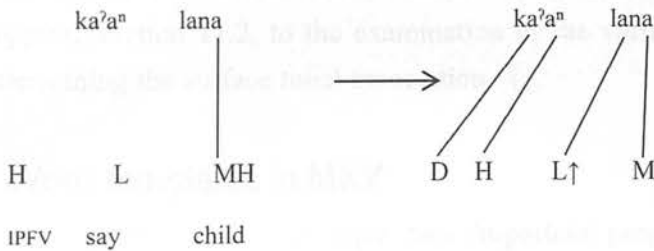
11.8 Floating High tone with the initial mora of the verb



It is going into the crack.

For verbs with other underlying tone melodies – for example, Low – the floating High tone of the imperfective associates with the second mora of the verb stem, as shown in (11.9).

11.9 Floating High tone with the second mora of the verb



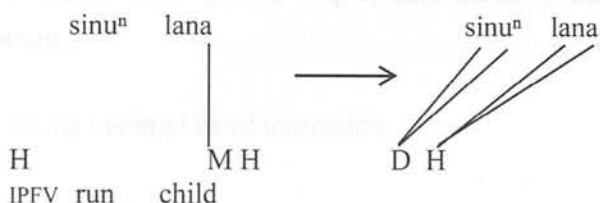
the child says

In these data we see that the Low tone sponsored by the verb root *kaʔaⁿ* ‘say’ occurs as a floating tone. The floating High tone sponsored by the imperfective associates with the second mora of the verb root. To account for the behaviour of the underlying tones of this group of verbs and others, in Chapter 8 we posited that some verbs have allomorphs of their roots which we call a ‘secondary stem’. As was shown in that chapter, these allomorphs co-occur with certain prefixes, such as the imperfective and the subjunctive. In other words, they do not occur

with a specific modal or aspectual category, but co-occur with modal, aspectual and derivational prefixes. Thus by calling these allomorphs secondary stems, we are not limiting their occurrence to certain modal, aspectual or derivational categories.

There is a group of verbs whose secondary stem loses the Mid tone sponsored by the verb root; in these cases the floating High tone of the imperfective skips the verb stem entirely as shown in (11.10).

11.10 Floating High tone as a floating tone following the verb



the child runs

This short overview of some of the basic principles of tonal association patterns in MXY highlights the fact that 'one size' does not fit all, in that there are a number of factors which come into play in determining the surface tone patterns. In addition, there is an interaction between underlying tones and the syntactic relationship which results in the surface form. We devote the second main section of this chapter, Section 11.2, to the examination of the various factors that play a role in determining the surface tonal association.

11.1.3. Word templates in MXY

The findings in this thesis contribute two important proposals to the general understanding of the nature of Mixtec words, beginning with the variety of MXY, with potential application to be further examined for other varieties of Mixtec. We proposed that CV: words with identical vowels should be considered mono-syllabic, but bimoraic, as argued in Chapters 4 and 6. This analysis differs from that of Pike (Pike 1948) in which he argues that CV: words consist of two short syllables. Another important finding is that for MXY there are at least two types of compounds, as explained in Chapter 6: trisyllabic compounds which usually consist of a prefix plus a root; and compounds with four syllables, comprising two roots.

Following the above mentioned analyses, the basic syllable types of MXY are as shown in (11.11).

11.11 Possible syllable structures

- a) light (σ) CV or V
- b) heavy (σ) CV: or V:

Our analysis shows that words are minimally bimoraic, examples of minimal words being given in (11.12). As documented in Chapter 9, stress occurs on the initial syllable, or on the only syllable of words comprising one heavy syllable. Recall that in MXY glottal stop is considered to be a feature of the vowel, not a consonant.

11.12 Minimal word templates

'CV.CV 'ti.ta 'opposum'
 'βi.lu 'cat'
 'ði[?].βa 'cocoa'

'CV.V 'k^wi.a 'year'
 'sa[?].uⁿ 'fifteen'

'V.CV 'i.naⁿ 'dog'
 'o.ko 'twenty'
 'i[?].niⁿ 'hot'

'CV: 'βee 'heavy'
 'βe[?]c 'house'

'V: 'aa 'salty'
 'uu 'two'
 'u[?]u 'difficult'

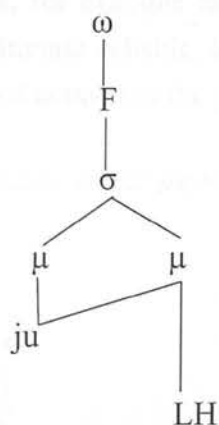
The increased duration found on initial syllables has led to the analysis that in MXY, trochaic feet are constructed from the two basic syllable types shown in (11.13).

11.13 Possible foot structures

- a) ('C \check{V} .C \check{V})
- b) ('CV:)

As was noted in Section 11.1.1, tones in MXY usually align with the rightmost mora. It then follows that in the case of words which consist of a single heavy syllable, tones align with the second mora. The data in (11.14) show the proposed prosodic structure for the word *ju*.^{LH} 'stone'.

11.14 Single heavy syllable as a foot in 'stone'



In (11.14) we see that the vowel is linked to two mora positions and that these moras form one heavy syllable. This heavy syllable is then considered a foot, forming a word.

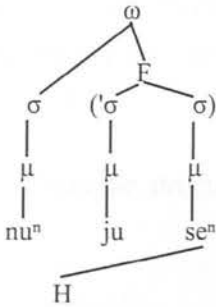
There are words in MXY which consist of more than one morpheme, for example there are many nouns that have the prefix *ʃʃʌ^H*- 'animal' as their first element. The second element can be of any of the minimal word types shown in (11.12). In (11.15), we give examples of multi-morphemic words; tone is omitted from these data.

11.15 Multi-morphemic words in MXY

CV.'CV.CV	tʃi.'βi.ko	'swallow'
	tʃi.'ku.tu	'cattle'
	tʃi.'ka.tʃi	'sheep'
CV.'CV:	tʃi.'ða:	'bird'
	tʃi.'no:	'spider'
CV.'V.CV	nu ⁿ . 'iju ⁿ	'acacia'

These nouns, and others, for example those which have the tree prefix $nu^{(H)}$ -, show stress on the penultimate syllable, that is the initial syllable of the root. We consider that this group of nouns has the prosodic structure as shown in (11.16).

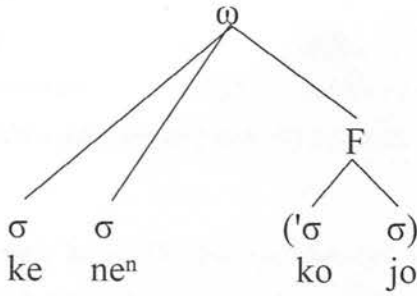
11.16 Prosodic structure of nu^{n} - $juse^{n}$ 'pitch-pine'



Here we see that the High tone sponsored by the prefix $nu^{(H)}$ - 'tree' associates with the final mora of $juse^{n}$ 'pine-needles'. We claim that it is only the two syllables of $juse^{n}$ which are parsed into a foot, leaving the syllable of the prefix as extrametrical, just as we saw was the case for verbal prefixes.

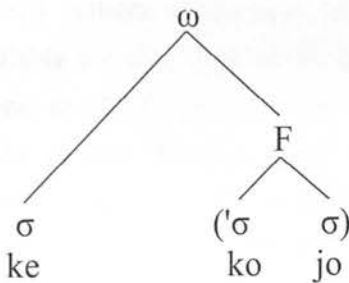
For compounds which comprise two roots, we have shown that it is the initial syllable of the second root which carries stress, as was shown in Chapter 9. The initial root receives no word stress, and it is the second root that is parsed into a foot. In (11.17) we show a possible prosodic structure for the compound word $kene^{n}$ - $kojo$ 'appear in a rush'.

11.17 Prosodic structure of *keneⁿkojo* 'appear in a rush'



The question is whether *keneⁿ* 'appear' should still be considered a word or not, as it is not stressed. In the diagram, we have opted for analysing it as two syllables. Note that it is only the two syllables of *kojo* 'pour' which are parsed into a foot, which then forms part of the compound word. This analysis was chosen for *keneⁿ-kojo* 'appear in a rush' to make it parallel in structure to *ke-kojo* 'come out in a rush'. Note that when CV: words appear as the first element of a compound, they have one light syllable. This gives the prosodic structure as shown in (11.18).

11.18 Prosodic structure of *ke-kojo* 'come out in a rush'



However in the case of compounds where the second word of the compound is one heavy syllable, the second morpheme remains heavy as shown in (11.19).

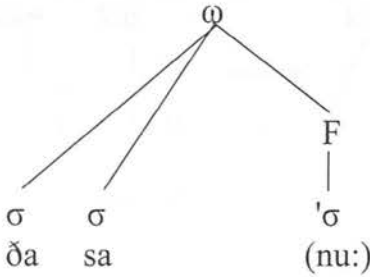
11.19 Foot structure for *ḍāsá núú lānā*

	ḍasa	+	nuu	lana	→	ḍāsá	(^ˈ nú:)	là↑nā
H	M		HL	MH				
IPFV	distribute		both?	child				

The children are handing out (something).

In the diagram in 11.20, we see that the second element of the compound forms a foot which comprises one heavy syllable.

11.20 Prosodic structure of *dasa nu:* 'distribute'



From these data we claim that in MXY there is only one stressed syllable per word and that for compounds, it is the second element of the compound which has stress on the initial syllable in the case of disyllabic words. Mono-syllabic words with a heavy syllable are also stressed. Or put in other terms, we claim that there is only primary stress in MXY, and that only roots may be stressed.

The priority of root stress is noted for Cupeño (Uto-Aztecán) by Alderete (2001). Although in Cupeño there are affixes which may be stressed, these only receive word stress when the root to which they attach is unstressed. In contrast, we claim that there are no stressed affixes in MXY. There are two contexts in which a root is not stressed: 1) when it is the initial element in a compound; and 2) when the focus of the utterance is elsewhere, roots may lose their stress, as we saw in Chapter 9.

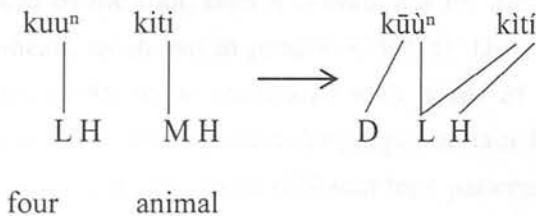
11.1.4. Relationship between stress and tone

Having reiterated the claim that stress appears on the initial syllable of roots, we now summarise the evidence presented in previous chapters to substantiate the

claim that in MXY there is no preference for High tones to associate with stressed syllables.

In Section 11.1.1, we showed how tones usually align at the right edge of mono-morphemic words, although there are some which are left-aligned. However, regardless of which edge the tones align on, the initial syllable is the one which is stressed. Then in Section 11.1.3 we summarised our findings that in disyllabic words, it is the initial syllable which shows increased duration, which we interpret as stress. In addition to these basic facts, in Chapters 6-10 we documented many examples in which floating High tones skip the stressed syllables, that is, the initial syllable. An example is shown in (11.21).

11.21 Tone alignment on 'four animals'



In previous chapters we have documented other contexts in which floating High tones skip the stressed syllable; for example, in Chapter 8 we saw that in most cases floating High tones align at the right edge of the verb root.

The question then becomes: is there any interaction between tonal association and metrical structure. Different types of interactions between tonal and metrical systems have been documented for the world's languages. Five possibilities, given in (11.22), are noted by Pearce (2006).

11.22 Tonal and metrical interaction

- a) In the association of tones to heads: for example, Winnebago (Hayes 1995), Digo (Kisseberth 1984), Creek (Kim 1999, Zec 1999), Seneca (Prince 1983)
- b) In the deletion of tones on non-heads: for example, Shanghai (Duanmu 1997, Yip 2002)
- c) In the spreading of tones within the foot: for example, Shanghai, Lhasa Tibetan (Duanmu 1992, 1993), Yoruba (Awoyale 2000)
- d) In the preference for certain tones on heads and non-heads: for example in de Lacy's analysis of MIY Mixtec (de Lacy 2000, 2002), Fuqing (Jiang-King 1996, de Lacy 2000)

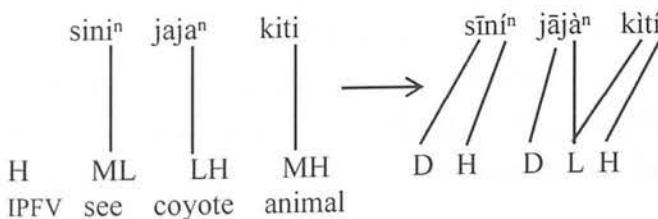
- e) In associating certain melodies with certain foot types: for example, Bole, Kanakuru, Hausa (Newman 1972, 2000, Leben 1997, 2001)

In addition to these possibilities listed by Pearce (2006), we also note that Remijsen (2001) documents that Ma'ya (Austronesian) has both tone and lexically contrastive stress, as independent factors in its word-prosodic system. We have seen that for MXY, stress is predictable, so it is obviously not a hybrid system like that documented by Remijsen.

We now turn to examine the processes listed in (11.22). The process in (11.22a) is found in languages where tones associate with the heads of metrical feet. In a subset of these languages, tones from non-heads are deleted, as described in the process shown in (11.22b). In cases where the sponsored tone associates with the head of the foot, then it is common for this tone to spread within the foot to the non-head, as shown in process (11.22c). De Lacy and Jiang-King claim that certain tones prefer to be associated with heads of feet and others with the non-heads, process (11.22d). In other languages certain foot types, for example monosyllabic versus disyllabic, show different tone patterns.

We now examine each of these phonological processes in the light of data from MXY. First we look at the claim that tones are associated with heads of feet. Clearly this does not apply to MXY, as most tones are aligned at the right edge of their sponsoring morpheme; that is, with the non-head. In fact the opposite of process (11.22b) is noted in MXY. Instead of tones being deleted from non-heads, the process of rightward shift documented in Chapters 5 and 6 has resulted in the underlying tones being associated with the non-heads. In Chapter 6 we also noted that tones spread across word boundaries; that is, the placement of a foot boundary does not impede tone spread as shown in (11.23).

11.23 Floating tones associate across word boundaries



11.24 *The coyote is looking at the animal.*

Here we again see that floating High tones skip the stressed syllables, both in the case of the floating High tone sponsored by the imperfective prefix and the High

tone sponsored by *jaja*^{nLH} ‘coyote’. These data also illustrate the process in MXY whereby floating High tones skip the head of the metrical foot and associate with the non-head, and the Low tone spreads to the head. These data fly in the face of Yip’s claim (Yip 2002) that prominence profiles – that is, which syllable of a foot is stressed – and tonal profiles – that is, where the High tone goes – cannot contradict one another. Or put in another way, if a foot is left-headed, the expectation is that the High tone will be attracted to the left edge. However, as we have seen, this manifestation is not what happens in MXY, as illustrated in (11.23).

In (11.22e) we noted that in some languages, certain tone melodies are restricted with regard to foot type. However, in the data set of 406 nouns used in Chapter 6, the attested tone patterns were found on both CV: words as well as CVCV words. That is, there did not seem to be any restriction on what tone melody could occur on CV: words.

These data and others presented throughout this thesis have shown that in MXY there does not seem to be any predilection for High tones to associate with the prominent syllables. In fact, we have shown that in many cases the opposite occurs, and the floating High tones skip initial syllables and align at the right edge, even though those syllables are not stressed. So although the processes given in (11.22) show possible relationships between tone and metrical structure, it appears that none of these processes is relevant for MXY. What is of particular interest is that in (11.22d), we see that de Lacy claims that there is a relationship between High tones and the stressed syllable for MIY. It would be interesting to see if acoustic data confirmed Pankratz and EV Pike (1967) and de Lacy’s analysis of their data. The problem with de Lacy’s analysis is that he used secondary data from papers co-authored by EV Pike and other SIL colleagues, such as EV Pike and Cowan (1967), Hunter and EV Pike (1969), EV Pike and Ibach (1978) as well as Pankratz and EV Pike (1967) rather than checking the data using acoustic analysis. It certainly is true that in some languages High tones are attracted to stressed syllables. However, de Lacy’s use of secondary Mixtec data as the basis of his claim that universally, High tones are attracted to the stressed syllables, needs further investigation, especially given that there is no correlation between stress and High tone in MXY for which we have used recorded data for our analysis.

11.2. WHAT GOVERNS TONAL ASSOCIATION

The data presented so far leads to the conclusion that there is no connection between metrical and tonal structure in MXY in that no particular level of tone can be shown to have a predilection for occurring on the stressed syllables. Having looked at what does not impact tonal association, we now look at five factors which do govern tonal association in this variety of Mixtec. There are three important principles which underpin our analysis: one, the underlying tones are the key players; two, a distinction has to be made between the phonological process of spreading tones from one mora to another and the process of associating a floating tone; and three, tones sponsored by lexical items have to be differentiated from those sponsored by affixes and enclitics. In order to examine these principles, first, we look at the preference of High tones to align at the right edge of the word; secondly, we look at how tones spread rather than insert default tones; thirdly, we look at the behaviour of floating tones; fourthly, we examine how far to the right a floating High tone may associate; and finally, we look at contexts in which tonal association makes reference to prosodic boundaries, such as word and phrase boundaries. In each section we describe the process and also look at what phenomena prevent the application of the process.¹ Processes that are limited to certain syntactic constructions are described in Section 11.2.5 on prosodic structure.

11.2.1. Align High Right

We now come to describe the constraints that govern the association of floating High tones. First, floating High tones align as 'far to the right as possible'. We now elucidate on what acts as a barrier to the right-ward movement of floating High tones. In (11.25), we see sequences of a verb plus a noun subject, in which the verb in the irrealis sponsors a Low High tone melody.

¹ A brief account of the tonal phenomena of noun phrases within an Optimality Theory framework is given in Appendix E.

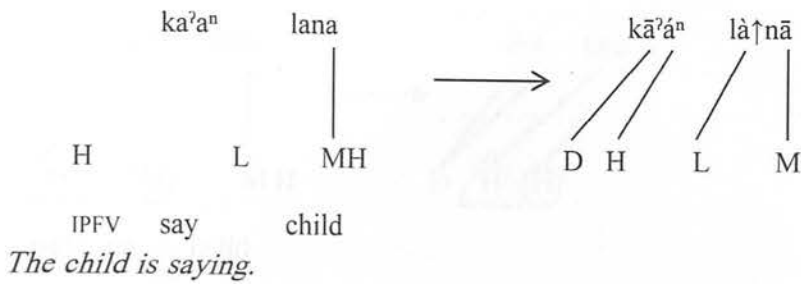
11.25 Align High right

- a) $ni^{?i^{nLH}} + lana^{MH} \rightarrow ni^{?i^n} \quad láná \quad \text{'child'}$
- b) $ni^{?i^{nLH}} + ina^{nML} \rightarrow ni^{?i^n} \quad íná^n \quad \text{'dog'}$
- c) $ni^{?i^{nLH}} + jaja^{nLH} \rightarrow ni^{?i^n} \quad jájà^n \quad \text{'coyote'}$

In (11.25a) and (11.25b) we see that the floating High tone of $ni^{?i^{nLH}}$ 'find' deletes the Mid tones sponsored by $lana^{MH}$ 'child' and ina^{nML} 'dog' and so associates at the right edge of these words. However, in (11.25c) we see that the floating High tone associates with the initial mora of $jaja^{nLH}$ 'coyote'. We therefore conclude that the Low tone associated at the right edge of a noun is neither deleted nor delinked by a floating High tone, and as a result the floating High tone associates with the initial mora. On the other hand, we see that the Mid tones associated at the right edge of $lana^{MH}$ 'child' and ina^{nML} 'dog' are deleted. So we see that when looking at data which contain nouns with a Low tone associated at the right edge, floating High tones neither delink nor delete these Low tones, with the result that the floating High tone associates with the initial mora.

When we turn to verbs, we need to fine-tune just where floating High tones may associate. As we saw in Chapter 8, all floating High tones do not associate with the same mora of the verb root. Pertinent to this discussion are the four groups of verbs which have secondary stems: that is, those verbs whose roots sponsor a Low tone, those with underlying Low High, as well as some verbs with underlying Mid, and some of those with a Mid High tone patterns.. For these verbs we see another factor in the association of floating High tones: that they don't skip over underlying tones, although they may skip moras that are unspecified for tone. Consider the following examples in which we give different verbal forms to illustrate this principle. In (11.26) we give the imperfective form of the verb $ka^?a^{nL}$ 'say'. Recall that for this group of verbs the Low tone occurs as a floating tone in the secondary stems.

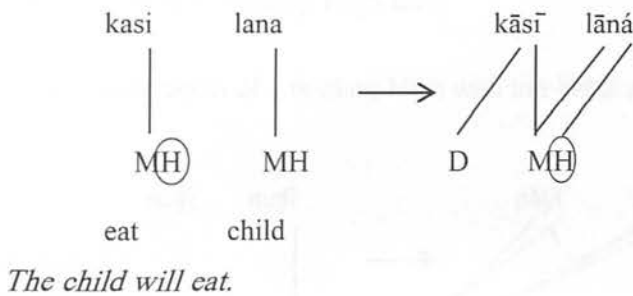
11.26 Underlying Low tone as a barrier



We see that the High tone sponsored by the imperfective associates with the second mora of the verb stem. We posit that further movement to the right is prevented by the presence of the floating Low tone which associates with the initial mora of *lana*^{MH} 'child'. This Low tone is raised to Mid as the sequence High Low Mid is prohibited.

We now turn to a verb which sponsors a Mid High tone melody. In (11.27), we give the irrealis form.

11.27 Irrealis of *kas*^{MH} 'eat'



Note that the High tone sponsored by the verb root, indicated by a circle, associates with the second mora of *lana*^{MH} 'child', deleting the Mid tone that was associated with that mora. Note that the floating High tone sponsored by *lana*^{MH} 'child' is also deleted. This association is in keeping with our premise that floating High tones prefer to align at the right edge of a word.

In (11.28), we give the imperfective of the verb *ses*^H 'eat'. This verb belongs to the group of Mid High verbs which loses the Mid tone in the secondary stem.

sponsored by the verb root associates with the second mora of the noun. In (11.28), we see that the floating High tone sponsored by the imperfective associates with a word which already has a High tone associated with it. This contrasts with the data we gave in Chapter 6 where in noun phrases floating High tones did not associate with words which already have a High tone associated with them. This leads us to posit that floating High tones sponsored by lexical items do not behave in the same way as floating High tones which mark verbal categories. In (11.26) and (11.29) we showed two principles which affect the rightward movement of floating High tones: in (11.26), we saw that the presence of a floating Low tone prevented a High tone from moving further to the right; and in (11.29), we showed that the floating High tone sponsored by the imperfective associated with the initial mora of *nufɪ*^{MH} ‘beans’, suggesting that floating High tones only skip one morpheme and then associate with the first mora following that boundary. This principle is discussed in Section 11.2.4 below. In Section 11.2.5 we discuss the role of constituent structure in the association of floating High tones.

11.2.2. Spread rather than insert

In Chapter 6 we showed that in MXY tones can be multiply-linked across word and phrase boundaries. Contexts in which spreading does not occur owing to constituent boundaries are discussed in Section 11.2.5. The restrictions here are MXY specific variations of the OCP as was shown in Chapter 6. In (11.30), we see that the final High tone associated with ‘many’ spreads to the initial mora of the following word even when there is already a High tone associated with that morpheme.

11.30 High tone spread even if there is already a High tone

βaa^{nH}	+	$k^w aju^{HL}$	→	$\beta \bar{a} \bar{a}^n$	$k^w \acute{a} j \acute{u}^{\`}$
many		horse			
<i>many horses</i>					

In (11.31), we see that the Low tone of *uni*^L ‘three’ is prevented from spreading to the initial mora of *kuku*^L ‘comb’ owing to the fact that there is already a Low tone associated with the second mora. These data are illustrative of the context in which a default Mid tone is inserted; that is, when the final Low tone of one word is prevented from spreading to the second word owing to the presence of a Low tone at the right edge of the second word.

11.31 No Low tone spread if there is a Low tone

uni^{nL} + kuka^L → ūnìⁿ kūkà
three comb
three combs

In (11.32) we see that a Mid tone can spread, even if there is already a Mid tone present in the following morpheme.

11.32 Mid tone spread even when there is a Mid tone

11.33
ii^{nM} + kitì^{MH} → īīⁿ kītī
one animal
one animal

In (11.31) and (11.32) we see that both High and Mid tones in verbs are permitted to spread to a following noun which has High or Mid tones, respectively. In these data we see an important aspect of MXY tonal association: that it is preferable to spread tones than to insert the default tone. In fact default tones are usually only inserted when otherwise there would be two adjacent Low tones as was shown in (11.31). Note that this prohibition on two adjacent Low tones only applies to Low tones sponsored by lexical items. In Chapter 10 we showed how two adjacent Low tones are permitted when one or both of them are sponsored by verbal prefixes.

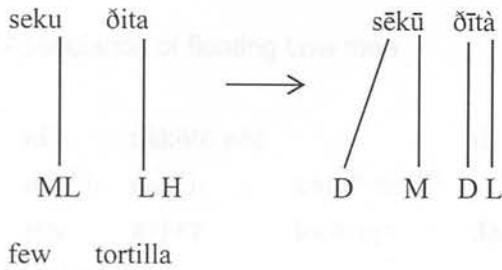
11.2.3. Association of floating tones

In describing the association of floating tones in MXY, we must make reference to the grammatical class of their sponsoring morpheme, as already stated in Section 11.1.2 above. We show that tones sponsored by lexical items behave differently from those sponsored by affixes. The floating tones sponsored by enclitics behave like those sponsored by lexical items although the norms which govern the association of tone with enclitics is idiosyncratic as described in Chapter 7. As was demonstrated in Chapter 6, all three levels – Low, Mid and High – occur in MXY as floating tones. We now look at the behaviour of each level in turn.

11.2.3.1. Floating Low tones

Floating Low tones sponsored by lexical items such as verbs and nouns do not associate with another item which has a Low tone associated with it. For example in (11.34), we see that the floating Low tone of *seku*^{ML} ‘few’ does not associate with *đita*^{LH} ‘tortilla’ as it already has a Low tone associated with it.

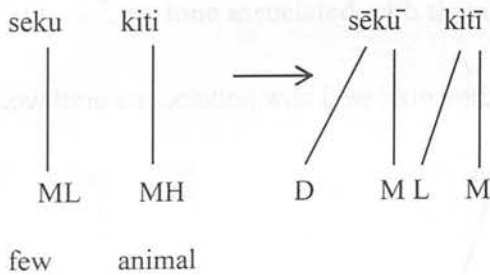
11.34 No association of floating Low tone if a Low tone is present



few tortillas

However, in (11.35), the floating Low tone does associate with *kiti*^{MH} ‘animal’. Note that the floating Low tone associates with the first mora to the right of the sponsoring morpheme.

11.35 Tonal association for ‘few animals’



few animal

Floating Low tones do, however, associate with the group of enclitics to which Low tones do not spread. In (11.36), the final Low tone associated with *ⁿkʷiɪ^L* ‘stop’ does not spread to the enclitic *tɪ^H* 3AN whereas in (11.37) the floating Low tone sponsored by *koto^M nee^{ML}* ‘look up’ does.

11.36 No spread of Low tone to some enclitics

hó ⁿ	nī ⁿ -	ⁿ k ^w i ⁿ	tī
ho ^{nHL}	nī ^{n(L)} -	ⁿ k ^w i ^{nL}	ti ^(H)
for this reason	PFV	stop	3AN

That's why it stopped.

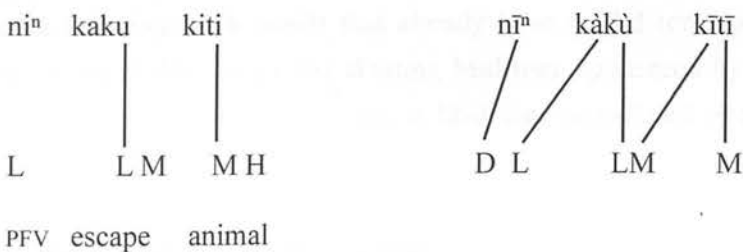
11.37 Association of floating Low tone

tē	nī ⁿ -	nàkōtō nēē		tī
te ^(M)	nī ^{n(L)} -	na ^(M) -	koto ^M nee ^{ML}	ti ^(H)
and	PFV	REPET	look up	3AN

and it looked up

That is, when describing the behaviour of Low tones, we have to differentiate between those which are linked in the underlying form and those which occur as floating tones. We also have to differentiate between those sponsored by lexical items, which may be linked in the underlying form or occur as Low tones and the floating Low tones which are sponsored by verbal prefixes. For as we show in (11.38), floating Low tones sponsored by verbal prefixes do associate with verb stems which have a Low tone associated with them.

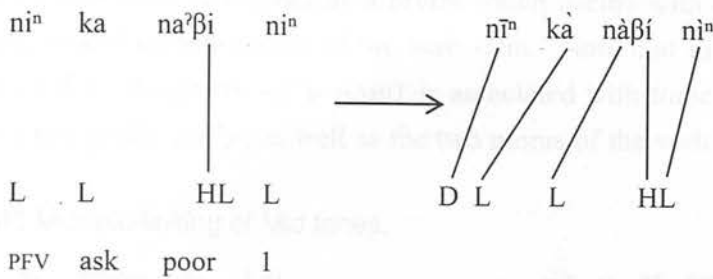
11.38 Low tone association with Low tone verb



The animal escaped.

We see that the floating Low tone of the perfective marker spreads to a verb root which has a Low tone associated with it. In fact, it is possible to have two adjacent Low tones sponsored by different prefixes as shown in (11.39).

11.39 Multiple Low tone verb prefixes



I humbly asked.

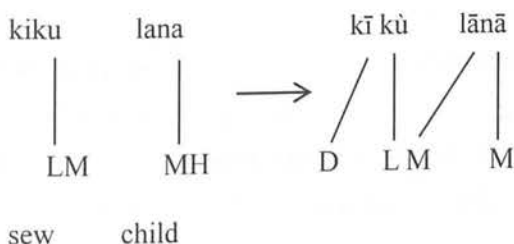
We see that in the underlying form, both the perfective prefix *ni^{n(L)}-* and *ka^(L)-* ‘ask’, the reduced form of *kaka^{nL}* ‘ask’, have Low tones. Given *MXY*’s tendency to preserve tones, we claim that in the surface form both of these Low tones are present, although they associate with the mora to their right.

So in this section we have demonstrated the difference in behaviour between floating Low tones sponsored by verbal prefixes and those sponsored by lexical items. We have also shown that Low tones sponsored by a verb stem do not behave in the same way as floating Low tones sponsored by prefixes. In addition, Low tones behave differently from High and Mid tones with regard to spreading.

11.2.3.2. Floating Mid tones

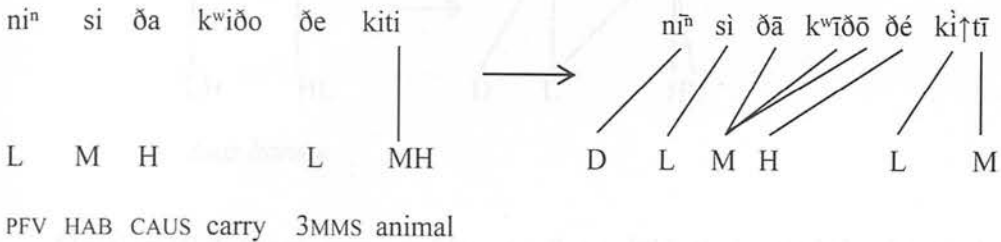
The best analysis from the data available is that there are no restrictions on the association of floating Mid tones nor are there different patterns for those sponsored by verbal prefixes and those sponsored by lexical items. Unlike Low tones, they do associate with words that already have a Mid tone associated with them as shown in (11.40), where the floating Mid tone sponsored by *kiku^{LM}* ‘sew’ associates with *lana^{MH}* ‘child’ which has a Mid tone associated with the second mora.

11.40 Association of ‘the child will sew’



Floating Mid tones sponsored by a prefix which occurs with a secondary stem are multiply-linked to both moras of the verb stem. Note that in (11.41), the Mid tone sponsored by the prefix *si*^(M)- HABIT is associated with three moras: the mora of the causative prefix *ǎa*^(H)-, as well as the two moras of the verb stem.

11.41 Multiple-linking of Mid tones



He used to load the animals.

In this example, the secondary stem of ‘load’, literally ‘cause to carry’ is toneless. Note that in the surface form a default Mid tone is inserted to provide a tone for the perfective prefix as no other tone is available to associate with it. The Low tone sponsored by the perfective marker associates with the prefix to the right. The Mid tone of the habitual prefix is linked to the three moras to its right. The High tone of the causative prefix associates with the enclitic. The Low tone of *ǎe* is associated to its right, on *kiti*, resulting in a prohibited High Low Mid sequence, so the Low tone is raised to Mid.

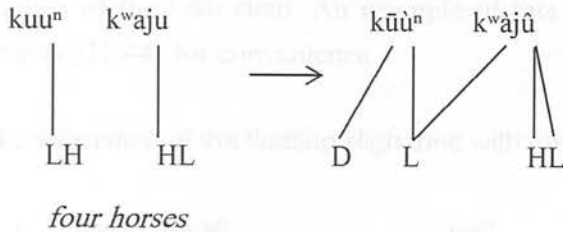
11.2.3.3. Floating High tones

In Section 11.2.1 above we described the tendency of floating High tones to associate at the right edge of words. In this section we describe other principles which govern the association of floating High tones, as the association patterns for floating High tones are by far the most complicated when compared to those of Low and Mid. One important principle when describing the association of floating High tones is that it is necessary to specify whether they are sponsored by a lexical word or an affix or an enclitic. Another important factor to keep in mind is that floating High tones behave differently from High tones which are associated in the underlying form.

Floating High tones sponsored by lexical items do not usually associate with other lexemes which have a High tone associated with them; for example in (11.42)

we see that the floating High tone sponsored by *kuu*^{LH} ‘four’ either does not associate with *k^waju*^{HL} ‘horse’ or fuses with the High tone associated with the second mora.

11.42 No association of floating High tone



Floating High tones sponsored by enclitics exhibit the same behaviour patterns as those of lexical items in that they do not associate with items that already have a High tone associated with them.

We also showed in Chapter 7, that floating High tones do not associate with the enclitic *nα*^(H) 1INCL, although floating High tones do associate with other enclitics which sponsor a floating High tone.

On the other hand, floating High tones sponsored by verbal prefixes do associate with verb stems or roots that have a High tone associated with them whether that High tone be sponsored by a lexical item or by another prefix. The floating High tones sponsored by a verbal prefix also associate with nouns or pronouns which have a High tone associated with them as shown in (11.43).

11.43 Association of a floating High tone

<i>nāi</i> ⁿ -	<i>kūú</i>	<i>há</i>	<i>sèðè</i>	<i>só'ó</i>
<i>nai</i> ^{nLH} -	<i>kuu</i> ^M	<i>ha</i> ^(LH)	(H)- <i>seðe</i>	<i>so'o</i> ^{HL}
what	be	COMP	IPFV do	2MSEMPH

What are YOU doing?

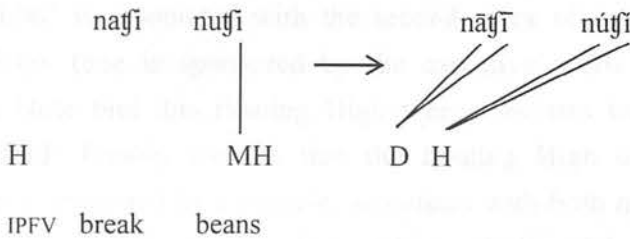
In this example, the floating High tone of the imperfective skips the secondary stem of ‘do’ and associates with the emphatic pronoun, even though it has a High tone associated at its right edge. The Low tone sponsored by *ha*^(LH) associates with both moras of the verb stem. The High tone sponsored by *ha*^(LH) is either deleted or fuses with the floating High tone of the imperfective. In this example,

we also see that the floating High tone of *nai*^{LH} ‘what’ associates with the second mora of *kuu*^M ‘be’ and spreads to the mora of *ha*^(LH) COMP.

11.2.4. Don't go too far

In Chapter 10, we saw how floating High tones sponsored by some verbal prefixes skip both moras of the verb stem. An example of this process is given in (11.29) repeated here as (11.44) for convenience.

11.44 Association of the floating High tone with the initial mora

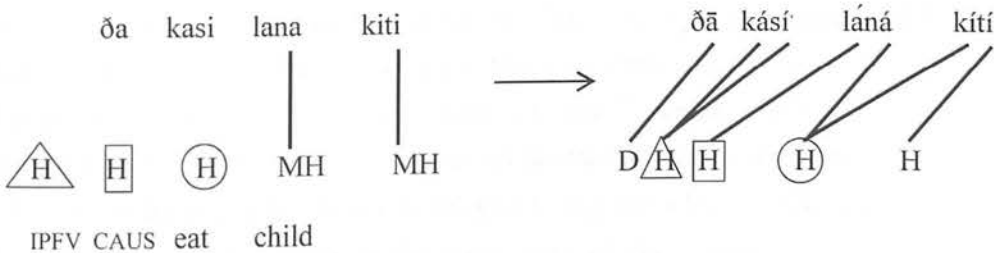


The beans are breaking.

Note that the floating High tone of the imperfective skips both moras of the verb root and associates with the initial mora of *nuŋĩ*^{MH} ‘beans’. Given that in other contexts floating High tones associate with the right edge, we might have expected that the floating High tone of the imperfective would have associated with the second mora, but such is not the case in these data.

Another context in which the floating High tone of the imperfective associates with the initial mora, in this case the initial mora of the verb stem, is in causative verbs, as was described in Chapter 10. An example is given in (11.45).

11.45 Association of the floating High tone of the imperfective



The child is feeding the animals.

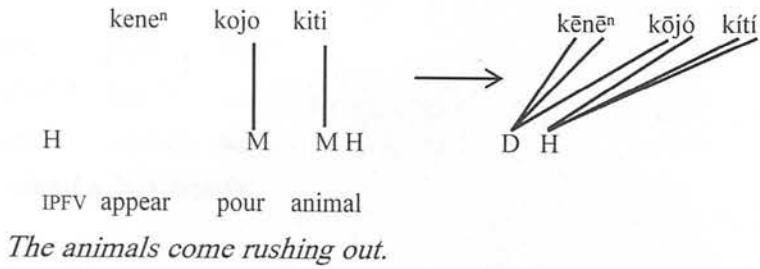
First, we note that in the underlying form of the verb and its prefixes there are three adjacent floating High tones: one sponsored by the imperfective prefix, shown in a triangle; the floating High tone sponsored by the causative prefix, shown in a rectangle; and the floating High tone sponsored by the verb stem, shown in a circle. Now we look at the location of the surface association of each of these three floating High tones. Working from right to left starting with the floating High tone sponsored by the verb stem, we see that this floating High tone, enclosed in a circle, associates with the second mora of *lana*^{MH} 'child' and spreads to the initial mora of *kitt*^{MH} 'animal'. The floating High tone sponsored by *lana*^{MH} 'child' is associated with the second mora of *kitt*^{MH} 'animal'. The next floating High tone is sponsored by the causative prefix and is enclosed in a rectangle. Note that this floating High tone associates with the initial mora of *lana*^{MH} 'child'. Finally we see that the floating High tone sponsored by the imperfective, enclosed in a triangle, associates with both moras of the verb stem. The floating High tone sponsored by *kitt*^{MH} 'animal' is deleted.

We propose that there are two important phonological processes at work here. First, floating High tones are attracted to the right edge; and secondly, floating High tones are allowed to skip only one morpheme in this variety of Mixtec.

In this example, the floating High tone sponsored by the verb root associates with the second mora of *lana*^{MH} 'child', as floating High tones are attracted to the right edge, and it is preferable to have a High tone associated at the right edge rather than preserve the Mid tone. Note that if this noun had had a Low tone associated at the right edge, the floating High tone would have associated with the initial mora. We note that there are no tones associated underlyingly with the two moras of the verb stem, the perfective and causative prefixes. We claim that in these cases floating High tones may only skip one morpheme. So in the case of the floating High tone sponsored by the imperfective, having skipped the causative morpheme, the furthest it can go from its sponsoring morpheme is the initial mora of the verb root. Similarly in the case of the floating High tone sponsored by the causative prefix, it skips the two moras of the verb stem – that is, one morpheme – and then associates with the initial mora of *lana*^{MH} 'child'. Note that we are assuming that it is morphemes rather than moras that are being counted.

This hypothesis can be further developed to explain why the floating High tone of the imperfective associates at the right edge of the second element of some verbal compounds. Consider the data in (11.46).

11.46 Right aligned High tones



The question here is why does the floating High tone of the imperfective align with the second mora of *kojo*^M ‘pour’ and not the first. We claim that the two words which form this type of compound are considered one unit. Therefore the floating High tone associates with the right edge as there is only one unit separating the prefixal High tone from the location where the floating High tone associates. Thus, this tonal association is in keeping with the tendency of floating High tones to align at the right edge of the following morpheme, especially when a Mid tone is associated with it as shown above in Section 11.2.1, only in this case the ‘morpheme’ is a compound verb.

More research is needed to check this hypothesis, but with the data available it does seem that morphemes rather than moras are being counted.

11.2.5. Boundary issues

One feature which contributes to the complexity of MXY tonal association is that the surface tones on some elements vary depending on the syntactic relationship between the element in question and the one to its left. We saw examples of this in Chapter 10 where we described the contexts in which Low tones spread, and also how the usually prohibited sequence of High Low High does occur within certain syntactic constituents. In this section we show some contexts in which syntactic constituents play a part in tonal association.

11.2.5.1. Low tone

In Chapter 10 we showed that Low tones spread in some contexts but not in others. In (11.47) we give an example of a noun phrase in which the noun has a Low High tone pattern, in this case *jaja*^{LH} ‘coyote’, and the modifying adjective *δuse*^{MH} ‘lazy’ has an underlying Mid High pattern, but in the surface form the Low tone of *jaja*^{LH} ‘coyote’ spreads to both moras.

11.47 Low tone spread from a noun to the modifying adjective

īī ⁿ	tū [?] ù ⁿ	jājà ⁿ	ðùsè ⁿ
ii ^{nM}	tu [?] u ^{nLM}	jaja ^{nLH}	ðuse ^{nMH}
one	word	coyote	lazy
<i>a story about a lazy coyote</i>			

Now consider the data in (11.48). In this example, the word following *jaja*^{nLH} ‘coyote’ has the same tone pattern Mid High as we saw in (11.47), but in this case, *ju*[?]*u*^{MH} ‘mouth’ does not belong to the same syntactic phrase as *jaja*^{nLH}. Note that the surface tone pattern on *ju*[?]*u*^{MH} ‘mouth’ is Low High.

11.48 Floating High tone associated across a phrase boundary

nī ⁿ -	sètū [?] à	jājà ⁿ	jù [?] ú	tí
ni ^{n(L)} -	se ^(M) -	tu [?] a ^{LM}	jaja ^{nLH}	ju [?] u ^{MH} ti ^(H)
PFV	make	ready	coyote	mouth 3AN
<i>The coyote got its mouth ready.</i>				

These examples illustrate an important feature of MXY tonal association: phrase boundaries need to be considered. In the first example, the word immediately following describes the coyote; in the second, the word immediately following is the object of the verb, with the coyote as the subject. The interaction of prosodic phrases and syntactic phrases is discussed in Section 11.3.

11.2.5.2. High Low High

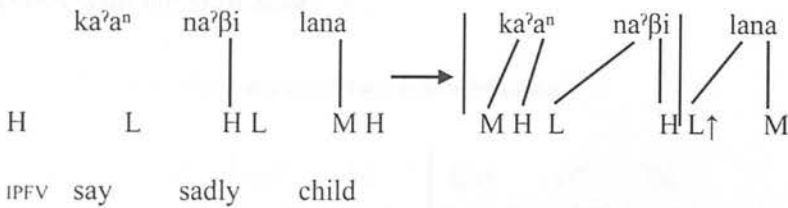
We now look at further evidence that MXY tonal association interacts with syntactic constituents. In Chapter 7 we saw how the Low tone in a High Low High sequence was raised to Mid. In Chapter 10 we saw that the prohibited sequence High Low High is permitted in compounds and also across prefixes and verbs. For example, in (11.49) we see that the negative prefix *a*^(LH)- has a High surface tone, and there is a Low High surface tone pattern on the verb stem; this part of the data is enclosed by vertical lines.

11.49 High Low High sequence

tē	nī ⁿ	βécé ⁿ	nó	á-	ní ^ʔ i ⁿ	hà	kàsì	nò
te ^(M)	ni ^{n(H)}	βee ^{nMH}	no ^(H)	a ^{LH} -	ni ^ʔ i ^{n(L)}	ha ^(LH)	kasi ^{MH}	no ^(H)
and	not even	self	1INCL	NEG	find	COMP	eat	1INCL
<i>and I haven't found anything for myself to eat</i>								

Another context in which the sequence High Low High is permitted is when a verb is followed by an adverb as shown in (11.50). This part of the data is enclosed in vertical lines.

11.50 High Low High across a verb and modifying adverb



The child is speaking sadly.

As the verb *ka^ʔaⁿ* ‘say’ occurs here with the secondary realis stem, then the Low tone sponsored by the verb occurs as a floating Low tone. This tone associates with the initial mora of ‘poor’, but it is not raised. On the other hand, the floating Low sponsored by *naβi^{HL}* ‘poor’ associates with *lana^{MH}* ‘child’, and it is raised. We claim that a verb plus an adverb form a constituent, whereas *lana^{MH}* ‘child’ belongs to a different constituent from *naβi^{HL}* ‘poor’. Note that verb plus adverb form a syntactic constituent, whereas adverb plus noun subject do not. How this relates to prosodic structure is discussed in Section 11.3.

11.2.5.3. Floating tones and clause boundaries

We now look at some examples from the text ‘The bully’ to illustrate how in some instances, tones float across clause boundaries. The two examples in this section form part of one long sentence in MXY.

In (11.51), it seems that clause boundaries prevent floating tones from associating to the right.

11.51 No float across clause boundary

Kō	βāsì	ná ⁿ ǒíkō	nō ⁿ	fī	jūtē ⁿ
ko ^(M)	βasi ^{LH}	na ⁿ ǒiko ^{LM}	no ^{n(L)}	fī ^(M)	jute ^{nML}
but	not	become angry	2MS	because	tomorrow
<i>but don't get angry because tomorrow.....</i>					

Here we see that the floating Low tone sponsored by *no*^(L) 2MS, does not float across a clause boundary, thus *fī*^(M) ‘because’ has a surface Mid tone, which we assume is an inserted default tone.

On the other hand in (11.52), we see that the floating Low tone of *no*^(L) 2MS associates with the complementiser *ha*^(LH) and the Low tone of the complementiser associates with the verb *kasì*^(MH).

11.52 Tones float across clause boundaries

nū ⁿ	jù [?] ú ⁿ	nó ⁿ	hà	kàsì	ní ⁿ	ìtē
nu ^{nLH}	ju [?] u ^{nMH}	no ^{n(L)}	ha ^(LH)	kasi ^{MH}	ni ^{n(L)}	ite ^{ML}
face	land	2MS	COMP	eat	I	grass
<i>...to your land in order to eat grass</i>						

The reason why tones cross clause boundaries in some cases but not in others is still to be determined. Nevertheless the data in (11.51) and (11.52) illustrate the different options found in MXY. The question therefore remains as how best to define the domain of tonal processes.

11.3. The syntax-phonology interface in MXY

We now turn to look at what the data from MXY contributes to the discussion of the syntax-phonology interface. We have already seen, for example in the data in (11.52), that tones can float across clause boundaries. In this section we first look at different ways that have been posited for how phonology and syntax interact; secondly, we look at MXY under these different views; and finally we look at some principles which govern tonal association across word boundaries and phrase boundaries.

Theories about the phonology-syntax interface can be divided into two main groups: one group claims that phonological processes have direct reference to

syntactic information, such as government; the other group claims that there is a separate hierarchical representation, called Prosodic Structure. The constituents in the prosodic structure are formed from syntactic constituents, but phonological processes refer to prosodic, rather than syntactic constituents.²

11.3.1. The Direct Reference model

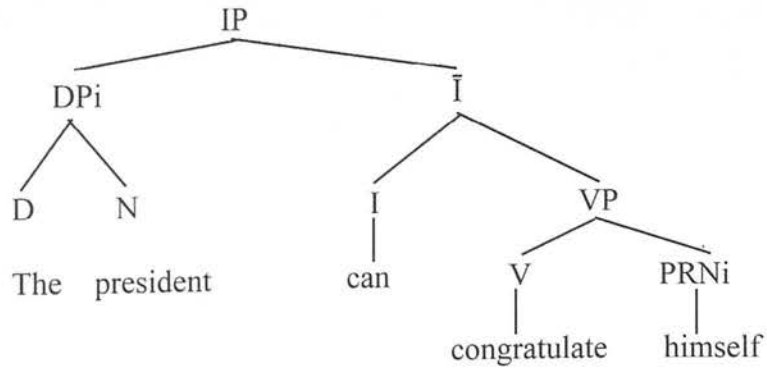
First we look at what is proposed by the Direct Reference Theory. One of the early proponents of these ideas is Kaisse (1985). She claims that for tonal sandhi to occur between words, these words must be in a c-command relationship. The notion of c-command is to be found in the work of those who follow a Government and Binding or a Minimalist approach to syntax, for example, Radford 1997. This approach is sometimes referred to as X-bar theory. Radford defines c-command as stated in (11.53).

11.53 C-command (from Radford 1997)

A node X c-commands another node Y if the mother of X dominates Y, and X and Y are disconnected (X and Y are disconnected if $X \neq Y$ and neither dominates the other).

In order to understand this process, in (11.54) we give a tree diagram from Radford (1997).

11.54



² An excellent overview of the theories is to be found in Elordieta (2008).

First, looking at the data we see that the pronoun 'himself' at the right of the diagram agrees grammatically with the noun 'the president' at the left-hand side of the diagram. The idea of c-command is invoked in this syntactic model to account for grammatical agreement – and indicated in diagrams by subscript indices.

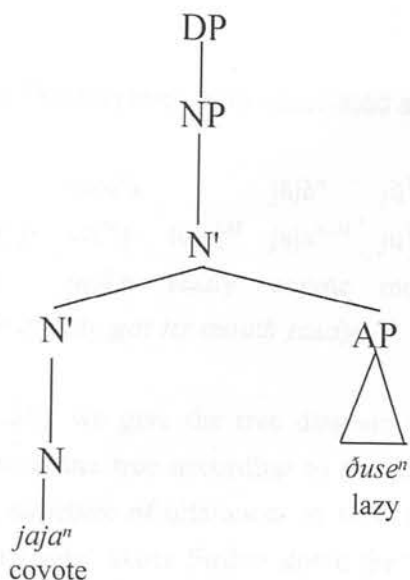
Radford (1997) explains the notion of c-command in 'lay-man's' terms by comparing the structural trees to a network of train stations. He explains that X and Y are in a c-command relationship if you can get from X to Y by catching a northbound train, getting off at the first station and catching a south-bound train on a different line. So in the tree diagram in (11.54), the determiner phrase 'the president' c-commands the pronoun 'himself', as travelling north from DP, one reaches IP, and then the node labelled PRN is the last 'station' on the southern line.

Since Kaisse's proposal, there have been modifications to the original idea: for example, that the words in question must mutually c-command each other; that is, A c-commands B, and B also c-commands A. However, the basic principle is that for external sandhi – that is, sandhi between two words – to occur, the two words have a certain syntactic relationship.

We now turn to examine data from MXY to see if external sandhi occurs when one word c-commands another. In MXY we show that although different types of phrases have the same syntactic structure, the tonal phenomena are different. This is shown in (11.55) and (11.56). In (11.55) we see a phrase which comprises a noun and an adjective. In this case the noun c-commands the adjective and the adjective c-commands the noun.

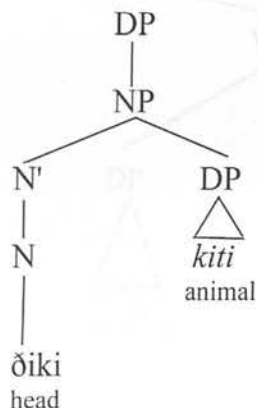


11.55 Noun plus adjective 'lazy coyote'



In (11.56) we give a genitival phrase comprising two nouns. Again both words c-command each other.

11.56 Genitival phrase 'the animal's head'



However, the tonal phenomena are different in each of these two kinds of phrases: Low tones spread in noun plus adjective phrases but not in genitival phrases. In other words, the same syntactic construction is no guarantee the tonal phenomena will be the same. When considering longer utterances of more than one phrase, we see that elements from one phrase c-command another. In (11.57), we give data which show that tones float across syntactic phrase boundaries: that is,

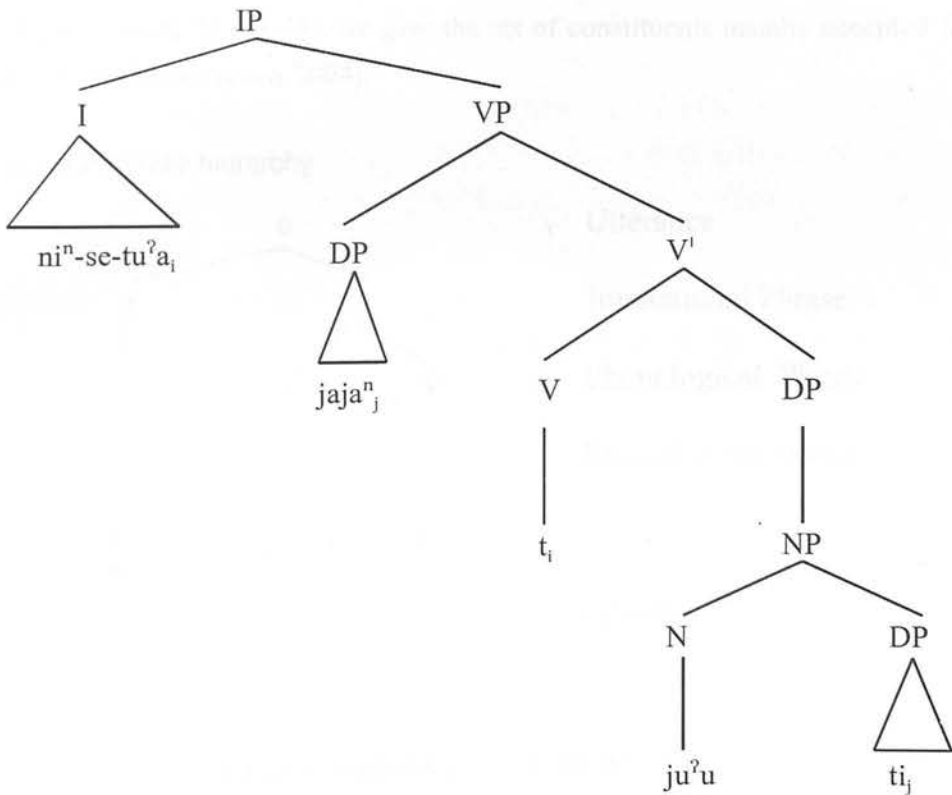
between the noun phrase subject *jaja*^{nLH} ‘coyote’ and the object *ju*^{2uMH} *ti*^(H) ‘its mouth’.

11.57 Floating High tone associated across a phrase boundary

niⁿ- sètū^{2à} jājàⁿ jù^{2ú} tí
ni^{n(L)}- se^(M)- tu^{2aLM} jāja^{nLH} ju^{2uMH} ti^(H)
PFV make ready coyote mouth 3AN
The coyote got its mouth ready.

In (11.58), we give the tree diagram for the data in (11.57). Note that this time, we draw the tree according to the presuppositions of X-Bar theory that the underlying structure of utterances in VSO languages is SVO, so that the verb *ni*ⁿ-*se*-*tu*^{2a} ‘got ready’ starts further down the tree and moves up; this is indicated by the trace *t* in the original position and indexed with *i* as the verb in its new position. Note that *jaja*^{nLH} ‘coyote’ and the pronoun *ti*^(H) 3AN are co-indexed with a *j* showing that the pronoun refers to *jaja*^{nLH}.

11.58 Structure of a VSO sentence

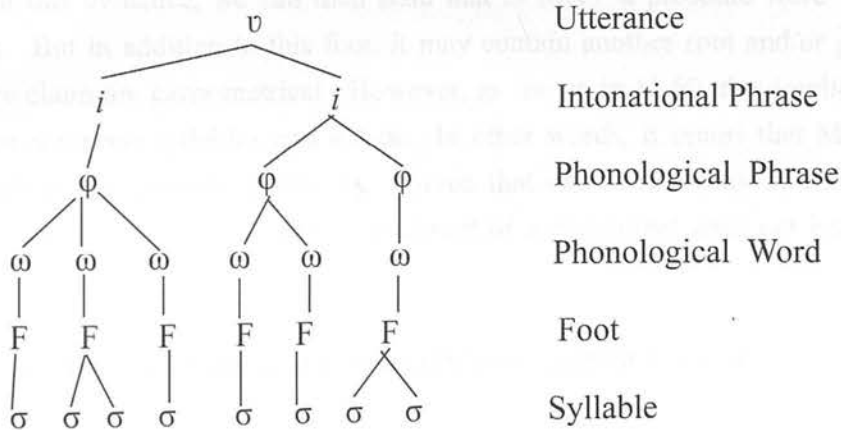


In this sentence, the word *jaja*^{LH} ‘coyote’ does c-command *ju*^{2MH} ‘mouth’. The surface tonal phenomena, however, are different from that of genitival phrases and from that of noun plus adjective. It would be possible to argue that the tonal phenomena are different in this case because the two words ‘coyote’ and ‘mouth’ are not adjacent in the deep structure. But that solution would not solve the problem that noun plus adjective phrases show different tonal phenomena from genitival phrases. In other words, words or phrases can both be in what is called a c-command relationship yet the surface tonal phenomena are different. That is, being in a c-command relationship does not adequately predict what the surface tonal association is, as there is more than one possible outcome. Some other theoretical construct is required to be able to differentiate these different kinds of phrases.

11.3.2. The Prosodic Structure model

We now turn to look at the Prosodic Hierarchy theory, which claims that phonological rules do not have direct access to the syntax. Under this proposal, prosodic constituents are built from syntactic ones, but phonological rules apply to the prosodic constituents not the syntactic ones. In this model there is a limited set of constituent levels. In (11.59), we give the set of constituents usually accepted for English, (from Gussenhoven 2004).

11.59 Prosodic hierarchy



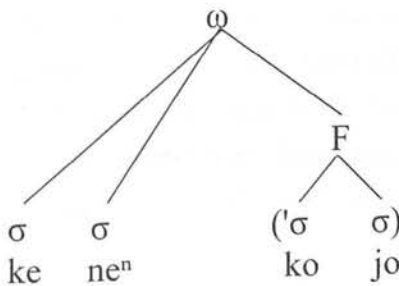
According to the Strict Layer Hypothesis, constituents comprise units from the level immediately below. This means that skipping levels is not permitted; so for

example, only words can be sub-units of phrases. Another important principle is that constituents are not permitted to contain constituents from the same level; for example, a phonological word cannot have another phonological word as one of its sub-units. However, Ladd (2008) convincingly argues for the need for recursion: that is, units to contain other units from the same level, for example permitting phrases to be a sub-unit of another phrase.

Having outlined the basics of Prosodic Structure we now look at some important features of the theory. Under this model, syntactic constituents are built into prosodic constituents. Phonological processes refer to these prosodic constituents, not syntactic ones. So for example, often there are features which mark the boundary of a prosodic phrase. Ladd (2008) points out that there must be phonological and phonetic grounds for the division of utterances into prosodic constituents. However, as Ladd (2008) points out, there is often mismatch between prosodic and syntactic constituents, or to put it another way, the pause breaks in speech do not always correspond to the edge of some syntactic constituent. This is then good evidence that prosodic constituents and syntactic ones are not isomorphic.

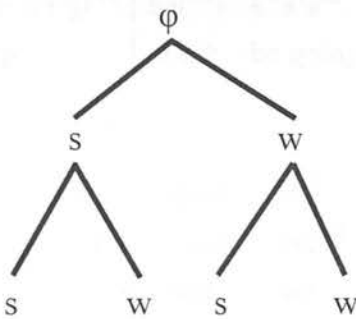
We now turn to evidence in MXY for prosodic units. First we look at prosodic words. In Chapter 9 we showed that the initial syllable of disyllabic roots is stressed. In Chapter 10, we also showed that for compounds which comprise two roots, it is the initial syllable of the second element which is stressed. That is, in compounds there is only one foot, with stress on the first syllable of the foot. Based on this evidence, we can then state that in MXY a prosodic word contains one foot. But in addition to this foot, it may contain another root and/or prefixes. These we claim are extra-metrical. However, as shown in 11.60, this implies that a word can comprise syllables and a foot. In other words, it seems that MXY can skip levels in the prosodic hierarchy. Given that extra-metricity is attested for other languages, we claim that the initial root of a compound does not bear stress and so is not parsed.

11.60 Prosodic structure of a compound word 'appear in a rush'



We now look at evidence for prosodic phrases in MXY. There are many phrases – for example, when a noun occurs as the subject of a sentence – that contain just one word. We have also seen evidence for two-word phrases based on tonal phenomena. Preliminary acoustic evidence shows that for genitival phrases, both words are parsed into feet, but the initial syllable of the initial word shows the greatest duration and is perceived as stronger. In (11.61) we show the relative prominence of syllables of a genitival phrase, assuming that it comprises two nouns, each with two syllables. Note that each noun preserves the word stress, but that the first noun shows overall prominence.

11.61 Prominence relationships of a genitival phrase



These preliminary observations are noteworthy in that they are different from what we showed for compound words in Chapter 10. In the case of compounds comprising two roots, it is the initial syllable of the second element that bears the word stress. The initial element carries no stress. However, in the case of genitival phrases both words are parsed into feet, each with the initial syllable showing increased duration.

Whether this structure holds true for other kinds of phrases, such as noun plus adjective, has yet to be ascertained. One problem for such research is that many adjectives have one heavy syllable. However whatever the metrical structure of these other phrases, the fact remains that for the phonology to assign the correct tone pattern, it needs to know the syntactic relationship between the two elements as not all phrase types show the same tonal phenomena.

In recorded material, for example the two texts included in Appendix D, it is difficult to determine intonational phrase boundaries. The issue here is that tones may spread from one phrase to the next, or floating tones sponsored by one phrase

may float to the next phrase and even from one clause to the next. In 11.62, we give an example of a run-on sentence from the text 'The Bully'. Vertical lines which extend beyond the rows of glossed text indicate clause breaks.

11.62 Examples of tones crossing constituent boundaries

a) Nē[?]eⁿ nùù jútéⁿ nìⁿ- nùkū-nēē tūkú ástō[?]ō
 ne[?]e^{nML} nuu^{MH} jute^{nML} ni^{n(L)}- nuku^{MH}_nee^{MH} tuku^M asto^{?L}o^{ML}
 early day tomorrow PFV set off again owner

b) t̥i^kàt̥i^l há k^wá[?]àⁿ tùkū ðē jùkū nī[?]í tí
 t̥i^(H)- ka^Lt̥i^{MH} ha^(LH) k^wa[?]a^{nL} tuku^M ðe^(L) juku^{MH} ni[?]i^M ti^(H)
 sheep COMP be going again 3MMS pasture with 3AN

c) k^wéná hà βásì kùú tī ðókō
 k^wena^{HL} ha^(LH) βasi^{LH} kuu^{ML} ti^(H) ðoko^{LM}
 so COMP not die 3AN hunger

Early the next morning the owner of the sheep set off again with the sheep so that they wouldn't die of hunger.

These data show how neither floating tones nor the spreading of tones are confined by clause or phrase boundaries. For example in (11.62b), the floating High tone of *t̥i^(H)- ka^Lt̥i^{MH}* 'sheep' associates with the complementiser which, at least syntactically speaking, is in a different clause. In (11.62c), the floating High tone associated with *ti^(H)* the last element in (11.62b) either spreads to *k^wena^{HL}* 'so', or the floating High tone sponsored by *ti^(H)* associates with it. Again we see that syntactic clause boundaries are no barrier to floating tones. A similar phenomenon is seen at the phrase level; for example in (11.62b), the floating High tone sponsored by *juku^{MH}* 'pasture' associates with the preposition *ni[?]i^M* 'with', which is in a separate syntactic phrase.

Utterances, on the other hand, have a clear end point, usually marked by lengthening of the final syllable, followed by pause. If the final morpheme has a High Low or a Mid Low tone pattern associated with it, then there is an audible down-glide.

Although there is evidence for prosodic constituent boundaries having a role to play in a few phrase types, for example noun plus adjective, it seems that the most important factor which influences the surface tones is the underlying tones of the words and morphemes in the utterance. More research is needed to be able to better explain the tonal domains which are relevant to MXY. One issue is that different types of syntactic phrases have different tonal associations. One clue that might aid in determining prosodic domains is that it is only in certain contexts that Low tones that are multiply-linked are raised. However, the practical problem is how to obtain the recorded data as it seems that these Low tones are only raised if the second element is in pragmatic focus. By examining both of these models on the interface between syntax and phonology, we see that neither theory provides a completely satisfying explanation for the phenomena of MXY.

11.4. SUMMARY OF RESEARCH

In this final section, we highlight some of the findings documented in this thesis, highlighting the new insights which come from our research.

11.4.1. Proto-Mixtec

In Chapter 5 we argued that Proto-Mixtec had two tone levels which in present day varieties correspond to Low and Mid. It is very likely that some words in Proto-Mixtec had a final glottal stop, preserved at least in part in MIY and MEH. We propose that High tone is an innovation, corresponding on the whole to final glottal stop, but also in loan words to the stressed syllable of Spanish in loan words, although in some varieties of Mixtec the High tone is associated with the mora to the right of the stressed syllable in Spanish.

This analysis differs from Longacre (Longacre 1957) who posited 3 tone levels for Proto-Mixtec. Dürr (Dürr 1987) posited two tone levels plus the feature [modify], to account for sandhi forms. We consider that tone sandhi can be accounted for by positing the presence of floating tones which then associate to the morpheme to the right.

We claim that these floating tones are a result of tone shift whereby tones, instead of associating with the first tone bearing unit of a disyllabic word, associate with the second. Thus for words which sponsor two tones, the second tone often becomes a floating tone, unless a tonal contour on a single mora is permitted.

Another contribution to the study of Mixtec varieties is that by positing tone shift and through a careful comparison of data from 12 varieties, we showed that mono-morphemic words in Mixtec varieties belong to one of six categories whose membership is remarkably stable across different Mixtec varieties. Although the surface tones in each category may vary in the present day varieties, we claim that on the whole, this is a result of tone shift. This analysis of Mixtec tonal phenomena can then be used as a basis for further research because the word list used gives clues as to which words may have floating tones. Also as floating tones may only appear in certain syntactic environments, for example as documented by Mak (1953) and Mak (1958), then the tonal phenomena have to be checked in a number of different syntactic environments.

11.4.2. Mixtec syllable structure

Unlike Pike who documented CV: words as comprising two syllables, we consider that these words are best considered mono-syllabic but bimoraic. We show that Pike's argument, based on the absence of contour tones on short vowels, although true for MIG, does not hold for other varieties, including MXY. We consider that words must have at least two moras, either formed by one heavy syllable or two light ones.

One outcome of this analysis of CV: words as mono-syllabic but bimoraic is the proposal that it is the mora, rather than the syllable, that is the tone bearing unit in MXY, and possibly in other varieties. We noted that in MXY, there is no correlation between the number of moras sponsored by a word or morpheme and the number of tones it sponsors; for example the complementiser *ha*^(LH) sponsors two tones, whereas the disyllabic word *kunu*^M 'run' sponsors only one. There are even some secondary stems which are toneless, as described in Chapter 8.

11.4.3. MXY tone inventory

Although in many languages it is possible to 'zero-out' a tone level, we give evidence in Chapter 5 that in MXY there are underlying High, Mid and Low tones. We show that underlying Mid participates in phonological processes that the default tone does not, even though acoustically underlying Mid and default are indistinguishable. This analysis differs from the analysis for MIL by Daly and Hyman (Daly and Hyman 2007) in which they show that there are only High and Low tones in the underlying form. Their analysis is based in part on the fact that Mid tones are transparent; that is, for the purpose of phonological processes, tones

are considered to be adjacent, even though they are separated on the surface by a Mid tone.

We also showed that the allotone of Low in High Low High sequences and in High Low Mid sequences is phonetically indistinguishable from an underlying Mid tone. So surface Mid tones may be the manifestation of three options: one, underlying Mid; two, inserted default; or three, the allotone of Low. This implies that in order to determine which of these three options applies to any surface Mid tone, careful research is needed to determine what are the underlying tones of the words and morphemes in the utterance.

11.4.4. Tone and prosodic prominence

The research presented in Chapter 9 confirms the work of other researchers such as Alexander (1980) that the initial syllable of disyllabic words carries stress. In Chapter 9 we presented acoustic analysis to show that these initial syllables show increased duration. In that chapter, we also showed that under certain focus conditions the initial syllable may lose the increased duration. We also presented data in Chapter 10 which showed that prefixes are not stressed in MXY.

The data presented in this thesis on the tonal phenomena of MXY show that High tones often associate with the second mora of a word; that is, they skip the stressed syllable. In fact data presented in this thesis show that for MXY there is no correlation between High tone and the stressed syllable, even though such a correlation was posited for MIY by de Lacy (de Lacy 1999) using data from Pankratz and EV Pike (1967). The relationship between stressed syllables and High tone is attested for other languages, see Yip (2002). The hypothesis that prominent syllables prefer High tones and non-prominent prefer Low has been shown to not apply to MXY.

We have also shown data in which High tones are deleted, but Mid or Low tones retained. Pulleyblank (2004) points out that in some languages it is worse to delete a High tone than it is a Low or a Mid tone, and that the tone that can be most easily deleted is often the one that is most often inserted. Here again the data from MXY run contrary to these assertions. First the only tone that can be inserted is a default tone, which phonetically sounds like Mid. All occurrences of High, Low and Mid in the surface forms correspond to an underlying High, Low or Mid, unless we are talking about a Low tone that is raised to Mid as it occurs in either the sequence High Low High or High Low Mid. Secondly, as was documented in Chapter 8, verbs which sponsor a Low High tone melody lose the High tone in

their secondary stems, and retain the Low. On the other hand, verbs which sponsor a Low Mid tone melody retain both the Low and the Mid tone throughout, although the Low tone is often raised to Mid if it occurs as part of a High Low Mid sequence. In other words, the idea of a tonal prominence scale such as that proposed by de Lacy (de Lacy 2002b) and shown in (11.63), and the constraints shown in (11.64) that heads prefer High tones and Low refers non-heads do not hold for MXY.

11.63 Tonal prominence scale

$$H > M > L$$

11.64 Preference of association of Heads and Non-Heads

$$*HD/L \gg *HD/M \gg *HD/H$$

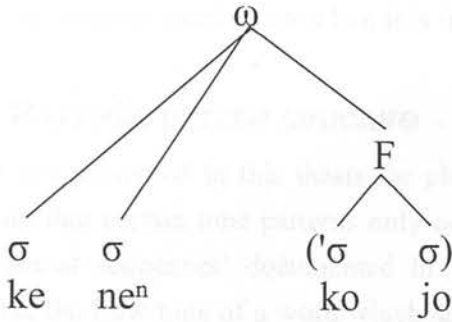
$$*NONHD/H \gg *NONHD/M \gg *NONHD/L$$

We therefore claim that in MXY that the placement of stress does not depend on the tonal properties of the mora. Or to put it in other words, we have found no correlation between tonal association and stress.

11.4.5. Words in MXY

The analysis presented in this thesis increases the possible word templates for MXY. Unlike Bradley and Hollenbach (1998), we show that there are multi-morphemic words in MXY, presenting durational evidence in Chapter 10 to show that there are compounds. We show that there is a minimal word constraint in that a word must be at least bimoraic: that is, either two light syllables or one heavy syllable, to account for CV: words with identical vowels. We show how compound verbs are distinguished from phrases in that in compounds, it is the initial syllable of the second root which shows word stress as shown in (11.65).

11.65 Structure of a compound verb



There are three features which enable us to differentiate between verbal compounds and phrases in MXY: one, whether the adverb *tuku*^M ‘again’ can be inserted between the elements; two, tonal phenomena, for example the spread of Low tone, or the occurrence of the adverbial form of a noun which is only distinguishable from the noun by tone; and three, the syllable which is stressed.

Although we did not present any acoustic evidence to substantiate the claim, we showed that in nouns which comprise a prefix and a root, it is the initial syllable of the root which has word stress.

The tonal and prosodic phenomena associated with compounding in MXY merits more research especially as some compounds in MXY are phrases in other varieties of Mixtec.

11.4.6. Verbal morphology

The tonal phenomena of MXY show an extremely complex system. To explain the apparent idiosyncratic behaviour of the association of floating High tones sponsored by different verbal prefixes, in Chapter 8 we propose that some verbs have secondary stems which co-occur with the subjunctive, the imperfective, the negative and the derivational prefix *ɗa*^(H)- CAUS. We also showed that prefixes do not receive stress, but that increased duration is only manifest on the verb root. Data also shows that as the number of prefixes increases, the duration of both the syllables of the verb root and the prefixes decreases.

11.4.7. Stress and focus

In Chapter 10, we saw data to show that words may be de-accented when the pragmatic focus of the utterance is on some other word. We also showed in Chapters 9 and 10 that the adverb *tuku*^(M) ‘again’ does not always receive word stress. More research is needed to determine the contexts in which *tuku*^(M) ‘again’

receives word stress and when it does not. One possible hypothesis is that *tuku*^(M) 'again' only receives word stress when it is in focus.

11.4.8. Prosodic phrase structure

The evidence presented in this thesis for phrase structure comes mainly from the observation that certain tone patterns only occur in certain syntactic contexts, akin to the 'special sequences' documented in Mak (1953 and 1958). As shown in Chapter 10, the Low tone of a word which sponsors a High Low melody spreads to both moras of a word with a Mid or a Mid High melody, if the data in question form certain kinds of phrases, for example a noun plus a modifying adjective, but this tone spread does not happen in genitival phrases nor where there is a syntactic phrase boundary. As was shown in Section 11.3 above, although Kaisse (Kaisse 1985) and others have documented certain sandhi features which occur between words when they are in a c-command relationship, this does not apply to MXY. Instead we propose that prosodic phrase structure must know the syntactic relationship between the two elements in order to correctly link underlying tones to the surface forms.

Preliminary evidence for genitival phrases shows how each word in the phrase is parsed, but that the duration of the first syllable of the first word is the longest. That is, for genitival phrases it is the first root which is prominent. The opposite prominence is seen in compounds where it is the second element which receives the word stress.

The occurrence of the prohibited sequence High Low High across morpheme or word boundaries is indicative of the two elements being in the same prosodic constituent, as this sequence does not occur across constituent boundaries. This is an area which needs more research. For example, preliminary studies indicate that High Low High is permitted in Noun plus Adjective phrases when the adjective has a restrictive meaning. However, when the adjective has a non-restrictive meaning High Low High does not occur. Acoustic data is needed to determine whether in these cases the Low is raised to Mid, or whether the High tone is lowered.

11.4.9. Underlying tones

In Section 11.2, we documented the various phonological processes that govern the association of underlying tones. As we have indicated in various places in this thesis, the underlying tones have a key role to play. For example, floating High tones do prefer to align at the right edge, but if a Low tone is already associated

there, then the High will align with the initial syllable. We have also seen that the spread of Low tone occurs in certain kinds of phrases. However, this process only takes place when the first element of the phrase has a Low High tone melody and the second a Mid or a Mid High tone pattern.

11.5. FINAL REMARKS

This thesis has documented the interaction of underlying tones, prominence and prosodic structure in MXY. It has shown that in MXY there are a number of factors which have a role to play in how the underlying tones are associated and result in the surface form. There are still issues to solve, such as determining the acoustic properties of different phrase types, as well as possible surface tonal differences. Nevertheless, the data and the analysis presented here show the complexity of MXY tonology in the light of acoustic analysis.

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Appendix A

List of abbreviations based on the abbreviations given in the Leipzig Standard Glossing rules. An asterisk beside an item indicates that this abbreviation comes from Shopen (2007). When neither the Leipzig list, nor Shopen had an abbreviation for a category in MXY, we determined our own, selecting a form that was not used by either list for something else. These categories have two asterisks.

1	first person
2	second person
3	third person
A	subject of a transitive verb *
ADJ	adjective
ADV	adverbial
AN	animal**
AUX	auxiliary
CAUS	causative
CLF	classifier
COL	collective **
COMP	complementiser
CON	contrastive **
COND	conditional
CONJ	conjunction*
CTR	counterfactual**
DEI	deity **
DEM	demonstrative
DIR	directional *
EMPH	emphatic
ENCL	enclitic
F	feminine
FS	feminine speech, this form is only used by female speakers **
G	general **
HABIT	habitual *
HON	honorific *
IMP	imperative

INCL	inclusive
INTENS	intensifier *
IPFV	imperfective
IRR	irrealis
LIM	limiter, 'only' 'just'
LOC	locative
LQ	liquid **
M	masculine
MS	masculine speech, this form is only used by male speakers **
NEG	negative
NMLZ	nominalizer
OBJ	object
P	object of transitive verb
PFV	perfective
PL	plural
PRCL	proclitic
PRED	predicative
PREP	preposition *
PRF	perfect
PROG	progressive
PROH	prohibitive
PROX	proximal
Q	question particle/marker
RECP	reciprocal
REL	relative
REPET	repetitive *
S	subject of an intransitive verb
SBJV	subjunctive

Appendix B:1

Ethnologue codes for Mixtec varieties sorted by language name

Mixtec,	Alacatlazala	[mim]	Mixtec,	Pinotepa Nacional	[mio]
Mixtec,	Alcozauca	[xta]	Mixtec,	San Juan Colorado	[mjc]
Mixtec,	Amoltepec	[mbz]	Mixtec,	San Juan Teita	[xtj]
Mixtec,	Apasco-Apoala	[mip]	Mixtec,	San Miguel el Grande	[mig]
Mixtec,	Atatláhuca	[mib]	Mixtec,	San Miguel Piedras	[xtp]
Mixtec,	Ayutla	[miy]	Mixtec,	Santa Lucía Monteverde	[mdv]
Mixtec,	Cacaloxtepec	[miu]	Mixtec,	Santa María Zacatepec	[mza]
Mixtec,	Chayuco	[mih]	Mixtec,	Silacayoapan	[mks]
Mixtec,	Chazumba	[xtb]	Mixtec,	Sindihui	[xts]
Mixtec,	Chigmecatitlán	[mii]	Mixtec,	Sinicahua	[xti]
Mixtec,	Coatzospan	[miz]	Mixtec,	Southeastern Nochixtlán	[mxy]
Mixtec,	Cuyamecalco	[xtu]	Mixtec,	Southern Puebla	[mit]
Mixtec,	Diuxi-Tilantongo	[xtd]	Mixtec,	Southwestern Tlaxiaco	[meh]
Mixtec,	Huitepec	[mxs]	Mixtec,	Soyaltepec	[vmq]
Mixtec,	Itundujia	[mce]	Mixtec,	Tacahua	[xtt]
Mixtec,	Ixtayutla	[vmj]	Mixtec,	Tamazola	[vmx]
Mixtec,	Jamiltepec	[mxt]	Mixtec,	Tezoatlán	[mxb]
Mixtec,	Juxtlahuaca	[vmc]	Mixtec,	Tidaá	[mtx]
Mixtec,	Magdalena Peñasco	[xtn]	Mixtec,	Tijaltepec	[xtl]
Mixtec,	Metlatónoc	[mxv]	Mixtec,	Tlazoyaltepec	[mqh]
Mixtec,	Mitlatongo	[vmm]	Mixtec,	Tututepec	[mtu]
Mixtec,	Mixtepec	[mix]	Mixtec,	Western Juxtlahuaca	[jmx]
Mixtec,	Northern Tlaxiaco	[xtn]	Mixtec,	Yoloxóchitl	[xty]
Mixtec,	Northwest Oaxaca	[mxa]	Mixtec,	Yosondúa	[mpm]
Mixtec,	Ocotepc	[mie]	Mixtec,	Yucuañe	[mvg]
Mixtec,	Peñoles	[mil]	Mixtec,	Yutanduchi	[mab]

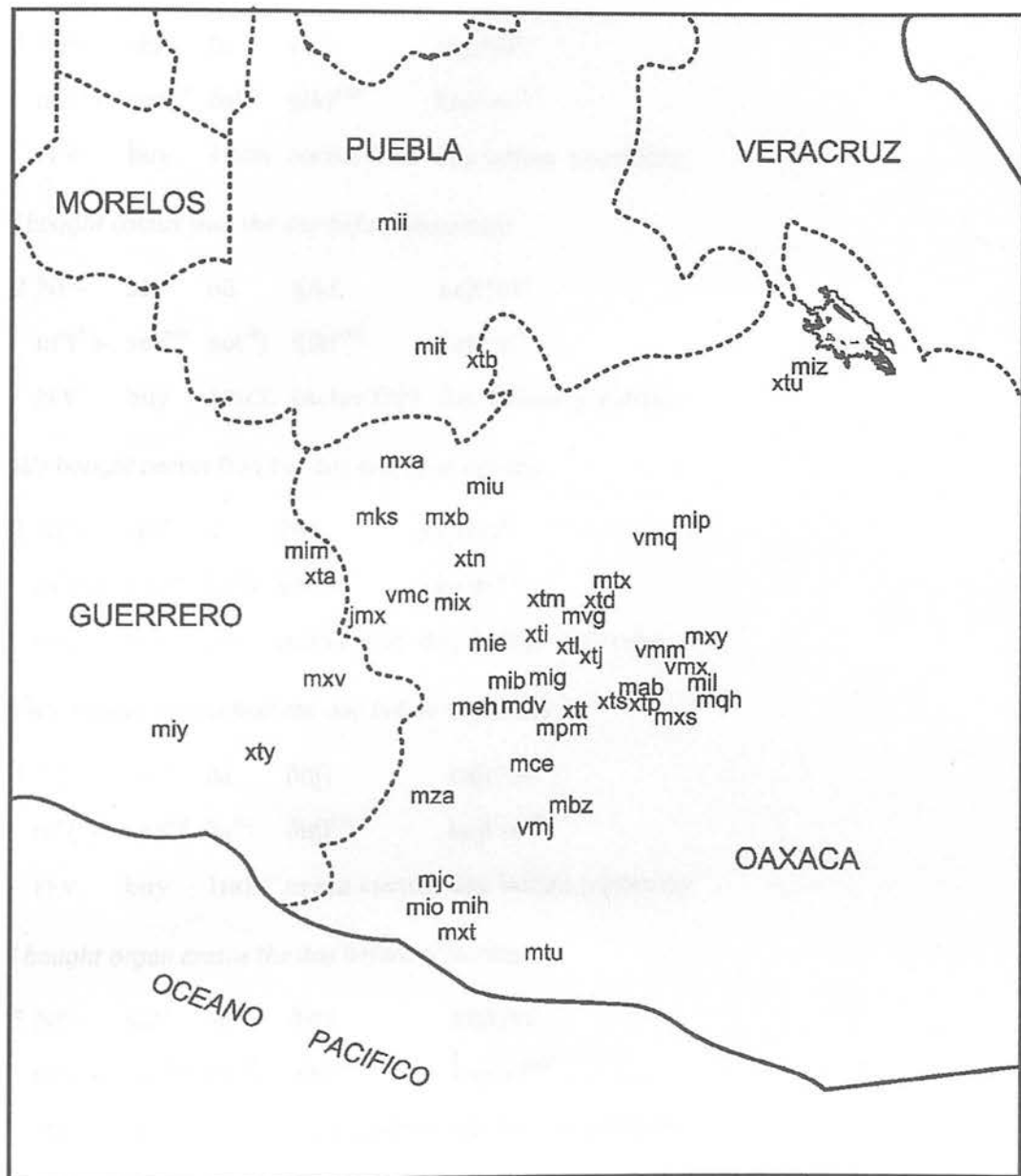
Appendix B:2

Ethnologue codes for Mixtec varieties sorted by code letters

Mixtec,	Western Juxtlahuaca	[jmx]	Mixtec,	Yucuañe	[mvg]
Mixtec,	Yutanduchi	[mab]	Mixtec,	Northwest Oaxaca	[mxa]
Mixtec,	Amoltepec	[mbz]	Mixtec,	Tezoatlán	[mxb]
Mixtec,	Itundujia	[mce]	Mixtec,	Huitepec	[mxs]
Mixtec,	Santa Lucía Monteverde	[mdv]	Mixtec,	Jamiltepec	[mxt]
Mixtec,	Southwestern Tlaxiaco	[meh]	Mixtec,	Metlatónoc	[mxv]
Mixtec,	Atatláhuca	[mib]	Mixtec,	Southeastern Nochixtlán	[mxy]
Mixtec,	Ocoatepec	[mie]	Mixtec,	Santa María Zacatepec	[mza]
Mixtec,	San Miguel el Grande	[mig]	Mixtec,	Juxtlahuaca	[vmc]
Mixtec,	Chayuco	[mih]	Mixtec,	Ixtayutla	[vmj]
Mixtec,	Chigmecatitlán	[mii]	Mixtec,	Mitlatongo	[vmm]
Mixtec,	Peñoles	[mil]	Mixtec,	Soyaltepec	[vmq]
Mixtec,	Alacatzalza	[mim]	Mixtec,	Tamazola	[vmx]
Mixtec,	Pinotepa Nacional	[mio]	Mixtec,	Alcozauca	[xta]
Mixtec,	Apasco-Apoala	[mip]	Mixtec,	Chazumba	[xtb]
Mixtec,	Southern Puebla	[mit]	Mixtec,	Diuxi-Tilantongo	[xtd]
Mixtec,	Cacaloxtotec	[miu]	Mixtec,	Sinicahua	[xti]
Mixtec,	Mixtepec	[mix]	Mixtec,	San Juan Teita	[xtj]
Mixtec,	Ayutla	[miy]	Mixtec,	Tijaltepec	[xtl]
Mixtec,	Coatzacoapan	[miz]	Mixtec,	Magdalena Peñasco	[xtm]
Mixtec,	San Juan Colorado	[mjc]	Mixtec,	Northern Tlaxiaco	[xtn]
Mixtec,	Silacayoapan	[mks]	Mixtec,	San Miguel Piedras	[xtp]
Mixtec,	Yosondúa	[mpm]	Mixtec,	Sindihui	[xts]
Mixtec,	Tlazoaltepec	[mqh]	Mixtec,	Tacahua	[xtt]
Mixtec,	Tututepec	[mtu]	Mixtec,	Cuyamecalco	[xtu]
Mixtec,	Tidaá	[mtx]	Mixtec,	Yoloxóchitl	[xty]

B: 3 Map of the Mixtec Region of Southern Mexico

(drawn by S Graham)



Appendix C

C.1 Elicitation list for Chapter 6 and for Chapter 9 Experiment 1

1 Nīⁿ- sèēⁿ ḍá tʃíkí kájì↑nīⁿ
 ni^{n(L)}- see^{nM} ḍa^{HL} tʃíkí^{MH} kaji^Lni^{nM}
 PFV buy 1HON cactus fruit day before yesterday

I bought cactus fruit the day before yesterday.

2 Nīⁿ- sèēⁿ nō tʃíkí kájì↑nīⁿ
 ni^{n(L)}- see^{nM} no^(H) tʃíkí^{MH} kaji^Lni^{nM}
 PFV buy 1INCL cactus fruit day before yesterday

We bought cactus fruit the day before yesterday.

3 Nīⁿ- sèēⁿ sī tʃíkí kájì↑nīⁿ
 ni^{n(L)}- see^{nM} si^(H) tʃíkí^{MH} kaji^Lni^{nM}
 PFV buy 3G cactus fruit day before yesterday

They bought cactus fruit the day before yesterday

4 Nīⁿ- sèēⁿ ḍá ðítʃí kájì↑nīⁿ
 ni^{n(L)}- see^{nM} ḍa^{HL} ðítʃí^{LH} kaji^Lni^{nM}
 PFV buy 1HON organ cactus day before yesterday

I bought organ cactus the day before yesterday.

5 Nīⁿ- sèēⁿ nō ðítʃí kájì↑nīⁿ
 ni^{n(L)}- see^{nM} no^(H) ðítʃí^{LH} kaji^Lni^{nM}
 PFV buy 1INCL organ cactus day before yesterday

We bought organ cactus the day before yesterday.

6 Nīⁿ- sèēⁿ sī ðítʃí kájì↑nīⁿ
 ni^{n(L)}- see^{nM} si^(H) ðítʃí^{LH} kaji^Lni^{nM}
 PFV buy 3G organ cactus day before yesterday

They bought organ cactus the day before yesterday.

7 Nĩⁿ- sèēⁿ ǎ́ ǎ́tá kájìníⁿ
 ní^{n(L)}- sec^{nM} ǎ́^{HL} ǎ́tá^{LH} kájìníⁿ
 PFV buy 1HON tortilla day before yesterday

I bought tortillas the day before yesterday.

8 Nĩⁿ- sèēⁿ nō ǎ́tá kájìníⁿ
 ní^{n(L)}- sec^{nM} no^(H) ǎ́tá^{LH} kájìní^{nM}
 PFV buy 1INCL tortilla day before yesterday

We bought tortillas the day before yesterday.

9 Nĩⁿ- sèēⁿ sí ǎ́tá kájìníⁿ
 ní^{n(L)}- sec^{nM} sí^(H) ǎ́tá^{LH} kájìní^{nM}
 PFV buy 3G tortilla day before yesterday

They bought tortillas the day before yesterday.

10 Nĩⁿ- sèēⁿ ǎ́ kíǎ́ kájìníⁿ
 ní^{n(L)}- sec^{nM} ǎ́^{HL} kíǎ́^{LM} kájìníⁿ
 PFV buy 1HON cooking pot day before yesterday

I bought a cooking pot the day before yesterday.

11 Nĩⁿ- sèēⁿ nō kíǎ́ kájìníⁿ
 ní^{n(L)}- sec^{nM} no^(H) kíǎ́^{LM} kájìníⁿ
 PFV buy 1INCL cooking pot day before yesterday

We bought a cooking pot the day before yesterday.

12 Nĩⁿ- sèēⁿ sí kíǎ́ kájìníⁿ
 ní^{n(L)}- sec^{nM} sí^(H) kíǎ́^{LM} kájìníⁿ
 PFV buy 3G cooking pot day before yesterday

They bought a cooking pot the day before yesterday.

13 Nĩⁿ- sèēⁿ ðá kītī kájì↑nĩⁿ
niⁿ(^L)- see^{nM} ða^{HL} kiti^{MH} kaji^Lni^{nM}
PFV buy 1HON animal day before yesterday

I bought animals the day before yesterday.

14 Nĩⁿ- sèēⁿ nō kītī kájì↑nĩⁿ
niⁿ(^L)- see^{nM} no(^H) kiti^{MH} kaji^Lni^{nM}
PFV buy 1INCL animal day before yesterday

We bought animals the day before yesterday.

15 Nĩⁿ- sèēⁿ sī kītī kájì↑nĩⁿ
niⁿ(^L)- see^{nM} si(^H) kiti^{MH} kaji^Lni^{nM}
PFV buy 3G animal day before yesterday

They bought animals the day before yesterday.

16 Nĩⁿ- sèēⁿ ðá kúťî kājìnĩⁿ
niⁿ(^L)- see^{nM} ða^{HL} kúťî kajìnĩⁿ
PFV buy 1HON pig day before yesterday

I bought a pig the day before yesterday.

17 Nĩⁿ- sèēⁿ nō kúťî kājìnĩⁿ
niⁿ(^L)- see^{nM} no(^H) kúťî kajìnĩⁿ
PFV buy 1INCL pig day before yesterday

We bought a pig the day before yesterday.

18 Nĩⁿ- sèēⁿ sī kúťî kājìnĩⁿ
niⁿ(^L)- see^{nM} si(^H) kúťî kajìnĩⁿ
PFV buy 3G pig day before yesterday

They bought a pig the day before yesterday.

19 Nĩⁿ- sèēⁿ ðá kúkà kājìníⁿ
 ní^{n(L)}- sec^{nM} ðá^{HL} kuka^L kajìníⁿ
 PFV buy 1HON comb day before yesterday

I bought a comb the day before yesterday.

20 Nĩⁿ- sèēⁿ nō kúkà kājìníⁿ
 ní^{n(L)}- sec^{nM} no^(H) kuka^L kajìníⁿ
 PFV buy 1INCL comb day before yesterday

We bought a comb the day before yesterday.

21 Nĩⁿ- sèēⁿ sī kúkà kājìníⁿ
 ní^{n(L)}- sec^{nM} si^(H) kuka^L kajìníⁿ
 PFV buy 3G comb day before yesterday

They bought a comb the day before yesterday.

22 Nĩⁿ- sèēⁿ ðá kúkù kājìníⁿ
 ní^{n(L)}- sec^{nM} ðá^{HL} kúkù kajìníⁿ
 PFV buy 1HON turkey chicks day before yesterday

I bought turkey chicks the day before yesterday.

23 Nĩⁿ- sèēⁿ nō kúkù kājìníⁿ
 ní^{n(L)}- sec^{nM} no^(H) kúkù kajìníⁿ
 PFV buy 1INCL turkey chicks day before yesterday

We bought turkey chicks the day before yesterday.

24 Nĩⁿ- sèēⁿ sī kúkù kājìníⁿ
 ní^{n(L)}- sec^{nM} si^(H) kúkù kajìníⁿ
 PFV buy 3G turkey chicks day before yesterday

They bought turkey chicks the day before yesterday.

25 Nĩⁿ- sècēⁿ ðá kúnìⁿ kājìⁿĩⁿ
 ni^{n(L)}- sec^{nM} ða^{HL} kúnìⁿ kajìⁿĩⁿ
 PFV buy 1HON turkey hen day before yesterday

I bought a turkey hen the day before yesterday.

26 Nĩⁿ- sècēⁿ nō kúnìⁿ kājìⁿĩⁿ
 ni^{n(L)}- sec^{nM} no^(H) kúnìⁿ kajìⁿĩⁿ
 PFV buy 1INCL turkey hen day before yesterday

We bought a turkey hen the day before yesterday.

27 Nĩⁿ- sècēⁿ sī kúnìⁿ kājìⁿĩⁿ
 ni^{n(L)}- sec^{nM} si^(H) kúnìⁿ kajìⁿĩⁿ
 PFV buy 3G turkey hen day before yesterday

They bought a turkey hen the day before yesterday.

28 Nĩⁿ- sècēⁿ ðá tākà kājìⁿĩⁿ
 ni^{n(L)}- sec^{nM} ða^{HL} taka^{LM} kajìⁿĩⁿ
 PFV buy 1HON wooden stake day before yesterday

I bought wooden stakes the day before yesterday.

29 Nĩⁿ- sècēⁿ nō tākā kājìⁿĩⁿ
 ni^{n(L)}- sec^{nM} no^(H) taka^{LM} kajìⁿĩⁿ
 PFV buy 1INCL wooden stake day before yesterday

We bought wooden stakes the day before yesterday.

30 Nĩⁿ- sècēⁿ sī tākā kājìⁿĩⁿ
 ni^{n(L)}- sec^{nM} si^(H) taka^{LM} kajìⁿĩⁿ
 PFV buy 3G wooden stake day before yesterday

They bought wooden stakes the day before yesterday.

31 Nĩⁿ- sècēⁿ ðá tīfī kájìⁿĩⁿ
 ni^{n(L)}- sec^{nM} ða^{HL} tīfī^{MH} kajìⁿĩ^{nM}
 PFV buy 1HON avocado day before yesterday

I bought avocados the day before yesterday.

32 Nīⁿ- sèēⁿ nō tīfí kájì↑nīⁿ
ni^{n(L)}- see^{nM} no^(H) tīfí^{MH} kaji^Lni^{nM}
PFV buy 1INCL avocado day before yesterday

We bought avocados the day before yesterday.

33 Nīⁿ- sèēⁿ sī tīfí kájì↑nīⁿ
ni^{n(L)}- see^{nM} si^(H) tīfí^{MH} kaji^Lni^{nM}
PFV buy 3G avocado day before yesterday

They bought avocados the day before yesterday.

34 Nīⁿ- òikō ðá t̥íki kájì↑nīⁿ
ni^{n(L)}- òiko^{MH} ða^{HL} t̥íki^{MH} kaji^Lni^{nM}
PFV sell 1HON cactus fruit day before yesterday

I sold cactus fruit the day before yesterday.

35 Nīⁿ- òikō nō t̥íki kájì↑nīⁿ
ni^{n(L)}- òiko^{MH} no^(H) t̥íki^{MH} kaji^Lni^{nM}
PFV sell 1INCL cactus fruit day before yesterday

We sold cactus fruit the day before yesterday.

36 Nīⁿ- òikō sí t̥íki kájì↑nīⁿ
ni^{n(L)}- òiko^{MH} si^(H) t̥íki^{MH} kaji^Lni^{nM}
PFV sell 3G cactus fruit day before yesterday

They sold cactus fruit the day before yesterday.

37 Nīⁿ- òikō ðá ðit̥í kájì↑nīⁿ
ni^{n(L)}- òiko^{MH} ða^{HL} ðit̥í^{LH} kaji^Lni^{nM}
PFV sell 1HON organ cactus day before yesterday

I sold organ cactus the day before yesterday.

38 Nīⁿ- ðìkō nō ðítǫ̃ kájì↑nīⁿ
 niⁿ(^L)- ðìkō^{MH} nō(^H) ðítǫ̃^{LH} kaji^Lni^{nM}
 PFV sell 1INCL organ cactus day before yesterday

We sold organ cactus the day before yesterday.

39 Nīⁿ- ðìkō sí ðítǫ̃ kájì↑nīⁿ
 niⁿ(^L)- ðìkō^{MH} si(^H) ðítǫ̃^{LH} kaji^Lni^{nM}
 PFV sell 3G organ cactus day before yesterday

They sold organ cactus the day before yesterday.

40 Nīⁿ- ðìkō ðá ðítà kájì↑nīⁿ
 niⁿ(^L)- ðìkō^{MH} ða^{HL} ðita^{LH} kaji^Lni^{nM}
 PFV sell 1HON tortilla day before yesterday

I sold tortillas the day before yesterday.

41 Nīⁿ- ðìkō nō ðítā kájì↑nīⁿ
 niⁿ(^L)- ðìkō^{MH} nō(^H) ðita^{LH} kaji^Lni^{nM}
 PFV sell 1INCL tortilla day before yesterday

We sold tortillas the day before yesterday.

42 Nīⁿ- ðìkō sí ðítā kájì↑nīⁿ
 niⁿ(^L)- ðìkō^{MH} si(^H) ðita^{LH} kaji^Lni^{nM}
 PFV sell 3G tortilla day before yesterday

They sold tortillas the day before yesterday.

43 Nīⁿ- ðìkō ðá kīðì kājì↑nīⁿ
 niⁿ(^L)- ðìkō^{MH} ða^{HL} kiðì^{LM}
 PFV sell 1HON cooking pot

I sold cooking pots the day before yesterday.

44 Nĩⁿ- ðìkō nō kídī kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} no^(H) kídì^{LM} kajìníⁿ
 PFV sell 1INCL cooking pot day before yesterday

We sold cooking pots the day before yesterday.

45 Nĩⁿ- ðìkō sí kídī kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} sí^(H) kídì^{LM} kajìníⁿ
 PFV sell 3G cooking pot day before yesterday

They sold cooking pots the day before yesterday.

46 Nĩⁿ- ðìkō ðá kítī kájì↑níⁿ
 ní^{n(L)}- ðìkō^{MH} ða^{HL} kítì^{MH} kaji^lni^{nM}
 PFV sell 1HON animal day before yesterday

I sold animals the day before yesterday.

47 Nĩⁿ- ðìkō nō kítí kájì↑níⁿ
 ní^{n(L)}- ðìkō^{MH} no^(H) kítì^{MH} kaji^lni^{nM}
 PFV sell 1INCL animal day before yesterday

We sold animals the day before yesterday.

48 Nĩⁿ- ðìkō sí kítí kájì↑níⁿ
 ní^{n(L)}- ðìkō^{MH} sí^(H) kítì^{MH} kaji^lni^{nM}
 PFV sell 3G animal day before yesterday

They sold animals the day before yesterday.

49 Nĩⁿ- ðìkō ðá kúťì kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ða^{HL} kúťì kajìníⁿ
 PFV sell 1HON pig day before yesterday

I sold a pig the day before yesterday.

50 Nĩⁿ- ðìkō nō kútfì kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} no^(H) kútfì kājìníⁿ
 PFV sell 1INCL pig day before yesterday

We sold a pig the day before yesterday.

51 Nĩⁿ- ðìkō sí kútfì kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} sí^(H) kútfì kājìníⁿ
 PFV sell 3G pig day before yesterday

They sold a pig the day before yesterday.

52 Nĩⁿ- ðìkō ðá kúkà kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ða^{HL} kuka^L kājìníⁿ
 PFV sell 1HON comb day before yesterday

I sold combs the day before yesterday.

53 Nĩⁿ- ðìkō nō kúkà kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} no^(H) kuka^L kājìníⁿ
 PFV sell 1INCL comb day before yesterday

We sold combs the day before yesterday.

54 Nĩⁿ- ðìkō sí kúkà kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} sí^(H) kuka^L kājìníⁿ
 PFV sell 3G comb day before yesterday

They sold combs the day before yesterday.

55 Nĩⁿ- ðìkō ðá kúkù kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ða^{HL} kúkù kājìníⁿ
 PFV sell 1HON turkey chicks day before yesterday

I sold turkey chicks the day before yesterday.

56 Nĩⁿ- ðìkō nō kúkù kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} no^(H) kúkù kajìníⁿ
 PFV sell 1INCL turkey chicks day before yesterday

We sold turkey chicks the day before yesterday.

57 Nĩⁿ- ðìkō sí kúkù kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} sí^(H) kúkù kajìníⁿ
 PFV sell 3G turkey chicks day before yesterday

They sold turkey chicks the day before yesterday.

58 Nĩⁿ- ðìkō ðá kúnìⁿ kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ða^{HL} kúnìⁿ kajìníⁿ
 PFV sell 1HON turkey hen day before yesterday

I sold a turkey hen the day before yesterday.

59 Nĩⁿ- ðìkō nō kúnìⁿ kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} no^(H) kúnìⁿ kajìníⁿ
 PFV sell 1INCL turkey hen day before yesterday

We sold a turkey hen the day before yesterday.

60 Nĩⁿ- ðìkō sí kúnìⁿ kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} sí^(H) kúnìⁿ kajìníⁿ
 PFV sell 3G turkey hen day before yesterday

They sold a turkey hen the day before yesterday.

61 Nĩⁿ- ðìkō ðá tākà kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ða^{HL} taka^{LM} kajìníⁿ
 PFV sell 1HON wooden stake day before yesterday

I sold wooden stakes the day before yesterday.

62 Nīⁿ- ðìkō nō tákā kájìníⁿ
 ní^{n(L)}- ðìkō^{MH} no^(H) taka^{LM} kájìníⁿ
 PFV sell 1INCL wooden stake day before yesterday

We sold wooden stakes the day before yesterday.

63 Nīⁿ- ðìkō sí tákā kájìníⁿ
 ní^{n(L)}- ðìkō^{MH} si^(H) taka^{LM} kájìníⁿ
 PFV sell 3G wooden stake day before yesterday

They sold wooden stakes the day before yesterday.

64 Nīⁿ- ðìkō ðá tíťí kájìníⁿ
 ní^{n(L)}- ðìkō^{MH} ða^{HL} tíťí^{MH} kájìní^{nM}
 PFV sell 1HON avocado day before yesterday

I sold avocados the day before yesterday.

65 Nīⁿ- ðìkō nō tíťí kájìníⁿ
 ní^{n(L)}- ðìkō^{MH} no^(H) tíťí^{MH} kájìní^{nM}
 PFV sell 1INCL avocado day before yesterday

We sold avocados the day before yesterday.

66 Nīⁿ- ðìkō sí tíťí kájìníⁿ
 ní^{n(L)}- ðìkō^{MH} si^(H) tíťí^{MH} kájìní^{nM}
 PFV sell 3G avocado day before yesterday

They sold avocados the day before yesterday.

67 Nīⁿ- sèsī sí tíťí kájìníⁿ
 ní^{n(L)}- sesi^{MH} si^(H) tíťí^{MH} kájìní^{nM}
 PFV eat 3G avocado day before yesterday

They ate avocados the day before yesterday.

68 Nīⁿ- sèsī ðá títĩ kájì↑nīⁿ
 ni^{n(L)}- sesi^{MH} ða^{HL} títĩ^{MH} kaji^Lni^{nM}
 PFV eat 1HON avocado day before yesterday

I ate avocados the day before yesterday.

69 Nīⁿ- sèsī nō títĩ kájiniⁿ
 ni^{n(L)}- sesi^{MH} no^(H) títĩ^{MH} kájiniⁿ
 PFV eat 1INCL avocado day before yesterday

We ate avocados the day before yesterday.

70 Nīⁿ- sèsī ðá ðità kájì↑nīⁿ
 ni^{n(L)}- sesi^{MH} ða^{HL} ðita^{LH} kaji^Lni^{nM}
 PFV eat 1HON tortilla day before yesterday

I ate tortillas the day before yesterday.

71 Nīⁿ- sèsī tí ðítá↑ kájì↑nīⁿ
 ni^{n(L)}- sesi^{MH} ti^(H) ðita^{LH} kaji^Lni^{nM}
 PFV eat 3AN tortilla day before yesterday

It ate tortillas the day before yesterday.

72 Nīⁿ- sèsī sí ðítá↑ kájì↑nīⁿ
 ni^{n(L)}- sesi^{MH} si^(H) ðita^{LH} kaji^Lni^{nM}
 PFV eat 3G tortilla day before yesterday

They ate tortillas the day before yesterday.

73 Nīⁿ- sèsī nō ðítá↑ kájì↑nīⁿ
 ni^{n(L)}- sesi^{MH} no^(H) ðita^{LH} kaji^Lni^{nM}
 PFV eat 1INCL tortilla day before yesterday

We ate tortillas the day before yesterday.

C. 2 Elicitation list for Chapter 7

Elicitation list for measuring the F0 of 'Low' tones in different contexts.

1 kīnīⁿ -tì kītí .

kini^{nML} ti^(H) kiti^{MH}

see 3AN animal

It will see the animals.

2 kīnīⁿ -tì tīlā .

kini^{nML} ti^(H) ti^Hla^M

see 3AN bread

It will see the bread.

3 kīnīⁿ tì tīkā .

kini^{nML} ti^(H) tika^{LM}

see 3AN grasshopper

It will see the grasshoppers.

4 kīnīⁿ -tì tītā .

kini^{nML} ti^(H) tita^{LM}

see 3AN opossum

It will see the opossum.

5 kīβì -tī tīkū .

kiβi^{LM} ti^(H) tiku^{LM}

enter 3AN crevice

It will enter the crevice.

6 kīβī -tī tīkū .

(H)- kiβi^{LM} ti^(H) tiku^{LM}

IPFV enter 3AN crevice

It is entering the crevice.

7 tēkū -tī kītí
teku^{ML} ti^(H) kiti^{MH}
hear 3AN animal

It will hear the animals.

8 tēkú -tī tíkā
(H)- teku^{ML} ti^(H) tika^{LM}
IPFV hear 3AN grasshopper

It is hearing the grasshoppers.

9 tēkú -tī kītí
(H)- teku^{ML} ti^(H) kiti^{MH}
IPFV hear 3AN animal

It is hearing the animals.

10 tēkú -tī títā
(H)- teku^{ML} ti^(H) tita^{LM}
IPFV hear 3AN opossum

It is hearing the opossum.

11 sēsī -tí tílā
(H)- sesi^(H) ti^(H) ti^Hla^M
IPFV eat 3AN bread

It is eating bread.

12 sēsī -tí kītí
(H)- sesi^(H) ti^(H) kiti^{MH}
IPFV eat 3AN animal

It is eating animals.

13 sīnīⁿ -tī kītí

(H)- sīnī^{nML} tī^(H) kītī^{MH}

IPFV see 3AN animal

It sees the animals.

14 sīnīⁿ -tī tīkā

(H)- sīnī^{nML} tī^(H) tīkā^{LM}

IPFV see 3AN grasshopper

It sees the grasshoppers.

15 sīnīⁿ -tī tīlā

(H)- sīnī^{nML} tī^(H) tī^Hlā^M

IPFV see 3AN bread

It sees the bread.

16 sīnīⁿ -tī tītā

(H)- sīnī^{nML} tī^(H) tītā^{LM}

IPFV see 3AN opossum

It sees the opossum.

C.3 Elicitation list for the focus experiment in Chapter 9

In this list, we have included one complete set of questions and answers for the different focus conditions. To avoid needless repetition for the remainder, we only include the answers; that is, the data that are measured.

1.1 Nāìkùú há nìⁿ- ðìkō níⁿ kājìníⁿ
nai^{nLH}- kuu^M ha^(LH) ní^{n(L)}- ðìkō^{MH} ní^{nHL} kājìníⁿ
what be comp PFV sell 2HON day before yesterday

What did you sell the day before yesterday?

1.2 nīⁿ- ðìkō ðá kākā kājìníⁿ
ní^{n(L)}- ðìkō^{MH} ða^{HL} kaka^{ML} kājìníⁿ
PFV sell 1HON quick lime day before yesterday

I sold quick lime the day before yesterday.

2.1 Nāìkùú há nìⁿ- ðìkō nóⁿ kājìníⁿ
nai^{nLH}- kuu^M ha^(LH) ní^{n(L)}- ðìkō^{MH} nó^{n(L)} kājìníⁿ
what be comp PFV sell 2MS day before yesterday

What did you sell the day before yesterday?

2.2 nīⁿ- ðìkō ðá kākā kājìníⁿ
ní^{n(L)}- ðìkō^{MH} ða^{HL} kaka^{ML} kājìníⁿ
PFV sell 1HON quick lime day before yesterday

I sold quick lime the day before yesterday.

3.1 Nāìkùú há nìⁿ- ðìkō níⁿ kājìníⁿ
nai^{nLH}- kuu^M ha^(LH) ní^{n(L)}- ðìkō^{MH} ní^{nHL} kājìníⁿ
what be comp PFV sell 2HON day before yesterday

What did you sell the day before yesterday?

3.2 nīⁿ- ðìkō nīⁿ kākā kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ní^{n(L)} kaka^{ML} kajìníⁿ
 PFV sell 1 quick lime day before yesterday

I sold quick lime the day before yesterday.

4.1 Nāìkùú há nīⁿ- ðìkō nóⁿ kājìníⁿ
 nai^{nLH}- kuu^M ha^(LH) ní^{n(L)}- ðìkō^{MH} nó^{n(L)} kajìníⁿ
 what be comp PFV sell 2MS day before yesterday

What did you sell the day before yesterday?

4.2 nīⁿ- ðìkō nīⁿ kākā kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ní^{n(L)} kaka^{ML} kajìníⁿ
 PFV sell 1 quick lime day before yesterday

I sold quick lime the day before yesterday.

5 nīⁿ- ðìkō ðá kītī kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ða^{HL} kiti^{MH} kajìníⁿ
 PFV sell 1HON animal day before yesterday

I sold animals the day before yesterday.

6 nīⁿ- ðìkō nīⁿ kītī kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ní^{n(L)} kiti^{MH} kajìníⁿ
 PFV sell 1 animal day before yesterday

I sold animals the day before yesterday.

7 nīⁿ- ðìkō ðá kúkù kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ða^{HL} kúkù kajìníⁿ
 PFV sell 1HON turkey chicks day before yesterday

I sold turkey chicks the day before yesterday.

8 nīⁿ- ðìkō nīⁿ kúkù kājìníⁿ
 ní^{n(L)}- ðìkō^{MH} ní^{n(L)} kúkù kājìníⁿ
 PFV sell 1 turkey chicks day before yesterday

I sold turkey chicks the day before yesterday.

9.1 Nāìkùú há nìⁿ- sēēⁿ níⁿ kājìníⁿ
 nāi^{nLH}- kuu^M ha^(LH) ní^{n(L)}- sec^{nM} ní^{n(L)} kājìníⁿ
 what be comp PFV buy 1 day before yesterday

What did you buy the day before yesterday?

9.2 nīⁿ- sēēⁿ ðá kākā kājìníⁿ
 ní^{n(L)}- sec^{nM} ða^{HL} kaka^{ML} kājìníⁿ
 PFV buy 1HON quick lime day before yesterday

I bought quick lime the day before yesterday.

10.1 Nāìkùú há nìⁿ- sēēⁿ nóⁿ kājìníⁿ
 nāi^{nLH}- kuu^M ha^(LH) ní^{n(L)}- sec^{nM} nó^{n(L)} kājìníⁿ
 what be comp PFV buy 2MS day before yesterday

What did you buy the day before yesterday?

10.2 nīⁿ- sēēⁿ ðá kākā kājìníⁿ
 ní^{n(L)}- sec^{nM} ða^{HL} kaka^{ML} kājìníⁿ
 PFV buy 1HON quick lime day before yesterday

I bought quick lime the day before yesterday.

11.1 Nāìkùú há nìⁿ- sēēⁿ níⁿ kājìníⁿ
 nāi^{nLH}- kuu^M ha^(LH) ní^{n(L)}- sec^{nM} ní^{n(L)} kājìníⁿ
 what be comp PFV buy 1 day before yesterday

What did you buy the day before yesterday?

11.2 nīⁿ- sèēⁿ níⁿ kàkà kājìníⁿ
 ní^{n(L)}- see^{nM} ní^{n(L)} kaka^{ML} kajìníⁿ
 PFV buy 1 quick lime day before yesterday

I bought quick lime the day before yesterday,

12.1 Nāìkùú há nìⁿ- sèēⁿ nóⁿ kājìníⁿ
 nai^{nLH}- kuu^M ha^(LH) ní^{n(L)}- see^{nM} nó^{n(L)} kajìníⁿ
 what be comp PFV buy 2MS day before yesterday

What did you buy the day before yesterday?

12.2 nīⁿ- sèēⁿ níⁿ kàkà kājìníⁿ
 ní^{n(L)}- see^{nM} ní^{n(L)} kaka^{ML} kajìníⁿ
 PFV buy 1 quick lime day before yesterday

I bought quick lime the day before yesterday.

13 Nīⁿ- sèēⁿ ðá kītī kājìníⁿ
 ní^{n(L)}- see^{nM} ða^{HL} kiti^{MH} kajìníⁿ
 PFV buy 1HON animal day before yesterday

I bought animals the day before yesterday.

14 Nīⁿ- sèēⁿ níⁿ kītī kājìníⁿ
 ní^{n(L)}- see^{nM} ní^{n(L)} kiti^{MH} kajìníⁿ
 PFV buy 1 animal day before yesterday

I bought animals the day before yesterday.

15 Nīⁿ- sèēⁿ ðá kúkù kājìníⁿ
 ní^{n(L)}- see^{nM} ða^{HL} kúkù kajìníⁿ
 PFV buy 1HON turkey chicks day before yesterday

I bought turkey chicks the day before yesterday.

16 Nĩⁿ- sèēⁿ níⁿ kúkù kājìníⁿ
 ní^{n(L)}- sec^{nM} ní^{n(L)} kúkù kājìníⁿ
 PFV buy 1 turkey chicks day before yesterday

I bought turkey chicks day the day before yesterday.

17.1 Nĩⁿ- sèēⁿ níⁿ kākā kājìníⁿ-ā
 ní^{n(L)}- sec^{nM} ní^{nHL} kaka^{ML} kājìníⁿ ā
 PFV buy 2HON quick lime day before yesterday Q

Did you buy quick lime day before yesterday?

17.2 Jā²āⁿ tǿ níⁿ- ðìkō ðá kākā kājìníⁿ
 ja²a^{nL} tǿ^(M) ní^{n(L)}- ðìkō^{MH} ða^{HL} kaka^{ML} kājìníⁿ
 no beCAUSE PFV sell 1HON quick lime day before yesterday

No, because I SOLD quick lime the day before yesterday.

18.1 Nĩⁿ- sèēⁿ nóⁿ kākā kājìníⁿ-ā
 ní^{n(L)}- sec^{nM} nó^{n(L)} kaka^{ML} kājìníⁿ ā
 PFV buy 2MS quick lime day before yesterday Q

Did you buy quick lime day before yesterday?

18.2 Jā²āⁿ tǿ níⁿ- ðìkō ðá kākā kājìníⁿ
 ja²a^{nL} tǿ^(M) ní^{n(L)}- ðìkō^{MH} ða^{HL} kaka^{ML} kājìníⁿ
 no because PFV sell 1HON quick lime day before yesterday

No, because I SOLD quick lime the day before yesterday.

19.1 Nĩⁿ- sèēⁿ níⁿ kākā kājìníⁿ-ā
 ní^{n(L)}- sec^{nM} ní^{nHL} kaka^{ML} kājìníⁿ ā
 PFV buy 2HON quick lime day before yesterday Q

Did you buy quick lime the day before yesterday?

19.2 Jāʔàⁿ tʃī nīⁿ- ðìkō níⁿ kākā kājìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- ðìkò^{MH} ní^{n(L)} kaka^{ML} kajìníⁿ
 no because PFV sell I quick lime day before yesterday

No, because I SOLD quick lime the day before yesterday.

20.1 Nīⁿ- sèēⁿ nóⁿ kākā kājìníⁿ-ā
 ni^{n(L)}- sec^{nM} nó^{n(L)} kaka^{ML} kajìníⁿ ā
 PFV buy 2MS quick lime day before yesterday Q

Did you buy quick lime the day before yesterday?

20.2 Jāʔàⁿ tʃī nīⁿ- ðìkō níⁿ kākā kājìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- ðìkò^{MH} ní^{n(L)} kaka^{ML} kajìníⁿ
 no because PFV sell I quick lime day before yesterday

No, because I SOLD quick lime the day before yesterday.

21 Jāʔàⁿ tʃī nīⁿ- ðìkō ðá kītī kájìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- ðìkò^{MH} ða^{HL} kiti^{MH} kajìníⁿ
 no because PFV sell 1HON animal day before yesterday

No, because I SOLD animals the day before yesterday.

22 Jāʔàⁿ tʃī nīⁿ- ðìkō níⁿ kītī kājìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- ðìkò^{MH} ní^{n(L)} kiti^{MH} kajìníⁿ
 no because PFV sell I animal day before yesterday

No, because I SOLD animals the day before yesterday.

23 Jāʔàⁿ tʃī nīⁿ- ðìkō ðá kúkù kājìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- ðìkò^{MH} ða^{HL} kúkù kajìníⁿ
 no because PFV sell 1HON turkey chicks day before yesterday

No, because I SOLD turkey chicks the day before yesterday.

24 Jāʔāⁿ tʃī nīⁿ- ðikō nīⁿ kúkù kājìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- ðiko^{MH} ni^{n(L)} kúkù kajìníⁿ
 no because PFV sell I turkey chicks day before yesterday

No, because I SOLD turkey chicks the day before yesterday.

25.1 Nīⁿ- ðikō nīⁿ kākā kājìníⁿ-ā
 ni^{n(L)}- ðiko^{MH} ni^{nHL} kaka^{ML} kajìníⁿ ā
 PFV sell 2HON quick lime day before yesterday Q

Did you sell quick lime the day before yesterday?

25.2 Jāʔāⁿ tʃī nīⁿ- sèēⁿ óá kākā kājìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- see^{nM} óa^{HL} kaka^{ML} kajìníⁿ
 no because PFV buy 1HON quick lime day before yesterday

No, because I BOUGHT quick lime the day before yesterday.

26.1 Nīⁿ- ðikō nóⁿ kākā kājìníⁿ-ā
 ni^{n(L)}- ðiko^{MH} no^{n(L)} kaka^{ML} kajìníⁿ ā
 PFV sell 2MS quick lime day before yesterday Q

Did you sell quick lime the day before yesterday?

26.2 Jāʔāⁿ tʃī nīⁿ- sèēⁿ óá kākā kājìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- see^{nM} óa^{HL} kaka^{ML} kajìníⁿ
 no because PFV buy 1HON quick lime day before yesterday

No, because I BOUGHT quick lime the day before yesterday.

27.1 Nīⁿ- ðikō nīⁿ kākā kājìníⁿ-ā
 ni^{n(L)}- ðiko^{MH} ni^{nHL} kaka^{ML} kajìníⁿ ā
 PFV sell 2HON quick lime day before yesterday Q

Did you sell quick lime the day before yesterday?

27.2 Jāʔàⁿ tʃī nīⁿ- sèēⁿ níⁿ kàkā kājìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- sec^{nM} ni^{n(L)} kaka^{ML} kajìníⁿ
 no because PFV buy I quick lime day before yesterday

No, because I BOUGHT quick lime the day before yesterday.

28.1 Nīⁿ- òikō nóⁿ kākā kājìníⁿ-ā
 ni^{n(L)}- òiko^{MH} no^{n(L)} kaka^{ML} kajìníⁿ ā
 PFV sell 2MS quick lime day before yesterday Q

Did you sell quick lime the day before yesterday?

28.2 Jāʔàⁿ tʃī nīⁿ- sèēⁿ níⁿ kàkā kājìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- sec^{nM} ni^{n(L)} kaka^{ML} kajìníⁿ
 no because PFV buy I quick lime day before yesterday

No, because I BOUGHT quick lime the day before yesterday.

29 Jāʔàⁿ tʃī nīⁿ- sèēⁿ òá kītī kájìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- sec^{nM} òa^{HL} kiti^{MH} kajìníⁿ
 no because PFV buy 1HON animal day before yesterday

No, because I BOUGHT animals the day before yesterday.

30 Jāʔàⁿ tʃī nīⁿ- sèēⁿ níⁿ kītī kájìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- sec^{nM} ni^{n(L)} kiti^{MH} kajìníⁿ
 no because PFV buy I animal day before yesterday

No, because I BOUGHT animals the day before yesterday.

31 Jāʔàⁿ tʃī nīⁿ- sèēⁿ òá kúkù kājìníⁿ
 jaʔa^{nL} tʃi^(M) ni^{n(L)}- sec^{nM} òa^{HL} kúkù kajìníⁿ
 no because PFV buy 1HON turkey chicks day before yesterday

No because I BOUGHT turkey chicks the day before yesterday.

32 Jā^ʔāⁿ tʃī nīⁿ- sèēⁿ níⁿ kúkù kājìníⁿ
 ja^ʔa^{nL} tʃi^(M) ni^{n(L)}- see^{nM} ni^{n(L)} kúkù kajìníⁿ
 no because PFV buy 1 turkey chicks day before yesterday

No, because I BOUGHT turkey chicks the day before yesterday.

33.1 Nīⁿ- òìkò níⁿ jā^ʔā kájì↑níⁿ -ā
 ni^{n(L)}- òìkò^{MH} ni^{nHL} ja^ʔa^{MH} kaji^Lni^{nM} --a
 PFV sell 2HON chili day before yesterday Q

Did you sell chilies the day before yesterday?

33.2 Jā^ʔāⁿ tʃī kākā nīⁿ- òìkò òá
 ja^ʔa^{nL} tʃi^(M) kaka^{ML} ni^{n(L)}- òìkò^{MH} òa^{HL}
 no because quick lime PFV sell 1HON

No, because it was QUICK LIME I sold.

34.1 Nīⁿ- òìkò nóⁿ jā^ʔā kájì↑níⁿ-ā
 ni^{n(L)}- òìkò^{MH} no^{n(L)} ja^ʔa^{MH} kaji^Lni^{nM} ā
 PFV sell 2MS chili day before yesterday Q

Did you sell chilies the day before yesterday?

34.2 Jā^ʔāⁿ tʃī kākā nīⁿ- òìkò òá
 ja^ʔa^{nL} tʃi^(M) kaka^{ML} ni^{n(L)}- òìkò^{MH} òa^{HL}
 no because quick lime PFV sell 1HON

No, because it was QUICK LIME I sold.

35.1 Nīⁿ- òìkò níⁿ jā^ʔā kájì↑níⁿ-ā
 ni^{n(L)}- òìkò^{MH} ni^{n(L)} ja^ʔa^{MH} kaji^Lni^{nM} ā
 PFV sell 1 chili day before yesterday Q

Did you sell chilies the day before yesterday?

35.2 Jā^ʔàⁿ tʃī kākā nīⁿ- ðìkō níⁿ
 ja^ʔa^{nL} tʃī kaka^{ML} nī^{n(L)}- ðìko^{MH} nī^{n(L)}
 no because quick lime PFV sell 1

No, because it was QUICK LIME I sold.

36.1 Nīⁿ- ðìkō nóⁿ jà^ʔā kájì↑nīⁿ-ā
 nī^{n(L)}- ðìko^{MH} nó^{n(L)} ja^ʔa^{MH} kaji^Lnī^{nM} ā
 PFV sell 2MS chili day before yesterday Q

Did you sell chilies the day before yesterday?

36.2 Jā^ʔàⁿ tʃī kākā nīⁿ- ðìkō níⁿ
 ja^ʔa^{nL} tʃī kaka^{ML} nī^{n(L)}- ðìko^{MH} nī^{n(L)}
 no because quick lime PFV sell 1

No, because it was QUICK LIME I sold.

37 Jā^ʔàⁿ tʃī kītī nīⁿ- ðìkō ðá
 ja^ʔa^{nL} tʃi^(M) kiti^{MH} nī^{n(L)}- ðìko^{MH} ða^{HL}
 no because animal PFV sell 1HON

No, because it was ANIMALS I sold.

38 Jā^ʔàⁿ tʃī kītī nīⁿ- ðìkō níⁿ
 ja^ʔa^{nL} tʃi^(M) kiti^{MH} nī^{n(L)}- ðìko^{MH} nī^{n(L)}
 no because animal PFV sell 1

No, because it was ANIMALS I sold.

39 Jā^ʔàⁿ tʃī kúkù nīⁿ- ðìkō ðá
 ja^ʔa^{nL} tʃi^(M) kúkù nī^{n(L)}- ðìko^{MH} ða^{HL}
 no because turkey chicks PFV sell 1HON

No, because it was TURKEY CHICKS I sold.

40 Jāʔàⁿ tʃī kúkù níⁿ- ðìkō níⁿ .
 jaʔa^{nL} tʃi^(M) kúkù ní^(L)- ðìkō^{MH} ní^(L)
 no because turkey chicks PFV sell I

No, because it was TURKEY CHICKS I sold.

41.1 Níⁿ- sècēⁿ níⁿ jāʔā kájìníⁿ-ā
 ní^(L)- sec^{nM} ní^{nHL} jaʔa^{MH} kajìníⁿ ā
 PFV buy 2HON chili day before yesterday Q

Did you buy chilies yesterday?

41.2 Jāʔàⁿ tʃī kākā níⁿ- sècēⁿ ðá
 jaʔa^{nL} tʃi^(M) kaka^{ML} ní^(L)- sec^{nM} ða^{HL}
 no because quick lime PFV buy 1HON

No, because it was QUICK LIME I bought.

42.1 Níⁿ- sècēⁿ nóⁿ jàʔā kájìníⁿ-ā
 ní^(L)- sec^{nM} nó^(L) jaʔa^{MH} kajìníⁿ ā
 PFV buy 2MS chili day before yesterday Q

Did you buy chilies yesterday?

42.2 Jāʔàⁿ tʃī kākā níⁿ- sècēⁿ ðá
 jaʔa^{nL} tʃi^(M) kaka^{ML} ní^(L)- sec^{nM} ða^{HL}
 no because quick lime PFV buy 1HON

No, because it was QUICK LIME I bought.

43.1 Níⁿ- sècēⁿ níⁿ jāʔā kájìníⁿ-ā
 ní^(L)- sec^{nM} ní^{nHL} jaʔa^{MH} kajìníⁿ ā
 PFV buy 2HON chili day before yesterday Q

Did you buy chilies the day before yesterday?

43.2 Jā^ʔàⁿ tʃī kākā nīⁿ- sèēⁿ nīⁿ .
 ja^ʔa^{nL} tʃi^(M) kaka^{ML} ni^{n(L)}- see^{nM} ni^{n(L)}
 no because quick lime PFV buy 1

No, because it was QUICK LIME I bought.

44.1 Nīⁿ- sèēⁿ nóⁿ jà^ʔā kájìnīⁿ-ā
 ni^{n(L)}- see^{nM} no^{n(L)} ja^ʔa^{MH} kajìnīⁿ ā
 PFV buy 2MS chili day before yesterday Q

Did you buy chilies the day before yesterday?

44.2 Jā^ʔàⁿ tʃī kākā nīⁿ- sèēⁿ nīⁿ .
 ja^ʔa^{nL} tʃi^(M) kaka^{ML} ni^{n(L)}- see^{nM} ni^{n(L)}
 no because quick lime PFV buy 1

No, because it was QUICK LIME I bought.

45 Jā^ʔàⁿ tʃī kītī nīⁿ- sèēⁿ ðá .
 ja^ʔa^{nL} tʃi^(M) kiti^{MH} ni^{n(L)}- see^{nM} ða^{HL}
 no because animal PFV buy 1HON

No, because it was ANIMALS I bought.

46 Jā^ʔàⁿ tʃī kītī nīⁿ- sèēⁿ nīⁿ .
 ja^ʔa^{nL} tʃi^(M) kiti^{MH} ni^{n(L)}- see^{nM} ni^{n(L)}
 no because animal PFV buy 1

No, because it was ANIMALS I bought.

47 Jā^ʔàⁿ tʃī kúkù nīⁿ- sèēⁿ ðá .
 ja^ʔa^{nL} tʃi^(M) kúkù ni^{n(L)}- see^{nM} ða^{HL}
 no because turkey chicks PFV buy 1HON

No, because it was TURKEY CHICKS I bought.

48 Jā²āⁿ tʃī kúkù níⁿ- sèēⁿ níⁿ
 ja²aⁿˡ tʃi(M) kúkù níⁿ(L)- seeⁿᵐ níⁿ(L)
 no because turkey chicks PFV buy 1

No, because it was TURKEY CHICKS I bought.

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C.4 Elicitation list for auxiliary and main verbs, Chapters 10

1 tē nīⁿ- kènēⁿ kōjō kītī
te^(M) nī^{n(L)}- kene^{nM} kojo^M kiti^{MH}
and PFV appear pour out animal

And the animal appeared in a rush.

2 tē nīⁿ- kènēⁿ kōjō kúkù
te^(M) nī^{n(L)}- kene^{nM} kojo^M ku^Hku^L
and PFV appear pour out turkey chicks

And the turkey chicks appeared in a rush.

3 tē nīⁿ- kènēⁿ kōjō kúnìⁿ
te^(M) nī^{n(L)}- kene^{nM} kojo^M ku^Hni^{nL}
and PFV appear pour out turkey hen

And the turkey hen appeared in a rush.

4 tē nīⁿ- kènēⁿ kōjō kólò
te^(M) nī^{n(L)}- kene^{nM} kojo^M ko^Hlo^L
and PFV appear pour out turkey

And the turkey appeared in a rush.

5 tē nīⁿ- kènēⁿ nāβā kītī
te^(M) nī^{n(L)}- kene^{nM} naβa^M kiti^{MH}
and PFV appear fly animal

And the animals came flying out.

6 tē nīⁿ- kènēⁿ nāβā kúkù
te^(M) nī^{n(L)}- kene^{nM} naβa^M ku^Hku^L
and PFV appear fly turkey chicks

And the turkey chicks came flying out.

7 tē nīⁿ- kènēⁿ nāβā kúnìⁿ
te^(M) nī^{n(L)}- kene^{nM} naβa^M ku^Hni^{nL}
and PFV appear fly turkey hen

And the turkey hen came flying out.

8 tē nīⁿ- kènēⁿ nāβā kólò
te^(M) nī^{n(L)}- kene^{nM} naβa^M ko^Hlo^L
and PFV appear fly turkey

And the turkey came flying out.

9 tē nīⁿ- kènēⁿ kōjō tūkū kītī
te^(M) nī^{n(L)}- kene^{nM} kojo^M tuku^M kiti^{MH}
and PFV appear pour out again animal

And the animals came rushing out again.

10 tē nīⁿ- kènēⁿ kōjō tūkū kúkù
te^(M) nī^{n(L)}- kene^{nM} kojo^M tuku^M ku^Hku^L
and PFV appear pour out again turkey chicks

And the turkey chicks came rushing out again.

11 tē nīⁿ- kènēⁿ kōjō tūkū kúnìⁿ
te^(M) nī^{n(L)}- kene^{nM} kojo^M tuku^M ku^Hni^{nL}
and PFV appear pour out again turkey hen

And the turkey hen came rushing out again.

12 tē nīⁿ- kènēⁿ kōjō tūkū kólò
te^(M) nī^{n(L)}- kene^{nM} kojo^M tuku^M ko^Hlo^L
and PFV appear pour out again turkey

And the turkey came rushing out again.

13 tē nīⁿ- kènēⁿ nāβā tūkū kītī
te^(M) nī^{n(L)}- kene^{nM} naβa^M tuku^M kiti^{MH}
and PFV appear fly again animal

And the animals came flying out again.

14 tē nīⁿ- kènēⁿ nāβā tūkū kúkù
te^(M) nī^{n(L)}- kene^{nM} naβa^M tuku^M ku^Hku^L
and PFV appear fly again turkey chicks

And the turkey chicks came flying out again.

15 tē nīⁿ- kènēⁿ nāβā tūkū kúnìⁿ
te^(M) nī^{n(L)}- kene^{nM} naβa^M tuku^M ku^Hni^{nL}
and PFV appear fly again turkey hen

And the turkey hen came flying out again.

16 tē nīⁿ- kènēⁿ nāβā tūkū kólò
te^(M) nī^{n(L)}- kene^{nM} naβa^M tuku^M ko^Hlo^L
and PFV appear fly again turkey

And the turkey came flying out again.

C.5 Elicitation lists for measuring the duration of verbal prefixes and verb root, for the experiment described in Chapter 10

1 tē hā- nīⁿ- ðà- kìtí nùⁿ↑ nù↑té
 tc^(M) ha^(M)- ni^{n(L)}- ða^(H) kiti^(L) nu^{n(H)} nute^{MH}
 and PRF PFV CAUS boil 3F water

And she has already boiled the water.

2 tē hā- nīⁿ- ðà- kìtí nùⁿ↑ tù↑lí
 tc^(M) ha^(M)- ni^{n(L)}- ða^(H) kiti^(L) nu^{n(H)} tuli^{HL}
 and PRF PFV CAUS boil 3F 'atole'

And she has already boiled the 'atole'.

3 tē hā- nīⁿ- ðà- kìtí nùⁿ↑ nà↑kú
 tc^(M) ha^(M)- ni^{n(L)}- ða^(H) kiti^(L) nu^{n(H)} naku^{MH}
 and PRF PFV CAUS boil 3F hominy

And she has already boiled the hominy.

4 tē hā- nīⁿ- ðà- kìtí nùⁿ↑ nù↑tjí
 tc^(M) ha^(M)- ni^{n(L)}- ða^(H) kiti^(L) nu^{n(H)} nuťjí^{MH}
 and PRF PFV CAUS boil 3F beans

And she has already boiled the beans.

5 tē nīⁿ- ðà- kìtí nùⁿ↑ nù↑té
 tc^(M) ni^{n(L)}- ða^(H) kiti^(L) nu^{n(H)} nute^{MH}
 and PFV CAUS boil 3F water

And she boiled the water

6 tē nīⁿ- ðà- kìtí nùⁿ↑ tù↑lí
 tc^(M) ni^{n(L)}- ða^(H) kiti^(L) nu^{n(H)} tuli^{HL}
 and PFV CAUS boil 3F 'atole'

And she boiled the 'atole'.

7 tē nīⁿ- ðà- kítí nùⁿ↑ nà↑kú
 te^(M) ni^{n(L)}- ða^(H) kiti^(L) nu^{n(H)} naku^{MH}
 and PFV CAUS boil 3F hominy

And she boiled the hominy.

8 tē nīⁿ- ðà- kítí nùⁿ↑ nù↑tjí
 te^(M) ni^{n(L)}- ða^(H) kiti^(L) nu^{n(H)} nufji^{MH}
 and PFV CAUS boil 3F beans

And she boiled the beans.

9 tē ðā- kítí nùⁿ↑ nù↑té
 te^(M) (H)- ða^(H)- kiti^(L) nu^{n(H)} nute^{MH}
 and IPFV CAUS boil 3F water

And she is boiling the water.

10 tē ðā- kítí nùⁿ↑ tù↑lí
 te^(M) (H)- ða^(H)- kiti^(L) nu^{n(H)} tuli^{HL}
 and IPFV CAUS boil 3F 'atole'

And she is boiling the 'atole'.

11 tē ðā- kítí nùⁿ↑ nà↑kú
 te^(M) (H)- ða^(H)- kiti^(L) nu^{n(H)} naku^{MH}
 and IPFV CAUS boil 3F hominy

And she is boiling the hominy.

12 tē ðā- kítí nùⁿ↑ nù↑tjí
 te^(M) (H)- ða^(H)- kiti^(L) nu^{n(H)} nufji^{MH}
 and IPFV CAUS boil 3F beans

And she is boiling the beans.

13 tē ðā- kítí nùⁿ↑ nù↑té .
 te^(M) ða^(H)- kiti^(L) nu^{n(H)} nute^{MH}
 and CAUS boil 3F water

And she will boil the water.

14 tē ðā- kítí nùⁿ↑ tù↑lí
 te^(M) (H)- ða^(H)- kiti^(L) nu^{n(H)} tuli^{HL}
 and IPFV CAUS boil 3F 'atole'

And she is boiling the 'atole',

15 tē ðā- kítí nùⁿ↑ nà↑kú .
 te^(M) (H)- ða^(H)- kiti^(L) nu^{n(H)} naku^{MH}
 and IPFV CAUS boil 3F hominy

And she is boiling the hominy.

16 tē ðā- kítí nùⁿ↑ nù↑tjí .
 te^(M) (H)- ða^(H)- kiti^(L) nu^{n(H)} nutjí^{MH}
 and IPFV CAUS boil 3F beans

And she is boiling the beans.

17 tē hā- nīⁿ- kítì nùtē
 te^(M) ha^(M)- ni^{n(L)}- kiti^L nute^{MH}
 and PRF PFV boil water

And the water has already boiled.

18 tē hā- nīⁿ- kítì tùlí .
 te^(M) ha^(M)- ni^{n(L)}- kiti^L tuli^{HL}
 and PRF PFV boil 'atole'

And the 'atole' has already boiled.

19 tē hā- nīⁿ- kītì nàkū
te^(M) ha^(M)- nī^{n(L)}- kiti^L naku^{MH}
and PRF PFV boil hominy

And the hominy has already boiled.

20 tē hā- nīⁿ- kītì nùtḡī
te^(M) ha^(M)- nī^{n(L)}- kiti^L nufḡi^{MH}
and PRF PFV boil beans

And the beans have already boiled.

21 tē nīⁿ- kītì nùtē
te^(M) nī^{n(L)}- kiti^L nute^{MH}
and PFV boil water

And the water boiled.

22 tē nīⁿ- kītì tùlí
te^(M) nī^{n(L)}- kiti^L tuli^{HL}
and PFV boil 'atole'

And the 'atole' boiled.

23 tē nīⁿ- kītì nàkū
te^(M) nī^{n(L)}- kiti^L naku^{MH}
and PFV boil hominy

And the hominy boiled.

24 tē nīⁿ- kītì nùtḡī
te^(M) nī^{n(L)}- kiti^L nufḡi^{MH}
and PFV boil beans

And the beans boiled.

25 tē kī́tí nù↑tē
te^(M) (H)- kiti^(L) nute^{MH}
and IPFV boil water

The water is boiling.

26 tē kī́tí tù↑lí
te^(M) (H)- kiti^(L) tuli^{HL}
and IPFV boil 'atole'

The atole is boiling.

27 tē kī́tí nà↑kū
te^(M) (H)- kiti^(L) naku^{MH}
and IPFV boil hominy

The hominy is boiling.

28 tē kī́tí nù↑tjī
te^(M) (H)- kiti^(L) nu^{tjī}^{MH}
and IPFV boil beans

The beans are boiling.

29 tē kī́tì nùtē
te^(M) kiti^L nute^{MH}
and boil water

The water will boil

30 tē kī́tì tùlí
te^(M) kiti^L tuli^{HL}
and boil 'atole'

The 'atole' will boil.

31 tē kītī nàkū
 te^(M) kiti^L naku^{MH}
 and boil hominy

The hominy will boil.

32 tē kītī nùtʃī
 te^(M) kiti^L nuʃi^{MH}
 and boil beans

And the beans will boil.

33 tē hā- nīⁿ- nàⁿ- ðīkō núⁿ kítí
 te^(M) ha^(M)- ni^{n(L)}- na^{n(M)}- ðiko^{MH} nu^{n(H)} kiti^{MH}
 and PRF PFV REPET sell 3F animal

And she has already sold the animals.

34 tē hā- nīⁿ- nàⁿ- ðīkō núⁿ nùʃí
 te^(M) ha^(M)- ni^{n(L)}- na^{n(M)}- ðiko^{MH} nu^{n(H)} nuʃi^{MH}
 and PRF PFV REPET sell 3F beans

And she has already sold the beans.

35 tē hā- nīⁿ- nàⁿ- ðīkō núⁿ túlí
 te^(M) ha^(M)- ni^{n(L)}- na^{n(M)}- ðiko^{MH} nu^{n(H)} tuli^{HL}
 and PRF PFV REPET sell 3F 'atole'

And she has already sold the 'atole'.

36 tē hā- nīⁿ- nàⁿ- ðīkō núⁿ kíðì↑
 te^(M) ha^(M)- ni^{n(L)}- na^{n(M)}- ðiko^{MH} nu^{n(H)} kiði^{LM}
 and PRF PFV REPET sell 3F cooking pot

And she has already sold the cooking pot.

37 tē nīⁿ- nàⁿ- ðikō núⁿ kítí
 te^(M) ni^{n(L)}- na^{n(M)}- ðiko^{MH} nu^{n(H)} kiti^{MH}
 and PFV REPET sell 3F animal

And she sold the animals.

38 tē nīⁿ- nàⁿ- ðikō núⁿ núǰí
 te^(M) ni^{n(L)}- na^{n(M)}- ðiko^{MH} nu^{n(H)} nuǰi^{MH}
 and PFV REPET sell 3F beans

And she sold the beans.

39 tē nīⁿ- nàⁿ- ðikō núⁿ túlí
 te^(M) ni^{n(L)}- na^{n(M)}- ðiko^{MH} nu^{n(H)} tuli^{HL}
 and PFV REPET sell 3F 'atole'

And she sold the 'atole'.

40 tē nīⁿ- nàⁿ- ðikō núⁿ kíðì↑
 te^(M) ni^{n(L)}- na^{n(M)}- ðiko^{MH} nu^{n(H)} kiði^{LM}
 and PFV REPET sell 3F cooking pot

And she sold the cooking pot.

41 tē nāⁿ- ðikō núⁿ kítí
 te^(M) na^{n(M)}- ðiko^{MH} nu^{n(H)} kiti^(L)
 and REPET sell 3F boil

And she will sell the animals.

42 tē nāⁿ- ðikō núⁿ núǰí
 te^(M) na^{n(M)}- ðiko^{MH} nu^{n(H)} nuǰi^{MH}
 and REPET sell 3F beans

And she will sell the beans.

43 tē nāⁿ- ðikō núⁿ túlí
te^(M) na^{n(M)}- ðiko^{MH} nu^{n(H)} tuli^{HL}
and REPET sell 3F 'atole'

And she will sell the 'atole'.

44 tē nāⁿ- ðikō núⁿ kíðì↑
te^(M) na^{n(M)}- ðiko^{MH} nu^{n(H)} kiðì^{LM}
and REPET sell 3F cooking pot

And she will sell the cooking pot.

45 tē nāⁿ- ðikó núⁿ kítí
te^(M) (H)- na^{n(M)}- ðiko^{MH} nu^{n(H)} kiti^(L)
and IPFV REPET sell 3F boil

And she is selling the animals.

46 tē nāⁿ- ðikó núⁿ núťjí
te^(M) (H)- na^{n(M)}- ðiko^{MH} nu^{n(H)} nuťji^{MH}
and IPFV REPET sell 3F beans

And she is selling the beans.

47 tē nāⁿ- ðikó núⁿ túlí
te^(M) (H)- na^{n(M)}- ðiko^{MH} nu^{n(H)} tuli^{HL}
and IPFV REPET sell 3F 'atole'

And she is selling the 'atole'.

48 tē nāⁿ- ðikó núⁿ kíðì↑
te^(M) (H)- na^{n(M)}- ðiko^{MH} nu^{n(H)} kiðì^{LM}
and IPFV REPET sell 3F cooking pot

And she is selling the cooking pot.

49 tē hā- nīⁿ- ðikō núⁿ kítí
 te^(M) ha^(M)- ni^{n(L)}- ðiko^{MH} nu^{n(H)} kiti^{MH}
 and PRF PFV sell 3F animal

And she has already sold the animals.

50 tē hā- nīⁿ- ðikō núⁿ nútjí
 te^(M) ha^(M)- ni^{n(L)}- ðiko^{MH} nu^{n(H)} nutji^{MH}
 and PRF PFV sell 3F beans

And she has already sold the beans.

51 tē hā- nīⁿ- ðikō núⁿ túlí
 te^(M) ha^(M)- ni^{n(L)}- ðiko^{MH} nu^{n(H)} tuli^{HL}
 and PRF PFV sell 3F 'atole'

And she has already sold the 'atole'.

52 tē hā- nīⁿ- ðikō núⁿ kíðì↑
 te^(M) ha^(M)- ni^{n(L)}- ðiko^{MH} nu^{n(H)} kiði^{LM}
 and PRF PFV sell 3F cooking pot

And she has already sold the cooking pot.

53 tē nīⁿ- ðikō núⁿ kítí
 te^(M) ni^{n(L)}- ðiko^{MH} nu^{n(H)} kiti^(L)
 and PFV sell 3F boil

And she sold the animals.

54 tē nīⁿ- ðikō núⁿ nútjí
 te^(M) ni^{n(L)}- ðiko^{MH} nu^{n(H)} nutji^{MH}
 and PFV sell 3F beans

And she sold the beans.

55 tē nīⁿ- ðikō núⁿ túlí
te^(M) ni^{n(L)}- ðiko^{MH} nu^{n(H)} tuli^{HL}
and PFV sell 3F 'atole'

And she sold the 'atole'.

56 tē nīⁿ- ðikō núⁿ kíðì†
te^(M) ni^{n(L)}- ðiko^{MH} nu^{n(H)} kiði^{LM}
and PFV sell 3F cooking pot

And she sold the cooking pot.

57 tē ðikō núⁿ kíťí
te^(M) ðiko^{MH} nu^{n(H)} kiti^{MH}
and sell 3F animal

And she will sell the animals.

58 tē ðikō núⁿ núťjí
te^(M) ðiko^{MH} nu^{n(H)} nuťji^{MH}
and sell 3F beans

And she will sell the beans.

59 tē ðikō núⁿ túlí
te^(M) ðiko^{MH} nu^{n(H)} tuli^{HL}
and sell 3F 'atole'

And she will sell the 'atole'.

60 tē ðikō núⁿ kíðì†
te^(M) ðiko^{MH} nu^{n(H)} kiði^{LM}
and sell 3F cooking pot

And she will sell the cooking pot.

61 tē ðíkó núⁿ kítí
te^(M) (H)- ðiko^{MH} nu^{n(H)} kiti^{MH}
and IPFV sell 3F animal

And she is selling the animals.

62 tē ðíkó núⁿ nútí
te^(M) (H)- ðiko^{MH} nu^{n(H)} nutí^{MH}
and IPFV sell 3F beans

And she is selling the beans.

63 tē ðíkó núⁿ túlí
te^(M) (H)- ðiko^{MH} nu^{n(H)} tuli^{HL}
and IPFV sell 3F 'atole'

And she is selling the 'atole'.

64 tē ðíkó núⁿ kíðì↑
te^(M) (H)- ðiko^{MH} nu^{n(H)} kiðì^{LM}
and IPFV sell 3F cooking pot

And she is selling the cooking pot.

Appendix D

Two glossed texts

D:1 Explanation of glossed texts

These two Mixtec texts, written by Rodolfo Miguel-López, are presented in the following format: the first line is written in Mixtec showing the surface tones; the second line shows the underlying tones; the third line gives the morpheme glosses, using the abbreviations shown in Appendix A; and the last line presents the English free translation.

The Mixtec transcription is according to the explanation provided in the Introduction, in Section 1.3 and in Chapter 2, Section 2.2.2. However, the reader should recall that for most morphemes in MXY, the underlying tones are aligned at the right edge. For words where the tones are aligned either at the left of the word or for multi-morphemic words, where tones are aligned at the left edge of the root, the tones sponsored are written following the syllable. In the case of morphemes which sponsor only floating tones, these tones are written in parentheses.

As stated in the Introduction, these texts are provided to demonstrate that the analysis described in this thesis accounts for the surface data in un-elicited material for this variety of Mixtec.

D:2 The bully

by Rodolfo Miguel-López

1 Tī sētéè↑ βēēⁿ tí
 ti^(H) (H)- se^(M)- tee^{LM} βee^{nMH} ti^(H)
 3AN IPFV make man self 3AN

The animal who thought it was 'macho'.

2 Kūðíí-iníⁿ t̥íkàt̥í sēsī tí íté k^wíí
 (H)- ku^(M)- ðii^(LH) -ini^{nML} t̥í^H- ka^Lt̥í^{MH} (H)- sesi^(H) ti^(H) ite^{ML} k^wií^H
 IPFV be happy inside sheep IPFV eat 3AN grass green

íⁿ tí íⁿ t̥ínùù
 i^{n(M)} ti^(H) ii^{nM} t̥i^(L)- nuu^{LH}
 PL 3AN one spherical mountain

The sheep were happily eating green grass on a mountain,

3 tē sītā ðútú ástò↑^o tì
 te^(M) (H)- sita ðutu^{MH} asto^{oML} ti^(H)
 and IPFV sing whistle owner 3AN

and their owner was whistling,

4 t̥í t̥ā^áⁿ ðè kùðíí-iníⁿ t̥ù↑kū hà íò↑
 t̥í ta^á^{nHL} ðe^(L) (H)- ku^(M)- ðii^(LH) -ini^{nML} tuku^M ha^(LH) io^{LM}
 because also 3MMS IPFV be happy inside again COMP very

βī sínē t̥íkàt̥í ðé
 βii^M (H)- si^(M)- nec^{ML} t̥i^(H)- ka^Lt̥í^{MH} ðe^(L)
 nicely IPFV HABIT graze AN sheep 3MMS

because he was also happy again, because his sheep were grazing nicely.

5 Tē ūūⁿ-nīⁿ nīⁿ- kàkū-nūū tʃikàtʃī īⁿká kà
 te^(M) uu^{nM} -ni^(M) ni^{n(L)}- kaku^M -nuu^{ML} tʃi^(H)- ka^Ltʃi^{MH} iⁿka^{ML} -ka^(L)
 and suddenly just PFV appear AN sheep another more

ājìβī tē nīⁿ- kà^ʔaⁿ īⁿ tī :

aji^Lβi^{MH} te^(M) ni^{n(L)}- ka^ʔa^{nL} ii^{nM} ti^(H)

people and PFV say one 3AN

And suddenly sheep belonging to somebody else appeared and one of them said:

6 — βā^ʔà-tikūú nóⁿ líà nīⁿ- kà^ʔaⁿ īⁿ kānérùⁿ .

no^{n(L)} li^Ha^L ni^{n(L)}- ka^ʔa^{nL} ii^{nM} kane^Hru^{nL}

2MS lass PFV say one ram

“Hello, lass,” said a ram.

7 — βā^ʔà-tikūú náⁿ k^wá^ʔa^ʔ nīⁿ- kà^ʔaⁿ īⁿ tī ðī^ʔí .

na^{n(H)} k^wa^ʔa^{LM} ni^{n(L)}- ka^ʔa^{nL} ii^{nM} ti^(H) ði^ʔi^{HL}

2FS sister/brother PFV say one 3AN female

“Hello, brother,” said one of the ewes.

8.1 — ĭ Nāiⁿ- kùú há sèðè nóⁿ kànécè nòⁿ

nai^{nLH}- kuu^M ha^(LH) (H)- seðe no^{n(L)} (H)- kane^{ML} no^{n(L)}

what be COMP IPFV do 2MS IPFV graze 2MS

kūū nūⁿ jù^ʔúⁿ níⁿ ?

(H)- kuu nu^{nLH} ju^ʔu^{nMH} ni^{n(L)}

IPFV be face land 1

“What are you doing grazing on MY land,

8.2 tē hā- tānī^ʔí íté -nìⁿ k^wā^ʔaⁿ .

te^(M) ha^(M)- ta^(H)- ni^ʔi^M ite^{ML} ni^{n(L)} k^wa^ʔa^{nL}

and PRF PROG finish grass 1 be going

And there soon won't be any grass left.”

9.1 —i Nāiⁿ- kúú há tá[?]áⁿ ⁿtǎ há òùkàⁿ
 nai^{nLH}- kuu^M ha^(LH) (H)- ta[?]a^{nML} ⁿtǎ^(H) ha^(LH) òuka^{nMH}
 what be COMP IPFV bother 2FSEMPH COMP thus
 kà[?]áⁿ nāⁿ há kàⁿèé ⁿtǔ[?]úⁿ nùⁿ jù[?]úⁿ náⁿ ?
 (H)- ka[?]a^{nL} na^(H) ha^(LH) (H)- kane^{ML} ⁿtǔ[?]ú^{nML} nu^{nLH} ju[?]u^{nMH} na^(H)
 IPFV say 2FS COMP IPFV graze 1EMPH face land 2FS

“What’s bothering you that makes you talk like that saying that I’m grazing on your land

9.2 tē nūⁿ jù[?]úⁿ ástò[?]áⁿ ⁿtǔ[?]úⁿ kàⁿèé nīⁿ .
 te^(M) nu^{nLH} ju[?]u^{nMH} asto[?]á^{nML} ⁿtǔ[?]ú^{nML} (H)- kane^{ML} nī^{n(L)}
 and face land owner 1EMPH IPFV graze 1

and it’s on my owners land that I am grazing.”

10 — Kō βāsì náⁿòíkō nōⁿ tǐ jūtēⁿ tē jā[?]àⁿ nīⁿ
 ko^(M) βasi^{LH} naⁿòiko^{LM} no^{n(L)} tǐ jute^{nML} te^(M) ja[?]a^{LM} nī^{n(L)}
 but not become angry 2MS because tomorrow and pass 1
 nūⁿ jù[?]úⁿ nóⁿ hà kàsì nīⁿ itē ijó i[?]āⁿ tǐ ijò
 nu^{nLH} ju[?]u^{nMH} no^{n(L)} ha^(LH) kasi^{MH} nī^{n(L)} ite^{ML} (H)- ijo^L i[?]a^{MH} tǐ ijo^{LM}
 face land 2MS COMP eat 1 grass IPFV be here because very
 āđì sèsì sí
 ađi^{LH} (H)- sesi^(H) si^(H)
 tasty IPFV eat 3G

“But don’t get angry, because tomorrow I’m going to come to your land to eat grass because it tastes so good,”

11 nīⁿ- kà[?]áⁿ kánérùⁿ tē k^wā[?]áⁿ tī .
 nī^{n(L)}- ka[?]a^{nL} kane^{Hru}n^L te^(M) k^wā[?]áⁿ tī^(H)
 PFV say ram and be going 3AN

the ram said and left.

12 Nē²ēⁿ nùù jútéⁿ nìⁿ- nùkū-nēē tūkú ástō²ō tʃíkàtʃī
 ne²e^{nML} nuu^{MH} jute^{nML} nì^{n(L)}- nuku^{MH}_nee^{MH} tuku^M asto^{2L}o^{ML} tʃi^H- ka^Ltʃi^{MH}
 early day tomorrow PFV set off again owner sheep

há k^wá²áⁿ tükū ðē jükū nì²í tí k^wéná hà βási kùú
 ha^(LH) k^wa²a^{nL} tuku^M ðe^(L) juku^{MH} nì²i^M ti^(H) k^wena^{HL} ha^(LH) βasi^{LH} kuu^{ML}
 COMP be going again 3MMS pasture with 3AN so COMP not die

tī ðókō

ti^(H) ðoko^{LM}

3AN hunger

Early the next morning the owner of the sheep set off again with the sheep so that they wouldn't die of hunger

13 tē ōré hà nīⁿ- sèè tī núⁿ sèsì tí íté
 te^(M) ore^{HL} ha^(LH) nì^{n(L)}- sec^L ti^(H) nu^{n(LH)} (H)- sesi^(H) ti^(H) ite^{ML}
 and when COMP PFV arrive 3AN where IPFV eat 3AN grass

hā- sínēē ðāβā kā tá tʃíkàtʃī tē nīⁿ-
 ha^(M)- (H)- si^(M)- nec^{ML} ðaβa^M ka^(L) ta^{HL}- tʃi^(H)- ka^Ltʃi^{MH} te^(M) nì^{n(L)}-
 PRF IPFV HABIT graze some more PL AN sheep and PFV

kà²áⁿ -nīⁿ tūkū kánérùⁿ :

ka²a^{nL} -nì^{n(M)} tuku^M kane^Hru^{nL}

say LIM again ram

When they arrived where they eat grass, some other sheep were already grazing, and the ram spoke again.

14 — Nāiⁿ- kùú há nàⁿ- nùkú nóⁿ kàncé -nīⁿ tūkū
 nai^{nLH}- kuu^M ha^(LH) na^{n(H)}- nuku^{MH} no^{n(L)} (H)- kance^{ML} -ni^{n(M)} tuku^M
 what be COMP SBJV look for 2MS IPFV graze LIM again
 nōⁿ i^ʔā
 no^{n(L)} i^ʔa^{MH}
 2MS here

“What are you looking for grazing here again?”

15 tē nòⁿ òì hà níⁿ- kā^ʔāⁿ nīⁿ hà βási kisi ká
 te^(M) no^{nL} òi^{LH} ha^(LH) ni^{n(L)}- kā^ʔāⁿ ni^{n(L)} ha^(LH) βasi^{LH} kisi^M -ka^(L)
 and isn't it the case COMP PFV say I COMP not come more
 nòⁿ βāⁿ
 no^{n(L)} βaⁿ
 2MS can't you see

And didn't I tell you that you weren't to come here anymore!?”

16 — Nāiⁿ- kùú há tā^ʔáⁿ ⁿtjā há ⁿtjísé jú βási nāⁿ
 nai^{nLH}- kuu^M ha^(LH) ta^ʔa^{nML} ⁿtja^(H) ha^(LH) ⁿtjise^M ju^(M) βasi^{LM} na^{n(H)}
 what be COMP bother 2FSEMPH COMP really approx come 2FS
 ðā- tā^ʔáⁿ jā^ʔāⁿ náⁿ
 (H)- ða^(H)- ta^ʔa^{nML} ja^ʔa^{nMH} na^{n(H)}
 IPFV CAUS bother OBJ 2FS

“What's up with you that you have the nerve to come and bother me?”

17 tē ⁿtjísē hà núⁿ jù^ʔúⁿ βééⁿ ⁿtjú^ʔú kāncé nìⁿ
 te^(M) ⁿtjise^M ha^(LH) nu^{nL} ju^ʔu^{nMH} βee^{nMH} ⁿtju^ʔu^{nML} (H)- kance^{ML} ni^{n(L)}
 and really COMP where land self 1EMPH IPFV graze I

And it really is the case that I'm grazing on MY land.

18 K^wā[?]áⁿ kúnú[?]úⁿ núⁿ jù[?]úⁿ βééⁿ náⁿ nóⁿ tē
 H- k^wa[?]a^{nL} (H)- kunu[?]u^{nMH} nu^{nL} ju[?]u^{nMH} βee^{nMH} na^{n(H)} no^{nH} te^(M)
 IMP be going IMP go home where land self 2FS or else
 kīnīⁿ nàⁿ ká
 kini^{nML} na^{n(H)} -ka^(L)
 know 2FS more

Off you go home to your own land or else you're in trouble."

19 — Tē ðó sènìⁿ-íníⁿ nóⁿ hà ðàjú[?]ú jǎ[?]āⁿ
 te^(M) ðo^{HL} seni^{nM} -ini^{nML} no^{n(L)} ha^(LH) (H)- ða^(H)- ju[?]u^{ML} ja[?]a^{nMH}
 and how think inside 2MS COMP IPFV CAUS be afraid OBJ
 nóⁿ
 no^{n(L)}
 2MS

"Surely you don't think that you are frightening me.

20 Kō ā- tùù k^wíí jù[?]ú ⁿtǔ[?]ú tǔi βēnīⁿ āđí[?]í
 ko^(M) a^{LH}- tuu k^wi^{iHL} ju[?]u^{MH} ⁿtǔ[?]u^{ML} tǔi^(M) βeni^{nMH} ađi[?]i^{HL}
 but NEG be not at all be afraid 1EMPH because only woman
 kùù há nà[?]βí sō[?]ó īⁿ nōⁿ
 (H)- kuu ha^(LH) na[?]βi^{HL} so[?]o^H i^{n(M)} no^{n(L)}
 IPFV be COMP defenceless 2MSEMPH PL 2MS

"But I'm not scared at all because you are all just a bunch of defenceless women.

21 tē híaⁿ kùù há tátúníⁿ βēēⁿ níⁿ
 te^(M) hia^{nHL} (H)- kuu ha^(LH) (H)- tatuni^{nHL} βee^{nMH} ni^{n(L)}
 and for this reason IPFV be COMP IPFV command self I
 k^wé nàⁿ- nà[?]jí nōⁿ
 k^we^{HL} (H)- na^{n(M)}- na[?]ji^(L) no^{n(L)}
 although IPFV REPET cry 2MS

That's why I get to boss you around, even though you keep on crying."

22 Kā²áⁿ ðù↑kāⁿ ká kánérùⁿ nàk^wííⁿ tí tē
 (H)- ka²a^{n(L)} ðuka^{nMH} -ka^(L) kane^Hru^{nL} (H)- nak^wii^{nLM} ti^(H) te^(M)
 IPFV say thus more ram IPFV be standing 3AN and
 ūū^{n-níⁿ} níⁿ⁻ kàkū-nūū ìíⁿ kánérùⁿ kà²nùⁿ
 uu^{nM} -ní^{n(M)} ní^{n(L)}- kaku^M -nuu^{ML} ii^{nM} kane^Hru^{nL} ka²nu^{nMH}
 suddenly lim PFV appear one ram big

The ram was still standing talking when suddenly a big ram appeared

23 tē k^wēná-níⁿ-kā ðūkúⁿ tí tē kōkóⁿ níⁿ⁻ kā²áⁿ tí :
 te^(M) k^wēná-níⁿ-kā ðuku^{nHL} ti^(H) te^(M) koko^{nHL} ní^{n(L)}- kā²áⁿ ti^(H)
 and extremely high 3AN and gruff PFV say 3AN

and it was enormous and it said in a gruff voice,

24 — Nāiⁿ⁻ kùú há sèðè só²ó kànèé nòⁿ
 nai^{nLH}- kuu^M ha^(LH) (H)- seðe so²o^{HL} (H)- kane^{ML} no^{n(L)}
 what be COMP IPFV do 2msemph IPFV graze 2MS
 kūū nūⁿ jù²úⁿ níⁿ
 (H)- kuu nu^{n(LH)} ju²u^{nMH} ní^{n(L)}
 IPFV be where land 1

“And what are YOU doing grazing on my land,

25 tē ðā- ní²í nóⁿ kūū ìtē nìⁿ
 te^(M) (H)- ða^(H)- ní²i^M no^{n(L)} (H)- kuu ite^{ML} ní^{n(L)}
 and IPFV CAUS finish 2MS IPFV be grass 1

and you are finishing up MY grass.

26 tē ðó ā- tùú nún kànèé nòⁿ áⁿ náíⁿ⁻ kùú sí
 te^(M) ðo^{HL} a^{LH}- tuu nu^{n(LH)} (H)- kane^{ML} no^{n(L)} a^{nH} nai^{nLH}- kuu^M si^(H)
 and how NEG be where IPFV graze 2MS or what be 3G

Isn't there anywhere else for you to graze, or what is up?”

27 — Kō βāsì náⁿðíkō níⁿ ðītō t̥jī ðónīⁿ
 ko^(M) βasi^{LH} naⁿðiko^{LM} ni^{nHL} ðito^{ML} t̥ji^(M) ðo^Hni^{Mn}
 but not become angry 2HON uncle because only

kási^{ʔó} ðá ðīðī ðá i^{ʔā}
 (H)- ka^(L)- si^{ʔo}^{HL} ða^{HL} ðiðī^{ML} ða^{HL} i^{ʔa}^{MH}
 IPFV say respectfully 1HON aunt 1HON here

“But don’t get angry, Uncle, because I am just greeting my aunts here.

28 tē níⁿ- sikhàⁿ tū^ʔùⁿ ðá jāⁿ tēnóⁿ nēkú βá^{ʔā} níⁿ
 te^(M) ni^{n(L)}- sika^{nL} tu^ʔu^{nLM} ða^{HL} ja^{n(H)} teno^{nHL} (H)- neku^M βa^{ʔa}^{LM} ni^{nHL}
 and PFV ask word 1HON 3FHON if IPFV be good 2HON

And I asked them if you were well,

29 kō nāⁿβīī hà nū^ʔùⁿ ðá
 ko^(M) nāⁿ- βii^{ML} ha^(LH) nu^ʔu^{nL} ða^{HL}
 but COMP go home 1HON

but right now I’m going home.”

30 Tē βāðó túní^ʔnuⁿ kànerùⁿ kūnù^ʔūⁿ tí
 te^(M) βaðo^{HL} (H)- tuni^ʔnu^{nLH} kane^Hru^{nL} ku^(L)- nu^ʔu^{nMH} ti^(H)
 and all of a rush IPFV roll ram go go home 3AN

And the ram rolled (down the hill) all in a rush on his way home

31 t̥jī ìò níⁿ- jù^ʔú tī tē níⁿ- kà^ʔàⁿ iⁿkā kà tī
 t̥jī io^{LM} ni^{n(L)}- ju^ʔu^L ti^(H) te^(M) ni^{n(L)}- ka^ʔa^{nL} iⁿka^L -ka^(L) ti^(H)
 because very PFV be afraid 3AN and PFV say another more 3AN

because it was very scared, and the other (sheep) said,

32 —j Nāiⁿ- kùú há nìⁿ- tā^ʔāⁿ ðè ?
 nai^{nLH}- kuu^M ha^(LH) ni^{n(L)}- ta^ʔa^{nML} ðe^(L)
 what be COMP PFV bother 3MMS

“What’s bothering him?”

33 — Kūḏānāⁿ nīⁿ- t̄sē^{ʔē} jí íⁿ júù t̄jī ìò nāḏī
 kuḏana^{nM} nī^{n(L)}- tu^(M)- se^{ʔeMH} ji^(H) ii^{nM} juu^{LH} t̄jī io^{LM} naḏi^{MH}
 perhaps PFV trip by foot 3MFS one stone because very ugly

kāā í^{ʔá} .

(H)- kaa í^{ʔaMH}

IPFV appear here

“Perhaps he tripped on a stone, because it’s really very rough here.”

34 Nēḏàá tē ā- nīⁿ- ⁿt̄júkáβá ká kānérùⁿ tī íō
 neḏa^{LaHL} te^(M) a^{LH}- nī^{n(L)}- ⁿt̄júkaβa^{MH} -ka^(L) kane^{HruNL} ti^(H) io^{LM}
 since then and NEG PFV return more ram 3AN very

sē- í^{ʔníⁿ} βééⁿ tí há íō tēè tī .

H- se- í^{ʔní^{nMH}} βee^{nMH} ti^(H) ha^(LH) io^{LM} tee^{LM} ti^(H)

imp make proud self 3AN COMP very man 3AN

Since then the ram has never come back, the one who was very proud that he was really macho.

1 Tū²ùⁿ jājàⁿ ðùsèⁿ
 tu²u^{nLM} jaja^{nLH} ðuse^{nMH}
 word coyote lazy

The story of the lazy coyote

2 Nāⁿ- nāⁿ- kānīⁿ níⁿ īīⁿ tū²ùⁿ jājàⁿ ðùsèⁿ tí síđí
 na^{n(H)}- na^{n(M)}- kani^{nM} ni^{n(L)} ii^{nM} tu²u^{nLM} jaja^{nLH} ðuse^{nMH} ti^(H) (H)- siđi^L
 SBJV REPET tell 1 one word coyote lazy 3AN IPFV sleep
 nè[↑]ūⁿ tōtō
 ne²u^{nM} toto^{MH}
 among rock

I am going to tell a story about a lazy coyote, the one who sleeps among the rocks.

3 síđí jājàⁿ tē ūūⁿ -nīⁿ nīⁿ- nākōò ðānāⁿ
 (H)- siđi^(L) jaja^{nLH} te^(M) uu^{nM} -ni^{n(M)} ni^{n(L)}- na^(M)- koo^{LM} ðana^{nM}
 IPFV sleep coyote and suddenly LIM PFV REPET get up confused
 tī
 ti^(H)
 3AN

The coyote was sleeping and suddenly it got up all confused

4 tē nīⁿ- kà²àⁿ tī níⁿ- sà[↑]àⁿ tí βééⁿ tí
 te^(M) ni^{n(L)}- ka²a^{nL} ti^(H) ni^{n(L)}- sa²a^{nLH} ti^(H) βee^{nMH} ti^(H)
 and PFV say 3AN PFV reply 3AN self 3AN

and it said to itself,

5 ðāā -jū tʃíkúðù nò
 ðāā -ju^M tʃiku^Hðu^L no^(H)
 what what sleepy head IINCL

“Oh what a sleepy head am I.

6 Nāiⁿ-kùú há kàsì nò hóⁿ ðù↑kāⁿ ðó -nì↑ⁿ
 nai^{nLH}- kuu^M ha^(LH) kasi^{MH} no^(H) ho^{nHL} ðuka^{nMH} ðo^{HL} ni^{n(M)}
 what be COMP eat IINCL for this reason thus how LIM

sīðí nò

(H)- siðí^(L) no^(H)

IPFV sleep IINCL

What will I eat as all I do is sleep?

7 tē kōkōⁿ sífí nò .

te^(M) (H)- kokoⁿ siti^{ML} no^(H)

and IPFV swallow stomach IINCL

and I'm hungry.

8 nāⁿ- kī^{ʔi}ⁿ nò jùkú há kàsì nò

na^{n(H)}- ki^{ʔi}^{n(L)} no^(H) juku^{MH} ha^(LH) kasi^{MH} no^(H)

SBJV go IINCL look for COMP eat IINCL

I'll go and look for something to eat,

9 βī^{ʔi} ká hà kùú nò ðókò↑ .

βi^{ʔi}^{MH} -ka^(L) ha^(LH) kuu^{ML} no^(H) ðoko^{LM}

or else more COMP die IINCL hunger

or else I'll die of hunger.

10 Nīⁿ- nùkū-nēē jájàⁿ k^{wá}ʔáⁿ tī jūkú há kàsì tí .

ni^{n(L)}- nuku^{MH}_nee^{MH} jaja^{nLH} k^{wa}ʔa^{nL} ti^(H) juku^M ha^(LH) kasi^{MH} ti^(H)

PFV set off coyote be going 3AN look for COMP eat 3AN

The coyote set off and went to look for something to eat.

11 ūūⁿ-nīⁿ nīⁿ- kìsōō tí núⁿ nàⁿkóò↑ īīⁿ jūtūⁿ
 uu^{nM} nī^{n(M)} nī^{n(L)}- kiso^{nMH} tí^(H) nu^{n(LH)} nàⁿkóò↑ īī^{nM} jutu^{nMH}
 suddenly LIM PFV arrive 3AN where be sitting one tree
 nōjúkú nájó^o↑ ,
 (H)- no- juku^M na^{MH}j^o^o^{LM}
 IPFV put pile up cornstalks

And what do you know but it arrived where there was a tree piled up with cornstalks (in the crotch of the tree),

12 tē nīⁿ- kùtjāāⁿ
 te^(M) nī^{n(L)}- ku^(M)- tjaa^{nMH}
 and PFV be rustle

And something rustled,

13 hóⁿ nīⁿ- nk^wiìⁿ tī ,
 ho^{nHL} nī^{n(L)}- nk^wiì^{nL} tí^(H)
 for this reason PFV stop 3AN

which is why it stopped

14 tē nīⁿ- nàkōtō nēē tì ,
 te^(M) nī^{n(L)}- na^(M)- koto^M nec^{ML} tí^(H)
 and PFV REPET look up 3AN

and it looked up

15 tē nīⁿ- sìnīⁿ tì īīⁿ títà↑ nōtúú núⁿ
 te^(M) nī^{n(L)}- sini^{nL} tí^(H) īī^{nM} tita^{LM} (H)- no- tuu^{MH} nu^{n(LH)}
 and PFV see 3AN one opossum IPFV put stand where
 nòjúkú nájó^o↑ sítjī tí nòò tàβíⁿ ,
 (H)- no- juku^{MH} na^{MH}j^o^o^{LM} (H)- sítjī tí^(H) noo^{LH} taβi^{nH}
 IPFV put pile up cornstalks IPFV chew 3AN cane sweet

and it saw an opossum perched on the pile of cornstalks, chewing cane

16 tē nīⁿ- sɪkàⁿ tū^ʔùⁿ jǎ^ʔǎⁿ jájàⁿ .
 te^(M) ni^{n(L)}- sika^{nL} tu^ʔu^{nLM} ja^ʔa^{nMH} jaja^{nLH}
 and PFV ask word OBJ coyote

and the coyote asked it,

17 Nāiⁿ- kùú há sèðè nóⁿ nòtúú nóⁿ síáⁿ .
 nai^{nLH}- kuu^M ha^(LH) (H)- seðe no^{n(L)} (H)- no- tuu^{MH} no^{n(L)} sia^{nHL}
 what be COMP IPFV do 2MS IPFV put stand 2MS there

“What are you doing there perched on top of the corn stalks?”

18 tē ūūⁿ -jū ðūkúⁿ nīⁿ- sènàβā títà tǐ
 te^(M) uu^{nM} -ju^M ðuku^{nHL} ni^{n(L)}- se- naβa^M tita^{LM} tǐ
 and suddenly approx high PFV opossum because

kíí nīⁿ- kǎ^ʔǎⁿ jájàⁿ .
 kii^H ni^{n(L)}- ka^ʔa^{nL} jaja^{nLH}
 abruptly PFV say coyote

and the opossum jumped really high because the coyote had spoken abruptly,

19 tē ní^ʔíⁿ títà tē ðíkò↑ tī níⁿ- kǎ^ʔǎⁿ tī
 te^(M) (H)- ni^ʔi^{nLM} tita^{LM} te^(M) (H)- ðiko^{LM} ti^(H) ni^{n(L)}- ka^ʔa^{nL} ti^(H)
 and IPFV tremble opossum and IPFV be angry 3AN PFV say 3AN
 núⁿ jájàⁿ tǐ nīⁿ- jù^ʔú tī .
 nu^{n(LH)} jaja^{nLH} tǐ ni^{n(L)}- ju^ʔu^{nHL} ti^(H)
 where coyote because PFV be afraid 3AN

the opossum was trembling and angry as it spoke to the coyote because it had been frightened.

20 nʔuʔu nòtúú sítʃí níⁿ nōò tàβíⁿ íʔá
 nʔuʔu^{ML} (H)- no- tuu^{MH} (H)- sítʃi ní^{n(L)} noo^{LH} taβi^{nH} íʔa^{MH}
 IEMPH IPFV put stand IPFV chew 1 cane sweet this

βāⁿ

βaⁿ

can't you see

"I'm perched chewing this sweet cane, isn't that obvious?"

21 tē sōʔó nāiⁿ- kùú há nùkù nóⁿ hà ðùkàⁿ
 te^(M) soʔo^{HL} nai^{nLH}- kuu^M ha^(LH) (H)- nuku^(H) no^{n(L)} ha^(LH) ðuka^{nMH}
 and 2MSEMPH what be COMP IPFV look for 2MS COMP thus

níⁿ- ðà- jùʔú jàʔāⁿ nóⁿ

ní^{n(L)}- ða^(H) juʔu^(L) jaʔa^{nMH} no^{n(L)}

PFV CAUS be afraid OBJ 2MS

And what are you looking for that makes you scare me like that?

22 tē nāⁿ- tù kānēē nāⁿβīī
 te^(M) na^{nL}- tu^(M) kanee^{ML} naⁿβii^{ML}
 and what idiot graze now

What idiot would be roaming around at this time of day.

23 tē iò íʔníⁿ há kàkà nò tʃí ā- tùù βíkò
 te^(M) io^{LM} íʔni^{nMH} ha^(LH) kaka^M no^(H) tʃi a^{LH}- tuu βiko^{LH}
 and very hot COMP walk IINCL because NEG be cloud

It's too hot to walk, because there aren't any clouds."

24 Tē níⁿ- kàʔāⁿ jājàⁿ níⁿ- sàʔāⁿ tí títàʔ
 te^(M) ní^{n(L)}- kaʔa^{nL} jaja^{nLH} ní^{n(L)}- saʔa^{nLH} ti^(H) tita^{LM}
 and PFV say coyote PFV reply 3AN opossum

And the coyote spoke in reply to the opossum,

25 ⁿtʃu[?]u[?] ⁿtʃinùú nùkù níⁿ hà kàsì níⁿ
ⁿtʃu[?]u^{ML} (H)- ⁿtʃinuu^{ML} (H)- nuku^(H) ni^{n(L)} ha^(LH) kasi^{MH} ni^{n(L)}
 IEMPH IPFV wander about IPFV look for 1 COMP eat 1

tʃī īò kōkōⁿ sítí nìⁿ
 tʃī io^{LM} (H)- kokoⁿ siti^{ML} ni^{n(L)}
 because very IPFV swallow stomach 1

“I’m wandering around looking for something to eat because I am very hungry (lit. my stomach is swallowing)”

26 tē βātà nì[?]iⁿ -kà nìⁿ hà kàsì níⁿ
 te^(M) βata^{LH} ni[?]i^{n(L)} -ka^(L) ni^{n(L)} ha^(LH) kasi^{MH} ni^{n(L)}
 and not yet find more 1 COMP eat 1

and I still haven’t found anything for me to eat

27 tē ā- kùnèé -ká nìⁿ ðòkò
 te^(M) a^{LH}- kuneé^{MH} -ka^(L) ni^{n(L)} ðoko^{LM}
 and NEG put up with more 1 hunger

and I can’t stand being this hungry.”

28 Tē nīⁿ- kà[?]àⁿ tītà nīⁿ- sà[?]àⁿ tí
 te^(M) ni^{n(L)}- ka[?]a^{nL} tita^{LM} ni^{n(L)}- sa[?]a^{nLH} ti^(H)
 and PFV say opossum PFV reply 3AN

And the opossum said in reply,

29 kō ðó ðù[?]sēⁿ só kùù há ðùkàⁿ kà[?]áⁿ
 ko^(M) ðo^{HL} ðuse^{nMH} so^{HL} (H)- kuu ha^(LH) ðuka^{nMH} (H)- ka[?]a^{n(L)}
 but how lazy 2MSEMPH IPFV be COMP thus IPFV say
 nòⁿ hà á- nì[?]iⁿ nòⁿ hà kàsì nóⁿ
 no^{n(L)} ha^(LH) a^{LH}- ni[?]i^{n(L)} no^{n(L)} ha^(LH) kasi^{MH} no^{n(L)}
 2MS COMP NEG find 2MS COMP eat 2MS

“But you are terribly lazy to be saying that you can’t find anything to eat.

30 tā- kēnéⁿ núⁿ nòtúú níⁿ í[?]ā nāⁿ- kūtjī nō
 ta^(H)- kene^{nM} nu^{n(LH)} (H)- no- tuu^{MH} ni^{n(L)} í[?]a^{MH} na^{n(H)}- kutji no^(H)
 PROG come up where IPFV put stand 1 here SBJV chew 1INCL

nóò tēnóⁿ kò↑kōⁿ sítí nōⁿ .
 noo^{LH} teno^{nHL} (H)- kokoⁿ siti^{ML} no^{n(L)}
 cane if IPFV swallow stomach 2MS

Come up here where I am if you are hungry.”

31 Tē níⁿ- sè- ū[?]ù sī lū[?]á ánúⁿ jājàⁿ há òùkàⁿ
 te^(M) ni^{n(L)}- se^(M) u[?]u^L si^(H) lu[?]a^M anu^{nHL} jaja^{nLH} ha^(LH) òuka^{nMH}
 and PFV do difficult 3G a little heart coyote COMP thus

níⁿ- kà↑[?]àⁿ títà
 ni^{n(L)}- ka[?]a^{nL} tita^{LM}
 PFV say opossum

It hurt the coyote to its core that the opossum had spoken like that but it said in reply,

32 kō níⁿ- kà[?]àⁿ tī níⁿ- sà↑[?]àⁿ tí .
 ko^(M) ni^{n(L)}- ka[?]a^{nL} ti^(H) ni^{n(L)}- sa[?]a^{nLH} ti^(H)
 but PFV say 3AN PFV reply 3AN

33 Nā[?]áⁿ βá[?]à↑ nōⁿ hà á- kùù níⁿ hà kàá nìⁿ
 (H)- na[?]a^{nM} βa[?]a^{LM} no^{n(L)} ha^(LH) a^{LH}- kuu ni^{n(L)} ha^(LH) kaa^{ML} ni^{n(L)}
 IPFV know good 2MS COMP NEG be able 1 COMP go up 1

nùⁿ nòðò nóⁿ
 nu^{n(LH)} (H)- noðo no^{n(L)}
 where IPFV be 2MS

“You know perfectly well that I can't come up to where you are

34 tʃī ðūkûⁿ
 tʃi^(M) ðuku^{nHL}
 because high

because it is (too) high.

35 Kō kánà^ʔβí nìⁿ nūùⁿ nóⁿ hà nùkù nóⁿ
 ko^(M) (H)- ka^(L)- na^ʔβi^{nHL} ni^{n(L)} nuu^{nLH} no^{n(L)} ha^(LH) nuku^{MH} no^{n(L)}
 but IPFV ask poor I face 2MS COMP look for 2MS

nōð

noo^{LH}

cane

But, please would you look for some cane

36 tē ðā- kūūⁿ nóⁿ sì↑ nāⁿ- kūtʃī níⁿ
 te^(M) ða^(H)- kuuⁿ no^{n(L)} si^(H) na^{n(H)}- kutʃi ni^{n(L)}
 and CAUS come down 2MS 3G SBJV chew I

and throw it down for me to chew. ”

37 Tē hā ðùkàⁿ níⁿ- kà^ʔàⁿ jājàⁿ níⁿ- sènīⁿ-īnīⁿ tītà
 te^(M) ha^(LH) ðuka^{nMH} ni^{n(L)}- ka^ʔa^{nL} jaja^{nLH} ni^{n(L)}- seni^{nM}_ini^{nML} tita^{LM}
 and COMP thus PFV say coyote PFV think opossum

As a result of what the coyote had said, the opossum thought,

38 nāiⁿ- kùú tú té i^ʔā hóⁿ k^wi↑níⁿ ðè hà
 nai^{nLH}- kuu^M tu^(M) te^{LM} i^ʔa^{MH} ho^{nHL} (H)- k^wini^{nML} ðe^(L) ha^(LH)
 what be idiot man this for this reason IPFV want 3MMS COMP
 nùkù nò há kàsì ðé
 nuku^{MH} no^(H) ha^(LH) kasi^{MH} ðe^(L)
 look for 1INCL COMP eat 3MMS

“Who in the world does he think he is that he wants me to look for something for him to eat,

39 tē nīⁿ βééⁿ nó á- nì^ʔíⁿ hà kàsì nò
 te^(M) ni^{n(H)} βee^{nMH} no^(H) a^{LH-} ni^ʔi^{n(L)} ha^(LH) kasi^{MH} no^(H)
 and not even self 1INCL NEG find COMP eat 1INCL

and I haven't found (enough) for myself to eat."

40 kō ā- nìⁿ⁻ kúnéé-íníⁿ tí há náìⁿ kùú há
 ko^(M) a^{LH-} ni^{n(H)} kuncé^{MH}_ini^{nML} ti^(H) ha^(LH) nai^{nLH-} kuu^M ha^(LH)
 but NEG CTR figure out 3AN COMP what be COMP

kújā^ʔāⁿ tí tē nīⁿ⁻ kà^ʔāⁿ tí
 ku^{(L)-} ja^ʔa^{nMH} ti^(H) te^(M) ni^{n(L)-} ka^ʔa^{nL} ti^(H)
 tell OBJ 3AN and PFV say 3AN

But it couldn't figure out how it should reply so it said,

41 Nóⁿ ðù↑kāⁿ kā^ʔáⁿ nòⁿ jáⁿ tē kúnētū lālī
 nó^{nHL} ðuka^{nMH} (H)- ka^ʔa^{n(L)} no^{n(L)} ja^{nH} te^(M) kunetu^M lalii^{HL}
 if thus IPFV say 2MS then and wait a little while

jù↑ nāⁿ nūkū níⁿ nóò kàsì nóⁿ ,
 ju^(M) na^{n(H)-} nuku^(H) ni^{n(L)} noo^{LH} kasi^{MH} no^{n(L)}
 approx SBJV look for 1 cane eat 2MS

"If that is what you are saying, then wait for a bit, while I look for something for you to eat,

42 ðó hà kùnā^ʔáⁿ nóⁿ hà òré hà ðà- kúúⁿ níⁿ
 ðo^{HL} ha^(LH) kuna^ʔa^{nMH} no^{n(L)} ha^(LH) ore^{HL} ha^(LH) ða^(H) kuuⁿ ni^{n(L)}
 how COMP know 2MS COMP when COMP CAUS come down 1

sì↑ nīká nòⁿ jù^ʔū nóⁿ tē kāðī nòⁿ nūùⁿ nóⁿ
 si^(H) (H)- nika^{ML} no^{n(L)} ju^ʔu^{MH} no^{n(L)} te^(M) kaði^{ML} no^{n(L)} nuu^{nLH} no^{n(L)}
 3G IPFV open 2MS mouth 2MS and close 2MS eye 2MS

but you should know that when I throw it down, you should keep your mouth open and close your eyes

43 k^wēná hà òré hà ðà- kénéⁿ níⁿ īⁿ īⁿ nōò jù[?]ú
 k^wena^{HL} ha^(LH) ore^{HL} ha^(LH) ða^(H) keneⁿ ní^{n(L)} ī^{nM} ī^{nM} noo^{LH} ju[?]u^{MH}
 so COMP when COMP CAUS throw down 1 one one cane mouth
 nóⁿ βāsì kécè↑ jākā nūùⁿ nóⁿ .
 no^{n(L)} βasi^{LH} kee^{LM} jaka^{ML} nuu^{nLH} no^{n(L)}
 2MS not enter rubbish eye 2MS

so that when I throw the cane down one at a time into your mouth, dust won't get into your eyes. ”

44 Tē ðī tūú↑ jājàⁿ nàⁿk^wīⁿ tī há ðùkàⁿ
 te^(M) ðii^{LH} (H)- tuu^{LM} jaja^{nLH} (H)- naⁿk^wi^{nL} tī ha^(LH) ðuka^{nMH}
 and happy IPFV feel coyote IPFV stand 3AN COMP thus
 níⁿ- kà[?]áⁿ tītà
 ní^{n(L)}- ka[?]a^{nL} tita^{LM}
 PFV say opossum

The coyote felt very happy standing (there) because of what the opossum had said

45 tī ìò tā[?]βí ðíkì tí há kí[?]íⁿ tī nūkū tí
 tī^(M) io^{LM} H- ta[?]βi^(L) ðiki^{LH} tí^(H) ha^(LH) kí[?]i^{nL} tí^(H) nuku^{MH} tí^(H)
 because very imp can't be bothered 3AN COMP go 3AN look for 3AN
 há kàsì tí
 ha^(LH) kasi^{MH} tí^(H)
 COMP cat 3AN

because it couldn't be bothered to go and look for something to eat

46 tē níⁿ- kà[?]áⁿ tī
 te^(M) ní^{n(L)}- ka[?]a^{nL} tī
 and PFV say 3AN

and it said,

47 nóⁿ ðù↑kāⁿ kā^ʔáⁿ nóⁿ tē nāⁿ- künētú níⁿ tē ká^ʔàⁿ
 nó^{nHL} ðuka^{nMH} (H)- ka^ʔa^{nL} nó^{n(L)} te^(M) na^{n(H)}- kunetu^M ní^{n(L)} te^(M) ká^ʔàⁿ
 if thus IPFV say 2MS and SBJV wait I and say
 nōⁿ òré hà ðà- kúúⁿ nóⁿ sì↑ nōⁿ .
 nó^{n(L)} ore^{HL} ha^(LH) ða^(H) kuuⁿ nó^{n(L)} si^(H) pues
 2MS when COMP CAUS come down 2MS 3G

“If that’s what you say, then I’ll wait and then you say when you are about to throw them down, all right?”

48 nētú jájàⁿ nàⁿk^wîⁿ↑ tī
 (H)- netu^M jaja^{nLH} naⁿk^wi^{nLM} tī
 IPFV wait coyote stand 3AN

The coyote was standing waiting,

49 níⁿ- kù- nā^ʔāⁿ lū^ʔá
 ní^{n(L)}- ku^(M)- na^ʔa^{nMH} lu^ʔa^M
 PFV be while a little

some time went by,

50 tē níⁿ- sènī-inīⁿ tì há ðó -níⁿ ðāná^ʔβí
 te^(M) ní^{n(L)}- seni^M_ini^{nML} ti^(H) ha^(LH) ðo^{HL} -ní^{n(M)} (H)- ða^(H)- na^ʔβi^{HL}
 and PFV think 3AN COMP how LIM IPFV CAUS poor

jā^ʔāⁿ tītā

jā^ʔāⁿ tita^{LM}

OBJ opossum

and it thought that the opossum was just deceiving it.

51 kō ūūⁿ -níⁿ níⁿ- ká^ʔàⁿ tītā níⁿ- sà^ʔàⁿ tí
 ko^(M) uu^{nM} ní^{n(M)} ní^{n(L)}- ka^ʔa^{nL} tītā ní^{n(L)}- sa^ʔa^{nLH} ti^(H)
 but suddenly LIM PFV say opossum PFV reply 3AN

But suddenly, the opossum said to the coyote,

57 tē nīⁿ- sèḏī tì núùⁿ↑ tí
 te^(M) ni^{n(L)}- seḏi^{ML} ti^(H) nuu^{nLH} ti^(H)
 and PFV close 3AN eye 3AN

and it closed its eyes,

58 tē nīⁿ- ⁿk^wità tītà ḏā- kúⁿ- kójó tí ííⁿ ííⁿ
 te^(M) ni^{n(L)}- ⁿk^wita^{LM} tītà ḏa^(H)- kuⁿ- kójo^M ti^(H) ii^{nM} ii^{nM}
 and PFV begin opossum CAUS come down pour out 3AN one one
 nóḏ sītḡi jájàⁿ
 noo^{LH} (H)- sītḡi jája^{nLH}
 cane IPFV chew coyote

And the opossum began to throw down the cane one at a time for the coyote to chew.

59 Siáⁿ -niⁿ kūū títā↑ nīⁿ- nì[?]i nōḏ tí
 sia^{nHL} ni^{n(M)} (H)- kuu tita^{LM} ni^{n(L)}- ni[?]i^M nōḏ ti^(H)
 for this reason LIM IPFV be opossum PFV finish cane 3AN

And what would you know but all the cane that the opossum (had) was soon finished,

60 tē ā- tùù nàⁿ-ⁿtḡé kà↑ḏā tī há ḡītù jájàⁿ tē hā-
 te^(M) a^{LH}- tuu naⁿ-ⁿtḡe^{HL} kaḏa^M ti^(H) ha^(LH) ḡitu^{MH} jája^{nLH} te^(M) ha^(M)-
 and NEG be how do 3AN COMP fill coyote and PRF
 nīⁿ- sàḃí tī .
 ni^{n(L)}- saḃi^{HL} ti^(H)
 PFV tire 3AN

and there was nothing it could do to fill up the coyote, and it had become tired,

61 sīáⁿ kùù há níⁿ- nàⁿ↑ðìkò tī tǐ
 sia^{nHL} (H)- kuu ha^(LH) ni^{n(L)}- na^{n(M)}- ðiko^{LM} ti^(H) tǐ
 for this reason IPFV be COMP PFV REPET be angry 3AN because

ā- k^winíⁿ sì↑ há tǐtù jájàⁿ .
 a^{LH}- k^wini^{nML} si^(H) ha^(LH) tǐtu^{MH} jaja^{nLH}
 NEG want 3G COMP fill coyote

that's why it got angry because the coyote was never getting full.

62 Sīáⁿ kùù há níⁿ- sè↑níⁿ-iníⁿ tì náⁿ-βá[?]à↑ kāōā
 sia^{nHL} (H)- kuu ha^(LH) ni^{n(L)}- seni^{nM} -ini^{nML} ti^(H) naⁿ- βa[?]a^{LM} kaōa^M
 there IPFV be COMP PFV think inside 3AN what good do
 tī k^wēná hà nàⁿ- kùnùⁿ jájàⁿ tǐ níⁿ- sàβí tī
 ti^(H) k^wena^{HL} ha^(LH) na^{n(H)}- kunuⁿ jaja^{nLH} tǐ ni^{n(L)}- saβi^{HL} ti^(H)
 3AN so COMP SBJV run coyote because PFV tire 3AN

and that was the reason that the opossum thought about what to do so that the coyote would run away.

63 Tē ūūⁿ -níⁿ níⁿ- sìníⁿ tì íⁿ júù jìtá[?]í né[?]úⁿ
 te^(M) ūūⁿ ni^{n(M)} ni^{n(L)}- sini^{nL} ti^(H) ii^{nM} juu^{LH} (H)- jita[?]i^{MH} ne[?]u^{nM}
 and suddenly LIM PFV see 3AN one stone IPFV be inside among
 nájó[?]ō tē níⁿ- kà[?]àⁿ tī
 na^(H)jo[?]o^{LM} te^(M) ni^{n(L)}- ka[?]a^{nL} ti^(H)
 cornstalk and PFV say 3AN

and then all of a sudden the opossum saw a stone in among the cornstalks, and it said,

64 hūⁿ hūⁿ

“A hah,

65 jūù íʔá ðā- kécē↑ nō jūʔú ðê
 juu^{LH} íʔa^{MH} ða^(H)- kee^{LM} no^(H) juʔu^{MH} ðe^(L)
 stone here CAUS enter 1INCL mouth 3MMS

here's a stone that I'll throw into his mouth,

66 k^wēná hà nàⁿ- kùnùⁿ ðê tʃī hā- nīⁿ- sàβí nò
 k^wena^{HL} ha^(LH) na^{n(H)}- kunuⁿ ðe^(L) tʃi^(M) ha^(M)- ni^{n(L)}- saβi^{HL} no^(H)
 so COMP SBJV run 3MMS because PRF PFV tire 1INCL

so that he will run away, because I'm tired."

67 Tē nīⁿ- sī tī jájàⁿ
 te^(M) ni^{n(L)}- sii^{LM} ti^(H) jaja^{nLH}
 and PFV say 3AN coyote

and it said to the coyote,

68 Níká nàʔ↑īⁿ jūʔú nóⁿ tʃī nāⁿ- ðā- kúúⁿ níⁿ
 (H)- nika^{ML} naʔi^{nMH} juʔu^{MH} no^{n(L)} tʃi^(M) na^{n(H)}- ða^(H) kuu^{nM} ni^{n(L)}
 IPFV open still mouth 2MS because SBJV CAUS come down 1

īⁿkā kà nōð kùtʃī nóⁿ
 iⁿka^{ML} -ka^(L) nōð kutʃi^M no^{n(L)}
 another more cane chew 2MS

"Keep your mouth open because I'm going to throw down another cane for you to chew."

69 Kō a- nīⁿ- sènīⁿ-íniⁿ jájàⁿ nāiⁿ kúú há nīⁿ-
 ko^(M) a^{LH}- ni^{n(H)} seniⁿ -ini^{nML} jaja^{nLH} nai^{nLH}- kuu^M ha^(LH) ni^{n(L)}-
 but NEG CTR think inside coyote what be COMP PFV

sè↑nīⁿ-íniⁿ tītà hā kàðà jáʔáⁿ tí
 seni^{nM} -ini^{nML} tita^{LM} ha^(LH) kaða^M jaʔa^{nMH} ti^(H)
 think inside opossum COMP do OBJ 3AN

But the coyote never thought what the opossum was planning on doing to it.

70 Tē nīⁿ- nīkā jājàⁿ jù^ʔú tí tē nīⁿ- ðà- kù-ⁿ
 te^(M) ni^(L)- nika^{ML} jaja^{nLH} ju^ʔu^{MH} ti^(H) te^(M) ni^(L)- ða^(H) ku^(M)-
 and PFV open coyote mouth 3AN and PFV CAUS come down

kàβá títà↑ jūù

kaβa^M tita^{LM} juu^{LH}

fall down opossum stone

And the coyote opened its mouth and the opossum threw down the stone,

71 kō iò kã^ʔnūⁿ sí

ko^(M) io^{LM} ka^ʔnu^{nMH} si^(H)

but very big 3G

but it was very big

72 tē nīⁿ- ⁿkìtīⁿ sī ðúkùⁿ↑ jájàⁿ

te^(M) ni^(L)- ⁿkiti^{L;NM} si^(H) ðuku^{nLH} jaja^{nLH}

and PFV get stuck 3G throat coyote

and it got stuck in the coyote's throat.

73 Nīⁿ- nùⁿ- kãβã tītã nūⁿ nò- túú tí tē

ni^(L)- nu^{nM}- kaβa^M tītã nu^{nLH} (H)- no- tuu^{MH} ti^(H) te^(M)

PFV come down fall down opossum face IPFV put stand 3AN and

k^wã^ʔãⁿ tī

k^wã^ʔãⁿ tī

be going 3AN

The opossum came down from where it had been and went away.

74 Tē nīⁿ- nòò jājàⁿ kìðì tí ðíkì tí k^wéná hà nàⁿ-
 te^(M) ni^{n(L)}- noo^{LM} jaja^{nLH} kiðì^M ti^(H) ðiki^{LH} ti^(H) k^wena^{HL} ha^(LH) na^{n(H)}-
 and PFV remain coyote shake 3AN head 3AN so COMP SBJV
 nèè júù há nīⁿ- ⁿkìtìⁿ ðū̀kùⁿ tí
 nee^M juu^{LH} ha^(LH) ni^{n(L)}- ⁿkìtì^{L;nM} ðuku^{nLH} ti^(H)
 come out stone COMP PFV get stuck throat 3AN

The coyote stayed shaking its head so that the stone which had got stuck in its throat would come out.

75 Tē k^wéná-nīⁿ-kā nīⁿ- nù- ðēèⁿ jājàⁿ há ðù̀kàⁿ nīⁿ-
 te^(M) k^wéná-nīⁿ-kā ni^{n(L)}- nu^M- ðee^{nLH} jaja^{nLH} ha^(LH) ðuka^{nMH} ni^{n(L)}-
 and extremely PFV become fierce coyote COMP thus PFV
 sēðē jā[?]āⁿ tí̀tā
 seðe^M ja[?]a^{nMH} tita^{LM}
 do OBJ opossum

And the coyote got ever so angry because of what the opossum had done to it.

76 Tē nīⁿ- sìkā tí k^wá[?]àⁿ tí kú- nàⁿ- nù̀kù tí tí̀tā↑
 te^(M) ni^{n(L)}- sika^M tí k^wa[?]a^{nL} tí ku^(L)- na^{n(M)}- nuku^{MH} ti^(H) tita^{LM}
 and PFV walk 3AN be going 3AN go REPET look for 3AN opossum
 k^wéná hà nàⁿ- tǎ[?]βì↑ tí̀tā hā nīⁿ- sēðē jā[?]āⁿ tí
 k^wena^{HL} ha^(LH) na^{n(H)}- tǎ[?]βì^{LM} tita^{LM} ha^(LH) ni^{n(L)}- sēðē ja[?]a^{nMH} ti^(H)
 so COMP SBJV pay opossum COMP PFV do OBJ 3AN

and it walked away and went to look for the opossum so that it would pay for what it had done to it.

77 Tē nīⁿ- kà[?]àⁿ jājàⁿ
 te^(M) ni^{n(L)}- ka[?]a^{nL} jaja^{nLH}
 and PFV say coyote

And the coyote said,

78 βītāⁿ tē nóⁿ nāⁿ- nāⁿ- ní^ʔiⁿ nó ðé tē kā^ʔnīⁿ nō
 βīta^{nM} te^(M) nó^{nHL} na^{n(H)}- na^{n(M)}- ní^ʔi^{nLH} no^(H) ðe^(L) te^(M) ka^ʔni^{nMH} no^(H)
 now and if SBJV REPET find 1INCL 3MMS and kill 1INCL

ðé

ðe^(L)

3MMS

“Now if we find him again, we’ll kill him.”

79 nāⁿ- k^wēná hà ðùkàⁿ kàðà já^ʔáⁿ ðé
 na^{n(H)}- k^wena^{HL} ha^(LH) ðuka^{nMH} kaða^M ja^ʔa^{nMH} ðe^(L)
 SBJV so COMP thus do OBJ 3MMS

Why would he do this to me,

80 tē ðó sènìⁿ-ínìⁿ ðè hà íō kō^ʔjō kāā
 te^(M) ðo^{HL} (H)- seniⁿ -ini^{nML} ðe^(L) ha^(LH) io^{LM} ko^ʔjo^{MH} (H)- kaa
 and how IPFV think inside 3MMS COMP very daft IPFV appear
 nō áⁿ náiⁿ kùú sí
 no^(H) a^{nH} nai^{nLH}- kuu^M si^(H)
 1INCL or what be 3G

and is it that he thinks I’m very daft or what?”

81 Tē nīⁿ- ⁿtʃinūū jājāⁿ
 te^(M) nī^(L)- ⁿtʃinu^{MuML} jaja^{nLH}
 and PFV wander about coyote

The coyote roamed

82 kō ā- nìⁿ- náⁿ- ní^ʔiⁿ jā^ʔáⁿ tí
 ko^(M) a^{LH}- nī^(H) na^{n(M)}- ní^ʔi^{nLH} ja^ʔa^{nMH} tí^(H)
 but NEG CTR REPET find OBJ 3AN

but it didn’t find the opossum.

83 Tē nīⁿ- ja^ʔà nūū tē nīⁿ- kùnāāⁿ jájàⁿ há nìⁿ- já^ʔā
 te^(M) ni^{n(L)}- ja^ʔa^{LM} nuu^{MH} te^(M) ni^{n(L)}- kùnāāⁿ jaja^{nLH} ha^(LH) ni^{n(L)}- ja^ʔa^{LM}
 and PFV pass day and PFV forget coyote COMP PFV pass

tī nī^ʔí títā

tī nī^ʔi^{MH} tita^{LM}

3AN with opossum

And days went by and the coyote forgot what had happened to it with the opossum.

84 Hā^ʔà kùù íⁿ tú^ʔūⁿ nāⁿ kānīⁿ ḏá k^wēná tá kī^{tī}
 ha^ʔa^{LH} (H)- kuu ii^{nM} tu^ʔu^{nLM} naⁿ- kani^{nM} ḏa^{HL} k^wena^{HL} ta^{HL}- kiti^{MH}
 this IPFV be one word REPET tell IHON about PL animal

jūkū īⁿ tí

juku^{MH} i^{n(M)} ti^(H)

wild PL 3AN

This is a story that I tell about the wild animals.

APPENDIX E TONAL ASSOCIATIONS

This appendix presents a brief overview of how surface forms are derived from the underlying tones. We have chosen to present the data in this appendix within an Optimality Theory framework.¹ This approach allows us to show where constraints must be ranked to obtain the correct surface form. In this section we look at some of the noun phrase data presented in Chapter 6 and show the phonological processes which are applied to the underlying tones to give the surface form.

It would have been possible to have written the entire thesis from an OT perspective. However, we decided to present the data in the main part of the thesis in a descriptive model as OT has and still is undergoing changes.

E.1. THE ALIGNMENT OF UNDERLYING TONES

A foundational principle in the analysis of MXY tone is that most tones align at the right edge of the morpheme which sponsors them. As a consequence the initial mora of a bimoraic morpheme is toneless. If this mora is also utterance initial then a default tone is supplied. First we look at words which sponsor one tone, and then those which sponsor two. In an OT framework we require two ranked constraints:

ALIGN TONES ROOT RIGHT (ATRR): The left edge of the tone melody coincides with the right edge of the sponsoring morpheme.

DEP: No insertion of tones.

E.1. Right alignment of sponsored tones

	uni^{nL}	ATRR	DEP
a)	$\emptyset \bar{u}ni^n$		*
b)	$\grave{u}ni^n$	*!	

In (E.1), we see that the option of having the Low tone sponsored by uni^{nL} 'three' associated with both moras is rejected as this association pattern means that the

¹ Most constraints used in this appendix are based on those found in Yip (2002).

tone sponsored by *uni*^{nL} ‘three’ is linked at the left edge of the sponsoring morpheme. Instead the Low tone is associated at the right edge and a default Mid tone is inserted to provide a tone for the initial toneless mora. This tableau establishes the ranking *ATTR* >> *DEP*, since inserting a default Mid tone is preferable to aligning the underlying tones at the left edge.

We now turn to words which sponsor two tones. We have already shown that rising contours are prohibited on a single mora, although falling contours are permitted utterance final. We can describe these restrictions with three more constraints:

*RISE: Rising contours are prohibited on a single mora.

*FLOAT: A tone must be associated with a TBU.

ALIGN CONTOUR RIGHT (ACR): Contours are only permitted at the right edge of an utterance.

The constraint ACR must be highly ranked in MXY as it is never violated. Therefore we omit it from the tableaux.

E.2. Falling contour utterance final

	<i>ina</i> ^{nML}	<i>ATTR</i>	* <i>FLOAT</i>	<i>DEP</i>
a) \mathcal{E}	<i>inā</i> ⁿ			*
b)	<i>inà</i> ⁿ	*!		
c)	<i>inā</i> ^{n(L)}		*!	*

In the data in (E.2a) for *ina*ⁿ ‘dog’, we see that although ALIGN TONE ROOT RIGHT results in a final contour, this option is preferable to that given in (E.2b), where the initial Mid of the underlying tone melody is associated with the initial mora. We also see that it is preferable to have a falling contour as shown in (E.2a) than to leave the Low tone unassociated, as in (E.2c). This tableau establishes the ranking *ATTR* >> **FLOAT*, and also **FLOAT* >> *DEP*.

In (E.3) for *dita* ‘tortilla’, we see the consequence of the prohibition of rising contours on single moras. The winning candidate given in (E.3a) has a floating High tone, but that is preferable to either aligning the underlying tones at the left edge, as shown in (E.3b), or having a rising contour word final as shown in (E.3c).

E.3. Alignment of two-toned melodies

	ǒìtà ^{LH}	ATTR	*RISE	*FLOAT	DEP
a) \mathcal{E}	ǒìtà ^(H)			*	*
b)	ǒìtà	*!			
c)	ǒìtà'		*!		*

From the data in (E.3), although we cannot ascertain the relative ranking of the constraints ALIGNTONEROOTRIGHT and *RISE, we do see that *RISE >> *FLOAT.

E.2. PHRASAL PHENOMENA

We now turn to examine how these constraints and others are ranked to account for the surface tones of two word phrases such as those found in Chapter 6. In that chapter we described how there are three ways in which tones are provided for TBU's which are toneless as a result of the association of the underlying tones at the right edge: the spread of the final tone of the preceding word; the association of a floating tone; insertion of a default tone.

We now look at how these processes can be expressed as OT constraints. To account for the multiple-linking of tones we require the following constraint:

*SPREAD: Do not multiply-link tones.

As we show later, in some contexts we need to differentiate between the spreading of different tones. For example, *SPREAD(H) would indicate a prohibition of the High tones being multiply-linked.

In addition the following constraints are required:

MAXL: Do not delete Low tones.

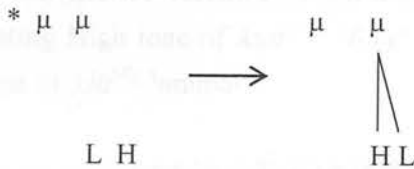
MAXM: Do not delete Mid tones.

As documented in Chapter 6, floating High tones tend to associate at the right edge of the word which follows their sponsoring morpheme. This can be described in terms of alignment as shown in the following constraint:

ALIGN-R (H, WORD): Align every High tone at the right edge of the prosodic word.

To rule out the metathesis of tones in two tone melodies, such as Low High, we note the constraint LINEARITY which preserves the underlying linear order of the input tones. This constraint rules out the possibility of the High tone of either a Mid High or a Low High tone melody associating at the right edge of their sponsoring morpheme to satisfy the ALIGN-R constraint, and the first element of the tone melody forming a contour. This prohibited process is shown in E.4.

E.4. Preserve the linear order of the input tones



This constraint is never violated in MXY, so we omit it from the tableaux.

With these constraints and those introduced earlier in this Section, we can account for most of the surface forms of the two word phrases given in Chapter 6. First we look at data in which the first element of the phrase sponsors a floating High tone.

E.5. Association of floating High tones

	kuu ⁿ LH 'four'	ðita ^{LH} 'tortilla'	ATTR	MAXL	*RISE	ALIGN-R	*FLOAT	DEP	*SPREAD
a)	kūù ⁿ ðítà ^(H)					*	*	*	
b)	kūù ⁿ ðítá		*!					*	*
c)	kūù ⁿ ðítá'				*!	*		*	
d)	kùú ⁿ ðítá		*!			*			

In this tableau it is difficult to determine the comparative ranking of the constraints as they seem to be intertwined.² However, we can say that for these data, constraints preventing either deleting or disassociating a Low tone must be highly ranked, as the floating High tone of *kuu*^{LH} ‘four’ neither deletes nor disassociates the Low tone associated with the second mora of *đita*^{LH} ‘tortilla’, even though this means that the floating High tone of *kuu*^{LH} ‘four’ does not associate at the right edge of *đita*^{LH} ‘tortilla’. The constraint which ensures the right alignment of the underlying tones cannot be violated.

Part of the complication of the previous example is the number of constraints needed to account for possibilities that are not attested as the surface form. So in the next tableau we reduce the number of constraints and possibilities to ones attested in other Mixtec varieties so that a clearer picture is gained. In E.6, we see that the floating High tone of *kuu*^{nLH} ‘four’ does delete the Mid tone associated at the right edge of *kítí*^{MH} ‘animal’.

E.6. Deletion of a Mid tone by a floating High tone

kuu ^{nLH} ‘four’ kítí ^{MH} ‘animal’		ATRR	ALIGN-R	DEP	MAXM	*SPREAD
a) \mathcal{E}	kūù ⁿ kítí			*	*	*
b)	kūù ⁿ kítí		*!	*		
c)	kùú ⁿ kítí	*!				

The tableau in E.6 illustrates a difficulty in the analysis of MXY tonal phenomena. The constraints shown in the tableau do apply but they seem to form two separate groups. In the first group we have ALIGN TONE ROOT RIGHT and ALIGN-R (H, WORD). Although the relative ranking cannot be ascertained, these two constraints are ranked higher than the constraints in the second grouping, that is DEP, MAX(M) and *SPREAD. We also note that the relative ranking of the constraints in the second group cannot be ascertained.

² There are other options which we have not included, and other possible constraints which could have been added, such as MAX(H). However, the resultant tableau would be even more unwieldy.

The association of a floating High tone with a word which has an underlying Mid Low tone melody results in a High Low contour as shown in E.7.

E.7. Association of a floating High tone resulting in a High-Low contour

kuu ⁿ LH 'four'		ATR	ALIGN- R	*FLOAT	DEP	MAXM	*SPREAD
ina ^{nML} 'dog'							
a)	kūù ⁿ ìná ⁿ				*	*	*
b)	kūù ⁿ ìná ⁿ			*!	*	*	*
c)	kūù ⁿ ínā ⁿ		*!		*		
d)	kùú ⁿ ìnà ⁿ	*!					

E.3. OCP EFFECTS

We now turn to examine what can loosely be termed OCP effects; that is, restrictions on adjacent identical tones. Unlike some tone languages, in MXY adjacent identical tones are permitted, but the restrictions are different for each of the three tone levels, High, Mid and Low. These restrictions are summarised in E.8.

E.8. Restrictions on the association and spread of tones

High	Floating	does not associate with the following word if there is a High tone associated at the right edge
	Spread	no restrictions
Mid	Floating	no restrictions
	Spread	no restrictions
Low	Floating	does not associate with the following word if there is a Low tone associated at the right edge
	Spread	does not spread to the following word if there is a Low tone at the right edge

The restrictions show that the strictest form of the OCP – that is, the prohibition of two adjacent identical tones – only applies to Low tones. On the other hand, adjacent Mid tones are permitted. We see that in the case of High tones we have to differentiate between the behaviour of final High tones which may spread to words that have a High tone associated at their right edge, and floating High tones which do not associate with a word that already has a High tone associated with it.

First we look at data in (E.9.) where a floating High tone does not associate with the second word in the phrase. The question then arises as to which constraints apply to give these restrictions. The following constraint bans the prohibited sequence of two separate High tones, but does not rule out a High tone being associated with two moras:

OCP(H): Adjacent High tones are not permitted.

E.9. No association of a floating High tone

kuu ⁿ LH ‘four’ k ^w aju ^{HL} ‘horse’		ATRR	OCP(H)	ALIGN-R	DEP	*SPREAD
a)	kūù ⁿ k ^w ájú ^ˆ				*	*
b)	kūù ⁿ k ^w ájú ^ˆ		*!	*	*	*
c)	kùú ⁿ k ^w ájù	*!				

In (E.9a), it is impossible to say whether the floating High tone of *kuu*^{nLH} ‘four’ is deleted or fuses with the High tone of *k^waju*^{HL} ‘horse’. However, we note that associating the floating High tone of *kuu*^{nLH} ‘four’ with *k^waju*^{HL} ‘horse’ is prohibited as this would result in adjacent High tones. However, as we see in (E.10), High tones do spread to elements which already have a High tone associated with them. Note that (E.10b) is ruled out because it inserts two default tones, rather than spread the High tone as occurs in the winning form.

We now turn to look at data where final High tones spread to words with a High tone.

E.10. Spread of final High tone

βaa ^{nH} ‘many’ k ^w aju ^{HL} ‘horse’		ATTR	DEP	*SPREAD(H)
a)	βāá ⁿ k ^w ájú`		*	*
b)	βāá ⁿ k ^w ājú`		**!	
c)	βáá ⁿ k ^w ájù	*!		

In the tableau in E.10, DEP >> *SPREAD(H), that is, it is preferable to spread the High tone of the first word than insert a default Mid tone. In these data it is assumed that it is the final High tone of βaa^{nH} ‘many’, which provides the tone for the initial mora of k^waju^{HL} ‘horse’. This assumption is based on the observation that in unambiguous cases, spread is always right-wards.

When looking at Low tones we see that adjacent Low tones are not permitted whether that sequence is made up of one Low tone spread to two moras or two separate Low tones.³ The constraint OCP(L) is taken to prohibit both these possibilities.

OCP(L): Adjacent Low tones are not permitted.

E.11. No Low Low sequence permitted

uni ^{nL} ‘three’ kuka ^L ‘comb’		ATTR	OCP(L)	DEP	*SPREAD(L)
a)	ūnì ⁿ kūkà			**	
b)	ūnì ⁿ kùkà		*!	*	*
c)	ùnì ⁿ kùkà	*!	*		*

³ The reader may recall that adjacent Low tones are permitted in verb phrases, and floating High tones which are sponsored by verbal morphemes do associate with words which already have a High tone. It is assumed that a constraint such as PRESERVE-MORPHEME must be higher ranked than the constraints described here.

E.4 CONCLUSION

This appendix presents a preliminary analysis of MXY tonal phenomena within a OT framework. A complete account would merit an entire thesis. Nevertheless this brief account shows that the ranking of constraints correctly indicates which option will be preferred, and therefore attested as the surface form. Obviously much more research and understanding of the newer versions of the theory are required to do justice to both the data and the theory.