TONE AND GLOTTALIZATION ON NOMINALS

IN SAN JUAN MIXTEPEC ZAPOTEC

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TONE AND GLOTTALIZATION ON NOMINALS
IN SAN JUAN MIXTEPEC ZAPOTEC

by

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Many thanks to the team of people who have helped me write this thesis. My committee members and SIL-Mexico colleagues have encouraged me, given me helpful insights, and proven to be skilled editors. My parents believed I could do this long before I dreamed it would happen. I am thankful that they kept encouraging me over the long haul.

I am especially grateful to the people of San Juan Mixtepec for their acceptance and patience with me as I continue to learn their language. In particular, I owe many thanks to my husband, Meinardo Hernández, who was my cheerful companion throughout the thesis-writing process. He patiently repeated phrases until I correctly heard the tone. He also reassured me of his confidence in me and helped me with the details of life while I was caught up in the details of this thesis.

Above all, I am grateful to God who repeatedly amazed me with His kindness. He gave me both energy to continue and insight into confusing linguistic problems. Without His help, this effort would have been fruitless.

November 1, 2004
ABSTRACT

TONE AND GLOTTALIZATION ON NOMINALS
IN SAN JUAN MIXTEPEC ZAPOTEC

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Previous Zapotecan analyses of tone on nominals account for tonal alternations caused primarily by the first person singular pronoun. The goal of this thesis is to describe and account for the tonal changes associated with nominals in San Juan Mixtepec Zapotec (SJMZ), from an autosegmental approach. In SJMZ, an Otomanguean language, both the first person singular pronoun and nouns classified as inanimate cause tonal alternations to preceding words.

The first part of this study focuses on words and phrases pronounced with non-glottalized vowels. The results show that the primary cause of tonal alternation in simple sentences and phrases that contain nouns is due to the presence of an initial
floating high tone on inanimate nouns that docks onto the previous word. No published Zapotecan tonal analysis has ever observed animacy-dependent tonal changes.

The second part of this study describes the interaction between tone and glottalization in SJMZ. Comparing the tonal behavior of glottalized words with non-glottalized lexical items shows that, while tone is contrastive on laryngeally complex lexical items, it is less salient. Instead of the four possible tone shapes, only three tone shapes occur on glottalized vowels. Additionally, their isolation pronunciation does not necessarily reflect their underlying tonal shape.

Finally, special attention is given to the first person singular pronoun in SJMZ. Like inanimate nouns, it has an initial floating high tone that affects the tone of a previous word; however, the tonal alternations that it causes are not identical to those caused by inanimate nouns.
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CHAPTER I
INTRODUCTION

1.1 Rationale for the study

In San Juan Mixtepec Zapotec (henceforth SJMZ), an Otomanguean language spoken in Oaxaca, Mexico, tone is lexically contrastive.¹ For example, [næd] can take four different meanings, depending on the relative pitch used during its pronunciation: [næd\(^\dagger\)] ‘doesn’t hurt’, [næd\(^\dagger\)] ‘didn’t say’, [næd\(^\dagger\)] ‘isn’t heavy’, and [næd\(^\dagger\)] ‘doesn’t want’. Additionally, the tone of a word frequently changes when it occurs in a larger context. For example, the word [mer\(^\dagger\)] ‘turkey’ is pronounced with a low tone in isolation, but when spoken in different contexts it can take either a low or a rising tone. The tone that /mer\(^\dagger\)/ takes depends on the animacy of a following word, as assigned by the SJMZ grammar. In the data in (1), /mer\(^\dagger\)/ has a low tone preceding the animate noun /mel\(^\dagger\)/ ‘fish’ and a rising tone before the inanimate noun /g\(^\dagger\)et\(^\dagger\)/ ‘tortilla’.

(1)  row\(^\dagger\) mer\(^\dagger\) mel\(^\dagger\)  ‘the turkey eats fish’
     row\(^\dagger\) mer\(^\dagger\) g\(^\dagger\)et\(^\dagger\)  ‘the turkey eats tortillas’

The tone system of SJMZ has only minimally been described (Reeck 1991). The most thorough tonal analyses that have been published for other Zapotecan languages were done before the onset of autosegmental phonology (Pike 1948; Leal 1950; Marks 1976; Speck 1978), and some of these (plus other more recent publications) have

¹ I am grateful to Meinardo Hernández for sharing his language with me. He provided all the data for this study, as well as insider commentaries as to which phonological analyses seemed more correct.
limited their description or analysis to Zapotecan tonal alternations that relate to the verbal morphology and the first person singular pronoun (Angulo 1926; Marks 1980; Bickmore and Broadwell 1998; Broadwell 2000; Beam de Azcona 2004). Few have detailed the tone sandhi that occurs in other parts of the grammar of the language (exceptions include Briggs 1961; Speck 1978; Mock 1983; 1985; 1988). Section 2.2 describes the findings of these and other linguists.

SJMZ motivators for tone sandhi include the first person singular pronoun and, although to a lesser degree, the verbal morphology; however, tone sandhi is not limited to those areas. This thesis seeks to analyze, from an autosegmental standpoint, the tonal behavior of nominals in SJMZ, including the first person singular pronoun. Indeed, the irregular behavior of the first person singular pronoun becomes clearer when compared with the tonal behavior of inanimate nouns.

The study of Zapotecan tonal systems is further complicated by the presence of glottalized vowels. Because of this laryngeal modification to the vowel, tone is more difficult to perceive. Additionally, only three of the four tone shapes that occur on non-glottalized vowels occur on glottalized vowels. This thesis will argue that glottalized vowels underlyingly are either toneless or have a contour tone. Level tones do not occur on glottalized nouns, except as a result of phonemic processes.

The remainder of this chapter presents a basic description of the SJMZ language community, sound system, and grammar. Chapter two gives a detailed summary of previous analyses of tone in Zapotecan languages. Chapter three focuses on the tonal
patterns of non-glottalized nouns. This chapter argues that the primary nominal tonal alternations in SJMZ are caused by a floating tone present on inanimate nouns. Chapter four shifts to a discussion of the tonal patterns on glottalized nouns, and then presents and critiques four unsuccessful analyses to account for the tonal behavior of the first person singular pronoun. Chapter five briefly summarizes the findings in chapters three and four.

1.2 Mixtepec Zapotec language community

The town of San Juan Mixtepec, district of Miahuatlán, Oaxaca has a population of 932, as of the year 2000. Nearly all of these (greater than 97%) speak SJMZ as their first language, and approximately one-fifth of the population is monolingual in SJMZ (INEGI 2000 census data). Additionally, more than 1000 (a conservative estimate) San Juan Mixtepec natives and their children live in cities outside of the language area and continue to speak SJMZ. Three or four towns in the area surrounding San Juan Mixtepec have a high degree of intelligibility with SJMZ (Grimes 2000; Hernández p.c.) and are able to share written materials; however, the tonal systems of the Zapotec dialects spoken in these towns differ from that of SJMZ, and will therefore not be considered in this thesis.

---

2 The orthography used in San Juan Mixtepec does not indicate tone, as meaning is almost always understood from context. A neighboring town, San Pedro Mixtepec, has decided to mark surface-level tone in their orthography. The findings from this analysis will provide a basis from which the people of San Pedro Mixtepec will be able to analyze the tonal alternations in their dialect. With a better understanding of the tonal complexities in their language, they will be able to determine whether writing phonemic-level tone will better serve them.
The Zapotec language family can be divided into four groups: Northern, Valley-Isthmus, Western, and Southern, and each of these groups can then be divided into two branches (Merrill ms.). The San Juan Mixtepec Zapotec language falls into the eastern branch (termed Cisyautepecan by Smith Stark 2001 as reported by Beam de Azcona 2004) of the Southern Zapotec family of languages. With the exception of a brief section in *A Trilingual Dictionary of [San Juan Mixtepec] Zapotec, English and Spanish* (Reeck 1991), all other studies of tone on Zapotec languages have come from the western branch of the Southern Zapotec languages and from the other Zapotec regions; to my knowledge, no analyses of Cisyautepecan Zapotec tone have been published to date. The map in Figure 1 (Mexico Channel 2004) was modified to show the four Zapotec regions. A star represents San Juan Mixtepec.

![Figure 1 Map of the Zapotec regions](image)

Figure 1 Map of the Zapotec regions
1.3 Phonological sketch

San Juan Mixtepec Zapotec has thirty consonant phonemes and six vowels that can either be pronounced modally or with laryngealization. The glottal stop [ʔ] is not a consonant, but rather a vocalic feature. The arguments for this analysis will be presented in section 1.3.2. Sections 1.3.1, 1.3.2, and 1.3.3 present the phonemic inventory of SJMZ, starting with the consonants, then the vowels, and finally the tones of words in isolation.

1.3.1 Consonants

Traditional Zapotecan analysis divides the consonant phonemes into a fortis series and a lenis series, rather than the more standard division of voiceless and voiced (Nellis and Hollenbach 1980). One reason for this division is that some of the sonorants have two different pronunciations: a more forceful variety and a softer form. Reeck (1991:263) states that in SJMZ,

Fortis consonants are articulated in a more forceful manner than are lenis consonants. Fortis obstruents are voiceless and more tensely articulated than their lenis counterparts… Fortis resonants (m, n, l, r, and ŋ^3) are tensely articulated and phonetically longer than lenis resonants.

Table 1 presents the consonant phonemes of SJMZ as outlined in Reeck 1991, modified to reflect IPA standards^4. I add the Palato-velar column, whereas Reeck interprets these segments as a sequence of a velar consonant and a high front vowel. I

---

^3 Whereas Reeck 1991 analyzes this sound as a nasalized rounded velar [ũ], I prefer to call it a labialized velar nasal [ŋ^3]. Further articulatory investigation is necessary to determine whether or not the tongue root makes contact with the velum.

^4 Fortis obstruents are presented in IPA as voiceless, whereas fortis sonorants are underlined.
give my reasons for this interpretation in section 1.3.2. The labiovelar plosives are articulated as a velar plosive with the lips rounded. Symbols in parentheses represent phonemes only found in loan words. Note that underlined consonants are fortis.

<table>
<thead>
<tr>
<th>Table 1 SJMZ consonant phonemes</th>
<th>Labial</th>
<th>Alveolar</th>
<th>Palatal</th>
<th>Velar</th>
<th>Palato-velar</th>
<th>Labiovelar</th>
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<tbody>
<tr>
<td>Plosives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fortis</td>
<td>p</td>
<td>t</td>
<td>k</td>
<td>k̂</td>
<td>k̃</td>
<td>k̄</td>
</tr>
<tr>
<td>lenis</td>
<td>b</td>
<td>d</td>
<td>g</td>
<td>ĝ</td>
<td>g̃</td>
<td>ḡ</td>
</tr>
<tr>
<td>Affricates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fortis</td>
<td>ts</td>
<td>t̂ʃ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lenis</td>
<td>dz</td>
<td>d̂ʒ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fricatives</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fortis</td>
<td>(f)</td>
<td>s</td>
<td>f̂</td>
<td>(x)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lenis</td>
<td>z</td>
<td>ẑ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasals</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>fortis</td>
<td>m</td>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lenis</td>
<td>m</td>
<td>n</td>
<td></td>
<td></td>
<td>η̃</td>
<td></td>
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<td>Laterals</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>fortis</td>
<td>l̂</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lenis</td>
<td>l</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibrant</td>
<td>r</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximants</td>
<td></td>
<td></td>
<td>j⁵</td>
<td></td>
<td>w</td>
<td></td>
</tr>
</tbody>
</table>

1.3.2 Vowels

Zapotecan languages are known for their laryngeally complex vowels. Black (2000:1) describes Zapotecan vowels with the following:

The outstanding characteristic of the vowels in Zapotec is the modifications which can occur in the stressed syllable. All seem to have laryngealized (or creaky voiced) vowels, though the pronunciation varies from simply a longer creaky voiced vowel to one which seems to be two like vowels checked in the middle (V'V). Some also have checked vowels (V') and/or aspirated vowels (Vⁿ) and in the same position.

---

⁵ Reek 1991 also includes in his phoneme chart fortis variants of the two semivowels, the vibrant, and the velar nasal, but then goes on to say that they are of marginal phonemic status since they only occur in complementary distribution with the lenis variant: only preceding a fortis segment and in geminates.
SJMZ, like other Zapotecan languages, has laryngeally complex vowels, although these are limited to a single phonemic contrast. The six SJMZ vowels qualities occur with modal pronunciation or modified by a glottal stop \([V^\text{i}]\) or \([V^\text{v}\text{i}]\). Following is a chart of the vowels in SJMZ.

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>i</td>
<td>u</td>
</tr>
<tr>
<td>Mid</td>
<td>e</td>
<td>o</td>
</tr>
<tr>
<td>Low</td>
<td>æ</td>
<td>a</td>
</tr>
</tbody>
</table>

The laryngealized form of the vowels is articulated as a checked vowel \([V^\text{i}]\) preceding fortis consonants, \([\text{j}o^\text{p}\text{j}]\) ‘six’. Before lenis consonants and pause, the glottalized vowel is checked and lightly rearticulated \([V^\text{v}\text{i}]\), \([\text{me}^\text{e} \text{d}\text{j}]\) ‘jaguar’ and \([\text{do}^\text{a}\text{i}]\) ‘rope’ (Reeck 1991:264). When the glottalized vowel occurs in a complex nucleus /i\text{V}^\text{i}/, the glottal stop frequently occurs between the two vowels [i\text{i}V], /[tsie}^\text{e}\text{l}/ \([tsi\text{e}^\text{e}\text{e}\text{e}]\) ‘spouse’. My reason for calling /g\text{i}/ and /k\text{i}/ consonant phonemes instead of a consonant-vowel sequence is that, when the following vowel is glottalized, the glottal stop usually does not fall between the palatal portion and the following vowel, as it does in /i/-vowel sequences. Rather, the glottal feature interrupts the following vowel \([g\text{i}V^\text{v}\text{i}]\), \([g\text{e}^\text{e}^\text{e}]\) ‘flower’, as it does in other consonant-glottalized vowel sequences.

While the phonemic status of this segment (or series of segments) has no bearing on the analysis in this thesis, the behavior of these elements as modified consonants and not a consonant-vowel sequence is important to mention.

---

6 According to acoustic analysis, this is not a true glottal stop, however, in most cases voicing ceases. Further acoustic analysis is necessary to fully understand laryngealization in SJMZ.
As in many other Zapotecan analyses, laryngealization is considered a feature of the vowel, not a glottal stop consonant, for several reasons. First, the glottal stop is limited in its distribution. It only occurs in the immediate vicinity of vowels: following a vowel, interrupting an /i/-vowel sequence, or interrupting a single vowel. It never occurs word initially like all other consonants do, including /j/ and /w/. Second, a [V^\#V] vowel has only one tone-bearing unit. If the glottal feature were a consonant, many one-syllable words would then be interpreted as two syllables and therefore be likely to have two tone-bearing units. As disyllabic words with two tone-bearing units, more tonal combinations would be expected. As the data shows, however, fewer tonal patterns occur on glottalized words than on non-glottalized words; the tone patterns permitted on glottalized words are reduced in number, not increased. Third, few monomorphemic words in SJMZ consist of more than one syllable. If the glottal feature were considered a consonant, there would be a large number of disyllabic monomorphemic words in the language, but these would be restricted in shape. Namely, nearly all disyllabic, monomorphemic words would obligatorily have an open first syllable and a glottal stop initial second syllable. Such a restricted shape of disyllabic words would be unusual.

1.3.3 Tone on the word

Monosyllabic SJMZ words and clitics pronounced with modal voice have four possible tone melodies: high (H), low (L), falling (HL), and rising (LH). Table 3 shows examples of the four tone shapes on nouns and pronouns of different syllable structures.
Table 3 Tone on non-glottalized nouns

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Low</th>
<th>Falling</th>
<th>Rising</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV</td>
<td>me ‘s/he’</td>
<td>da ‘mat’</td>
<td>me ‘air’</td>
<td>mæ ‘bean’</td>
</tr>
<tr>
<td>CVC</td>
<td>dan ‘field’</td>
<td>bel ‘flame’</td>
<td>zed ‘salt’</td>
<td>ʒuz ‘lady’</td>
</tr>
<tr>
<td>CCV</td>
<td>mki ‘nit’</td>
<td>nkob ‘dough’</td>
<td>ñtʃaŋ ‘garlic’</td>
<td>nletʃ ‘onion’</td>
</tr>
<tr>
<td>CVV</td>
<td>mzie ‘squash flower’</td>
<td>bia ‘soap’</td>
<td>liow ‘key’</td>
<td>nia ‘hand’</td>
</tr>
</tbody>
</table>

SJMZ words are not evenly distributed between the four tone classes. There are relatively few high-toned words in the language. Low-toned words, on the other hand, are very common. The high number of falling-toned words is due to the fact that many of these are loanwords.

The high tone is articulated with a slight rise in pitch, while the low tone has a slight fall in pitch. The falling tone starts higher than the high tone, optionally rises slightly, and then falls to a pitch slightly above the pitch of the low tone. The rising tone lowers slightly in pitch at the start of its articulation and then rises nearly to the level of the high tone. Figure 2 graphically illustrates the shape of the four tones based on one male speaker’s pronunciation of a noun and an adjective of each tone class in isolation.\(^7\)

![Figure 2 SJMZ tone shapes on non-glottalized words](image)

Glottalized words in isolation are pronounced with one of only three pitch shapes. Indeed, Reeck states, “the contrast between high and falling tones in syllables

---

\(^7\) These and other data presented in this thesis were recorded onto a Toshiba Satellite A45-S1202 laptop computer using Speech Analyzer 2.5.
with glottalized vowel nuclei is neutralized to a phonetic falling tone” (1991:264). The three pitch shapes glottalized words can take is illustrated in Figure 3, where the dotted line represents the glottal closure.

![Figure 3 SJMZ tone shapes on glottalized words](image)

Only the rising tone has a clear low-high shape. Perceptually, the first and second tones of Figure 3 are low and falling, as their shape prior to the glottal stop indicates, and the second half of the vowel is not always articulated. In isolation, the pitch on glottalized words is generally higher than that on non-glottalized words, whereas in a larger context, the glottal feature seems to have a lowering effect on falling-toned words.

The shape of the “low” glottalized tone (the first in Figure 3) is a fairly level tone preceding the glottal closure, around 140 or 150 Hz. The post-glottal rearticulation, if it occurs, falls quickly from 180 to 150 or 140 Hz. Sometimes this fall in tone is more evident on the following sonorant consonant. On the glottalized falling tone, the pre-glottal stop vowel falls from approximately 180 to 150 Hz. The post-glottal stop articulation is a slight fall from 170 to 160 Hz. The rising glottalized tone is decidedly level on both sides of the glottal stop. The first half of the vowel can range in frequency
from 120Hz up to 160 Hz., almost always level. The post-glottal stop rearticulation is a level tone, 30 to 40 Hz. higher than the pre-glottal stop frequency. When a glottalized vowel with a rising tone is not rearticulated, the rise occurs entirely before the articulation of the glottal stop. The phonemic tone of these three glottalized pitch shapes will be analyzed in section 4.2.

Table 4 presents glottalized words from each of the pitch groups with different syllable structures.

<table>
<thead>
<tr>
<th></th>
<th>Falling</th>
<th>Low</th>
<th>Rising</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV’</td>
<td>none known</td>
<td>do’ ‘mortar stone’</td>
<td>ma’ ‘moon’</td>
</tr>
<tr>
<td>CV’C</td>
<td>zi’dz ‘pineapple’</td>
<td>gi’n ‘chili pepper’</td>
<td>bæ’l ‘meat’</td>
</tr>
<tr>
<td>CCV’…</td>
<td>mbi’tʃ ‘frog’</td>
<td>ndzo’p ‘girl’</td>
<td>ptʃuʃ ‘tomato’</td>
</tr>
<tr>
<td>CCV’…</td>
<td>none known</td>
<td>bzia’ ‘bean’</td>
<td>bia’ ‘cactus’</td>
</tr>
</tbody>
</table>

For the purposes of analysis, as will become evident throughout this presentation, analyzing the two contour tones in SJMZ as a concatenation of high and low tones proves to be fruitful.

1.3.4 Syllable structure

Zapotecan syllable structure permits sonorants and semivowels preceding obstruents in the onset (Black 1995, Marlett and Pickett 1987, Reeck 1991, Regnier 1993, Jaeger and VanValin 1982), even though this violates the Sonority Sequencing Principle that states that segments increase in sonority as they move closer to the nucleus. In Zapotecan analyses, then, words such as /wɡaʔ/ [uɡaʔaJ] ‘corn plant’ and /lɡi]/ [lɡi] ‘marketplace’ are interpreted as being monosyllabic. One of the arguments for this analysis is that these sonorants are not phonemic tone-bearing units (Regnier
1993:59 and Jaeger and VanValin 1982:134), rather the pitch of a previous syllable spreads onto them. One consequence of this analysis is a large syllable template. Indeed, (Reeck 1991:265) analyzes the syllable template as containing maximally three consonants in the onset, two vowels in the nucleus, and three consonants in the coda (CCCVVCCC).

In Reeck’s analysis, the first consonant of a complex onset must be a sonorant. When there are three consonants in the onset, the second and third consonants are both obstruents. In contrast to Reeck’s analysis of tri-consonantal onsets, I propose that the onset is maximally two consonants. Reeck’s tri-consonantal onsets are solely /ngb/ and /waćš/ (where /tš/ is a single affricate consonant). I argue that ngb is phonemically /ŋwʰb/, and that পা/tš is phonemically /ŋwʰtš/. My reason for this analysis is as follows: in both of Reeck’s tri-consonantal clusters, the first element is a nasal and the middle element is a velar obstruent, agreeing in voicing with the following obstruent. I propose that in both of these clusters, the middle consonant is a phonetic entity only, whose presence serves to highlight the difference between a labio-velar nasal and a following obstruent. Indeed, in the case of the latter consonant cluster proposed by Reeck /waćš/, no k consonant is written orthographically. The word [ŋwktšiets] ‘iguana’ is written ngutsiets, a spelling that reflects the phonemic reality /ŋwštšiets/ since orthographically /ŋw/ is written ngu. In the case of the onset cluster /ngb/, since the consonant /b/ is labial, phonetic differentiation occurs to the underlyingly nasal labio-velar /ŋwʰb/. Some
speakers have retained the underlying representation in their pronunciation: [ŋ̊ biðz] vs. [ŋbiðz] ‘sun.’

Complex nuclei, according to Reeck, have as their first vowel either of the two high vowels: /i/, as in /zieʃ/ ‘corn on the cob’ and rarely /u/, as in /3uekʰl/ ‘cockroach.’ In contrast to Reeck’s analysis, I argue that, with the exception of loanwords, complex nuclei only permit the vowel /i/ as the first element. I analyze the second example from above as a complex onset and simple nucleus, /3wekʰl/. Loan words are not limited by this generalization, /maestrə/ ‘teacher (Sp. *maestro),’ for example. In iV nuclei, any vowel with the exception of /i/ and /æ/ (in their modal and glottalized forms) can follow /i/ in the nucleus.

Alternate analyses of the iV nuclei include considering the high front vowel as a palatalized form of the preceding consonant /CiV/ or considering /j/ a consonant phoneme /CjV/. An argument against calling /i/ a vowel as in /biaʃ/ ‘soap’ is that it does not bear tone apart from the following vowel. However, if the SJMZ tone-bearing unit is the nucleus, rime, or mora (and complex nuclei do not constitute bimoraicity), and not the vowel, this counter-argument is no longer valid. The additional arguments against calling /i/ a vowel, i.e. calling it palatalization or a consonant, can also be discounted. The palatalized consonant interpretation is disfavored because it would practically double the already substantial consonant inventory. Analyzing the initial /i/ of complex nuclei as the consonantal semivowel /j/ calls for a syllable onset of three (or, according to Reeck’s analysis, four) consonants. A final argument against calling
these nucleus-initial high vowels consonants or consonantal features is the pronunciation of the /iV/ nucleus. As mentioned in section 1.3.2, this sequence of elements is pronounced as [iV]. If the /i/ were a consonant or a consonant feature, the glottal stop would be expected to be pronounced after the vowel, just as it is following any other consonant. It would be unusual to find the vowel and the glottal stop metathesized in this one special case.

SJMZ syllable codas are only complex in three instances: in loanwords where the coda can have up to three consonants /maestrV/ ‘teacher’ (Sp. maestro), in onomatopoetic words where the coda can have two consonants (the first of which must be a nasal) /izinM/ ‘hummingbird’ (and this may actually be [izinM]), and in words where the negative suffix /-d/ follows a consonant-final root /iM/ ‘not the sun’. With the exception of /i/, any consonant can occur as the sole element in the syllable coda, including the complex consonants /kW/ and /gW/ as in /mækW/ ‘dog’ and /biaW/ ‘shirt’.

1.3.5 Word structure

Monosyllabic SJMZ roots are almost always a single, albeit complex, syllable. Indeed, in many Southern Zapotec languages there seems to be a preference for monosyllabic roots such that pre- and post-tonic vowels are deleted, oftentimes creating complex onsets. Concerning a western Southern Zapotec language, Beam de Azcona (1998:11) says the following:
Nearly every facet of [Coatlán-Loxicha Zapotec] phonology has been affected by the historical vowel deletion in Southern Zapotec. Most Zapotec roots were disyllabic with initial stress, and in these the post tonic syllables were lost. In addition, pretonic syllables of proclitics such as aspect and animacy markers,\(^8\) also lost their vowels.

This phenomenon is visible through the adoption of loan words into the language and by comparing words, particularly animal words, with the Zapotec languages spoken in other regions. For example, disyllabic words for ‘party’ [lanji] and ‘knot’ [biqit] in the more conservative Isthmus Zapotec have been reduced to monosyllabic, complex onset words in SJMZ, [lani] and [bgo\textbackslash].

In spite of the preference for monosyllabicity in the SJMZ lexicon, compounding, verbal morphology, and the use of clitics make polysyllabic words commonplace. Nouns may consist of a single root, a noun-noun compound /bajɬ-gi\textbackslash etɬ/ ‘tortilla cloth (lit. shawl-tortilla)’, or noun-adjective compound /di\textsuperscript{2}d\textbackslash tɬ-i\textbackslash til\textbackslash/ ‘Spanish (lit. word-Castilian)’. Additionally, many nouns are formed by attaching a nominalizer prefix (CVC in form) to a verb or adjective stem /gi\textbackslash enɬ-mban\textbackslash/ ‘life (lit. Nominalizer-alive)’.

Verbs take their form by attaching an aspectual prefix to a verb stem. Most aspect prefixes consist of a single consonant (\(\text{c}\)- habitual, \(\text{b}\)- completive, \(\text{g}\)- potential, \(\text{z}\)-future, \(\text{n}\)- stative, \(\text{n}\)- unreal\(^9\)), however several aspect prefixes have a CV shape (\(\text{nol}^\text{2}\)- progressive I, \(\text{k}^\text{2}a\)- progressive II). The verb stem may consist of a single root or may be a verb-noun compound /tnabɬ-di\textsuperscript{2}dz\textbackslash/ ‘ask (lit. ask-word)’ or a verb-adjective

\(^8\) Beam de Azcona (personal communication) now considers these ‘proclitics’ prefixes.

\(^9\) The \(n\)- for unreal seems to cause the root to change in tone. Since this thesis focuses on nominals, it will not be explained here.
compound /rak\-n\'e\'h\'e\'h\'e/ ‘make happy (lit. make-happy)’. Finally, a number of clitics and suffixes attach to words of different parts of speech, lengthening a one-syllable word to two or more syllables. For example clitic /=ake\'/ attaches to nouns to mean ‘too’ /ngid\'a=alke\'/ ‘chicken too’ or it can attach to the number /tib\'/ ‘one’ to mean ‘always’ /tib\'=ajke\'/.

The historic syllable reduction that has gone on in SJMZ has implications on the study of tone in the language. If the deleted vowels bore contrastive tone, those tones may still be present in the language as floating tones. In section 3.3 the possibility of floating tones from historical syllable reduction is considered.

1.3.6 Spanish influence

The preference for monosyllabic roots can be seen in the phonemic modifications made to words when they are borrowed from Spanish. Spanish loanwords typically lose the final open syllable vowel. Vowels that occur in unstressed syllables frequently elide. The Spanish words almohada [almo\'a\'da] ‘pillow’ and razón [ra\'son] ‘reason’ are pronounced [Imad\'] and [rson\'] respectively in SJMZ, and considered monosyllabic by native speakers. More recent loans have not undergone such dramatic modifications, as can be seen in [sa\'pato] ‘shoe (Sp. zapato [sa\'pato]).’ Tone on monosyllabic loanwords is generally falling; however, some of the oldest loans have a rising tone, [me\'z\'] ‘table (Sp. mesa)’, for example. When the borrowed word is pronounced with two syllables, the first syllable has a low tone and the second has a high or falling tone.
1.3.7 Phonation

As mentioned in section 1.3.2, SJMZ vowels divide into two groups: modal and laryngealized. Modal vowels are pronounced with a normal phonation: neither breathy nor creaky. Laryngealized vowels are “interrupted” by a glottal stop.

On the phrase level, the exact distribution of laryngealized vowels has yet to be fully explored. In Quiegolani Zapotec (an eastern Southern Zapotec language) and Guevea de Humboldt Zapotec (an Isthmus Zapotec language), the glottal feature only occurs on stressed syllables. In non-stressed environments, the laryngeal feature is lost (Black 1995, Marks 1980). In SJMZ the same seems to be true in rapid speech. However, the existence of two disyllabic words whose stress falls on the second syllable but laryngealization occurs on the first, reveals that at least in slow speech, the glottal feature remains in unstressed syllables.

An additional laryngeal phenomenon in SJMZ is that the glottal feature is mobile. In some phrases the glottal feature moves off of a pronoun or article and onto a stressed root, resulting in a modal form of the pronoun or article. For example, /lo\lvu/ ‘your face’ is articulated [lo\lv\lvu]. In the case of the first person singular pronoun /na/, the glottal is frequently lost completely, as in /lo\lv na/ [lo\lv na] ‘my face’. Since the tones that can occur on laryngealized words are different than those on non-laryngealized words, this observation is important. This thesis will not, however, aim to further explain the mobility of the glottal feature.
1.4 **Grammatical sketch**

Since this study focuses on the tone of words in a larger context, a general overview of the grammar of SJMZ is helpful. The following sections outline the grammatical structure of SJMZ sentences and noun phrases.

1.4.1 **Basic word order**

The basic word order in SJMZ is verb-subject-object (VSO); however, this order is flexible. A subject or object noun phrase (but not both) may be fronted; if a subject is fronted, an emphasis particle may or may not accompany it. Sentence-modifying adverbs normally occur sentence-initially, but may occur sentence-finally. When a sentence contains an indirect object, it generally follows the other elements of the sentence. This sentence order is illustrated in examples (3) and (4) in section 1.4.2.

1.4.2 **The noun phrase**

The noun phrase in SJMZ consists, minimally, of a single noun in isolation. A number may precede the noun. Optionally, one or more adjectives can follow the noun to further specify or describe it. A determiner may follow the noun (or adjective, when one exists). Figure 4 formally shows the noun phrase.

\[
\text{NP} \rightarrow (\text{Quant}) \text{ N (*Adj)} (\text{Det})
\]

Figure 4 The SJMZ noun phrase

In a phrase of possession, a prefix /ɿ-/ attaches to the root noun, one or more adjectives optionally follow the noun, and the possessor noun or pronoun follows. Phrase (2) shows this form when the phrase /maɿ jeʔnɿ/ ‘little animal’ is possessed by the noun /mgiɿ/ ‘man’.
(2) ʃaŋ-маʃ  je²nʃ  mgIʃ
Possession-animal  little  man
‘the man’s little animal’

Sentences (3) and (4) demonstrate both the basic word order and the structure of the noun phrase. Sentence (3) includes an intransitive verb, showing the VS order, and a complex noun phrase. Sentence (4) contains a bi-transitive verb, thereby showing the VSO-indirect object word order.

(3) ʃaŋ-ʃo²ʃ  tsønʃ  maʃkʷʃ  je²nʃ  koʃ
Habitual-bark  three  dog  little  those
Those three puppies are barking.

(4) ʃaŋ-gaʃ  ʃeʃ  na²ʃ  tiβʃ  gI²ʃ  loʃ  na²ʃ
Compleitive-give  sister  I  one  flower  to  I
My sister gave me a flower.

1.4.3 Pronouns

From a traditional analysis, SJMZ pronouns consist of a single open syllable with a non-complex onset and a level tone. Most pronouns, though not all, have a high tone. Table 5 shows the basic pronouns of SJMZ.
Table 5 SJMZ pronouns

<table>
<thead>
<tr>
<th></th>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>First person</td>
<td>naʃ</td>
<td>inclusive</td>
</tr>
<tr>
<td>Second person</td>
<td>luʃ</td>
<td>toʃ</td>
</tr>
<tr>
<td>Third person</td>
<td>Human</td>
<td>meʃ</td>
</tr>
<tr>
<td></td>
<td>Contempt (human)</td>
<td>jiʃ</td>
</tr>
<tr>
<td></td>
<td>Deity</td>
<td>neʃ</td>
</tr>
<tr>
<td>Animal</td>
<td>maʃ</td>
<td>=aʃ (post-consonant) / =wʃ (post-vowel)</td>
</tr>
<tr>
<td>Inanimate</td>
<td>=aʃ (post-consonant) / =wʃ (post-vowel)</td>
<td></td>
</tr>
</tbody>
</table>

These pronouns stand out as the basic pronouns of the language for three reasons:

1. They are, with the exception of the inanimate pronoun, exclusively CV syllables, even though the majority of nouns have either a complex onset or nucleus, or a syllable coda.

2. They permit a single level tone; the noun form of the word for ‘animal’, in contrast, has a falling tone /ma\V/.

3. They function as a complete noun phrase that cannot be modified by quantifiers, adjectives, or determiners.

Reeck (p.c.) proposes that many other pronouns exist in the language. He argues that the SJMZ noun phrase can also be replaced by certain group of words that normally function as nouns. According to Reeck, these should be considered pronouns. A few examples of these non-traditional pronouns include /ni\b/ ‘boy’, /ndzo\p/ ‘girl’, /ʒeʃ/ ‘sir’, /ʒus/ ‘lady’, and /ŋeʃ/ ‘youth’. While these nouns do seem to behave at times like pronouns, for the purposes of this analysis, they will be considered simple nouns.

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10 When following a vowel, the pronoun takes the form of the consonant /w/ and contributes a high tone to the word to which it attaches. For example, in the question /peʃ gɪwʃ/ ‘is it a hill?’ the tone of the word ‘hill’ /gɪʃ/ is low, however with the /=wʃ/ elitic attached, a rising tone is realized.
CHAPTER II
LITERATURE REVIEW

2.1 Autosegmental phonology

Autosegmental phonology developed in contradiction to the generativist assumption that elements of language are distinct units, composed of stacks of distinctive features, occurring on the same linear level. To describe a word like impede [impid], a linear series of phonetic characteristics is listed, as in Figure 5.

<table>
<thead>
<tr>
<th></th>
<th>i</th>
<th>m</th>
<th>p</th>
<th>i</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>-consonantal</td>
<td>+consonantal</td>
<td>+consonantal</td>
<td>-consonantal</td>
<td>+consonantal</td>
<td></td>
</tr>
<tr>
<td>+sonorant</td>
<td>+sonorant</td>
<td>-sonorant</td>
<td>+sonorant</td>
<td>-sonorant</td>
<td></td>
</tr>
<tr>
<td>+continuant</td>
<td>-continuant</td>
<td>-continuant</td>
<td>+continuant</td>
<td>-continuant</td>
<td></td>
</tr>
<tr>
<td>-back</td>
<td>+nasal</td>
<td>-nasal</td>
<td>-back</td>
<td>-nasal</td>
<td></td>
</tr>
<tr>
<td>+high</td>
<td>+labial</td>
<td>+labial</td>
<td>+high</td>
<td>+coronal</td>
<td></td>
</tr>
<tr>
<td>+voiced</td>
<td>+voiced</td>
<td>-voiced</td>
<td>+voiced</td>
<td>+voice</td>
<td></td>
</tr>
<tr>
<td>-ATR</td>
<td></td>
<td></td>
<td></td>
<td>+ATR</td>
<td></td>
</tr>
</tbody>
</table>

Figure 5 Linear representation of ‘impede’

This model fails to take into account that different elements can share characteristics. In the word impede above, both [m] and [p] share the same labial place of articulation. In a non-linear model, that commonality is visible because it is represented as a single feature, shared by two segments. In the above linear model, the individual characteristics of each phone appear to be totally unrelated.

The central idea in autosegmental phonology is that language is not composed of a linear sequence of distinct elements, as had been assumed; rather, segments occur
on different levels or “tiers.” In visible representations, “association lines” demonstrate how the tiers come together. Although the elements on each tier are indeed linear, the multiple tier approach allows for elements to come together in such a way that adjacent and apparently nonadjacent elements can affect each other.

Autosegmental phonology deals with five common phenomena in tone languages that a linear model is hard-pressed to explain (Yip 2002:65):

1. Mobility: Tones can move to different segments.
2. Stability: Tone can remain when segments disappear.
3. One-to-many: A single tone can associate to many segments.
4. Many-to-one: More than one tone can associate to a single segment.
5. Toneless syllables: Not all syllables necessarily have a specified tone.

Presented in the 1970s as a different method to approach tone analysis, autosegmental phonology gained popularity and has become a central part of nearly all theories of phonology and even some theories of morphology and syntax.

2.2 Zapotec tone analyses

Analysis of tone in Zapotecan languages has a sporadic past. Over the last century there have been periods in which detailed analyses have been produced, and then long stretches of time in which little more than passing reference has been given to Zapotecan tonal systems. Many brief accounts including the tonal inventory of a language and a few instances of tone sandhi have made their way into the publications, but few thorough analyses have been published. Of the few analyses that exist, most
were written prior to the development of autosegmental theory, and therefore present a
number of rules and patterns that seem unrelated.

The remainder of this chapter summarizes Zapotec tone descriptions and
analyses from the past century, highlighting points that may be helpful in this analysis
of SJMZ. I present these descriptions and analyses regionally and chronologically.
Although the first tone analysis that I am aware of is from a Valley Zapotec dialect
(Angulo 1926), I begin this summary with Northern Zapotec analyses, as these
languages are probably the farthest linguistically removed variants from SJMZ. From
there I present the Valley-Isthmus Zapotec analyses as these are more numerous and
have a longer history. I include Isthmus studies with the Valley variants because,
linguistically, these areas are relatively close. From there I move to the Western
Zapotec region, even though it is probably more distinct linguistically from SJMZ than
the Valley-Isthmus region, because the analyses from this region are scarce. I end the
presentation of Zapotecan tone analyses in the Southern region since this is the region
SJMZ pertains to and because much of the work from this area is very recent.

Throughout these analyses, several key points repeatedly come to the surface.
First, the first person singular pronoun causes unusual tone patterns normally resulting
in a high tone on the verb or noun stem to which it attaches. Second, tonal alternations
can be leftward moving, rightward moving, or both. Third, tones generally perturb from
low to high. Fourth, unstressed stems in phrases and compound words frequently
experience both tonal and glottal simplification. Fifth, there seems to be an association
between the glottal stop and falling tones. Sixth, less tone shapes occur on glottalized words than on words with only modal vowels. This thesis will touch upon many of these issues as they relate to SJMZ.

2.2.1 Northern Zapotec analyses

Villa Alta Zapotec in the Northern region, as analyzed by Eunice Pike (1948), has three level tones (high, mid, and low). These level tones also concatenate to form contour tones. In contrast to SJMZ, words are normally two or more syllables in length. Pike describes the tonal sequences that may and may not occur. She states that the tone perturbations in this language are “regressive,” that is, tones alter the tone on preceding, but not following words or syllables. The tone system is not symmetrical as certain tone sequence patterns cannot occur utterance-finally and are only the result of tonal perturbations caused by following tones. Pike divides morphemes into tone classes. In one class of low tone morphemes, for example, low never changes, regardless of the following tone or morpheme. In another low class it may or may not change, depending on the context. In the third class of low tone morphemes, the tone alters only when the previous tone is also altered. She additionally found that tone alternations occur both word-internally and across word boundaries. Counter to Pike’s claim about Villa Alta Zapotec, underlying (“innate”) tone in SJMZ is not necessarily that which occurs utterance-finally.

Jumping off of Pike’s 1948 article, Leal (1950) further explores the Villa Alta Zapotec tone system, focusing on the interaction between pronouns and verbs or nouns.
She finds that, while occasional tonal alternations occur on stems that precede a number of the pronouns, the first person singular pronoun causes numerous and seemingly unpredictable tonal alternations both to verbs and nouns. Despite the distance both geographically and linguistically between the two languages, the first person singular pronoun in SJMZ also significantly alters the tone of verbs and nouns.

Following these two, publications on Northern Zapotec tone ceased until 1976 when Marks wrote on the tonomechanics of Sierra Juárez Zapotec verbs. She reiterates the “problem” of the first person singular pronoun, saying that it is “the basic factor influencing tone perturbations in relation to Sierra Juárez verb morphology” (1976:74). Additionally, this pronoun has a “raising influence” on a noun stem that it possesses (1976:101). Marks presents eleven rules that describe most of the tonal alternations in Sierra Juárez verb morphology, nine of which directly relate to the first person singular pronoun. She divides tone perturbation rules into those motivated morphologically and those motivated phonologically. Sierra Juárez Zapotec has three tone levels (high, mid, and low) and two contour tones (rising and falling). In Sierra Juárez Zapotec disyllabic verbs, only the second syllable may have a contour tone even though stress falls on the first syllable. Additionally, in disyllabic words both syllables have contrastive tone. Like Villa Alta Zapotec, Marks observes certain restrictions regarding consecutive tones in Sierra Juárez Zapotec. Specifically, a series of two consecutive high tones on a single verb does not occur, unless the first person singular pronoun causes such an alternation. Marks also indicates that, in the case of the first person singular pronoun,
tone perturbs leftwardly, but, in contrast to Villa Alta Zapotec, she notes that Sierra Juárez Zapotec tones can cause the tone on later elements to alter, i.e., rightward perturbation. Additionally, certain classes of verbs do not undergo a change in tone as a result of the first person singular pronoun.

The next work that touches on Northern Zapotec tone (although tone is not central to the article) is Nellis and Hollenbach (1980). In their brief analysis of Cajonos Zapotec tone, they observe high, low, falling, and occasionally mid tones. A historic rising tone, as observed in the dialect of the older people, has transformed into a low tone in the speech of the youth. On laryngealized syllables, they observe high, low, falling (high-low), and mid (articulated as a high-mid glide) tones. They also make reference to downdrift. In contrast, upstep will be shown to be a driving force in SJMZ.

More recently, with the tool of autosegmental phonology in hand, Bickmore and Broadwell have taken up the Northern Zapotec tone issue again. In their 1998 article on Sierra Juárez tone, they present an enlightening analysis of the tonal irregularities that the first person singular pronoun causes. In their analysis, they show how the first person singular pronoun can change the tone on non-adjacent preceding syllables. Utilizing a spin-off of autosegmental phonology called the Morphemic Tier Hypothesis, they argue that the tone of the first person singular pronoun is on a separate tier than the tone of the verb stem. With the first person singular tone on a different tier, a floating high tone (that precedes the morpheme’s associated low tone) can skip syllables and dock onto the stressed syllable of the verb (and any preceding toneless syllables). This
thesis will use both the Morphemic Tier Hypothesis and the circumfixal pronoun theory (which Bickmore and Broadwell argue against) in attempting to analyze the first person singular pronoun data from SJMZ.

Yip (2002) returns to the Bickmore and Broadwell analysis, suggesting a reanalysis with Optimality Theory. By presenting a constraint in which high tones dock onto stressed syllables, she implies that the Morphemic Tier Hypothesis is unnecessary in the analysis of Sierra Juárez Zapotec tone. The constraint that Yip presents is helpful; in fact, Broadwell makes use of it in his 1999 and 2000 discussions of Maquiltianguis Zapotec tone. Yip’s suggestions will also be taken in attempting to analyze the SJMZ first person singular pronoun.

Broadwell (2000) and Broadwell and Zhang (1999) analyze the tone in Maquiltianguis Zapotec. In this Zapotecan language, unlike SJMZ, vowel length is contrastive, and contour tones are only found on stressed, open syllables. The stressed syllable is the rightmost heavy syllable in a word. As in the analysis of Sierra Juárez Zapotec, a floating tone on the Maquiltianguis Zapotec first person singular pronoun docks onto a preceding stressed syllable (whether or not it is immediately adjacent). Additionally, high tone spreads from one word to the next. At times this rightward high tone spreading co-occurs with the leftward high tone docking that comes from the first person singular pronoun. Using Optimality Theory, Broadwell and Zhang explain that the language unites the two high tones as one instead of allowing a sequence of high tones, which would violate the Obligatory Contour Principle.
Although these most recent articles only deal with a very small portion of the language, their innovative means of explaining the tonal phenomena associated with the first person singular pronoun are useful to the study of Zapotecan tone as a whole. The tool of autosegmental phonology, used also in this study, truly helped explain the Northern Zapotec tonal phenomena, albeit in a limited range of data. Reanalyzing the remainder of the previously compiled Northern Zapotec data with this tool would open more doors to understanding Zapotecan tone systems.

2.2.2 Valley and Isthmus Zapotec analyses

The study of tone in Zapotec languages began with Angulo’s 1926 analysis of tone on Teotitlán del Valle (Valley) Zapotek [sic.] verbs. He finds that verbs divide into two classes. The first class includes verbs in which the tone on the root and prefix aspect markers does not change while the tone on the suffix person markers changes. The second class includes verbs (and also possessed nouns) whose tone changes depending on the person marker. With each of the first, second, and third person pronouns, the aspect-root-person conjunct has a normal tone shape and an abnormal shape that is the mirror image of the normal shape (presumably high-to-low, low-to-high, and mid-to-mid).

Following Angulo, Radin (1930) observes in Tehuantepec (Isthmus) Zapotec that tone patterns change on both the verbs and the nouns depending on the pronominal suffix. Normally, the first person singular pronoun causes the verb root to have a high tone, the second person pronoun causes a low tone, and the third person pronoun
generally causes a high tone, but occasionally a mid tone. He observes that, “without a clear realization of these tone patterns Zapotec grammar is unintelligible” (1930:67).

After Radin’s analysis, no further Valley and Isthmus Zapotec tone analyses were published until 1961. At that point, Briggs (1961), in a grammar of Mitla (Valley) Zapotec, cites three different environments where tonal alternations occur: when certain affixes attach to stems, when words come together to form compound words, and when certain stems come together in a phrase. As will be discussed in this thesis, tonal alternations also occur in the latter two of these environments in SJMZ. Briggs found that, in Mitla Zapotec compound words, tonal contours neutralize to high tone in the non-final stems. She also observed that while tonal alternations occur regressively (leftwardly), they are more commonly progressive (rightward). Additionally, she observed that tones generally perturb from low to high.

Again, Valley-Isthmus tone publications ceased until 1980. At that point, Marks (1980) shows that all three of the Guevea de Humboldt (Isthmus) tones, high, low, and low-high, neutralize to high in pre-stressed syllables across morpheme boundaries (in compound words, for example). This is similar to the neutralization found in Mitla Zapotec compound words, but more general since in Mitla Zapotec, the low tone does not neutralize to high. Marks also comments on the distribution of glottalization in relation to tone. She mentions that glottalization, like tone, is not constant, and that not all tone shapes co-occur with the glottal features of the vowels. (Both of these observations are also true in SJMZ, as will be shown in this thesis.) An example of both
of these phenomena is that a low tone never occurs on a checked, open syllable, so when the first person singular pronoun changes a simple vowel to a checked vowel in an open syllable, the tone obligatorily changes to high. This change of tone does not necessarily come directly from the first person singular pronoun because a number of stems do not change in tone with that pronoun. Marks also observes that in Guevea de Humboldt Zapotec, the glottal feature is not alone in altering tone; some tone sandhi is dependent on the lenis or fortis quality of the following segment.

In Isthmus Zapotec, Mock’s (1983, 1985, 1988) analyses identify four prosodic elements: tone, glottalization, laryngealization, and stress. She states, however, that laryngealization and glottalization occur on the segmental tier “despite their independent behavior” (1988:209). She describes the tone system as “basically a pitch-accent system” (1983:93), where the tones are “merely the products of phonological rules” (1983:93). So, most morphemes have a lexically specified “pitch-accent” (H, L, LH, or HL); the tone of each of the syllables in a word is predictable based on the word’s lexically determined pitch-accent and discourse-determined stress (she differentiates pitch-accent from “stress-accent”). Stress “provides the focus for the pitch accents and laryngealization, and the limiting frame for glottalization” (1985:350).

Mock observes three phonemic tone processes at work: lexical tone specification on words and clitics that do not have a pitch-accent of their own, tone neutralization, and tone sandhi. Utterance medially, L and LH tone patterns neutralize to L (leaving only L, H, and HL) while LH and H tones neutralize to LH pre-pause
(leaving LH, L, and HL). Tone sandhi occurs across word boundaries, almost always a LH tone spreading its H to the initial syllable of a following word. Additionally, the potential and completive aspects change the first component of a verb’s pitch accent to H in subordinate clauses (L becomes HL and LH becomes H).

Although stating that voice quality modifications fall on the segmental tier (1988), Mock’s 1985 article treats voice quality features as autosegments. Glottalization “has its domain on the entire morpheme, being manifested as a postvocalic glottal stop in each syllable” (1985:355). Laryngealization is realized phonetically as a creaky vowel. In contrast to glottalization that occurs on both accented and unaccented syllables and can spread from morpheme to morpheme, laryngealization only occurs on accented syllables. When the stress of a morpheme changes, both laryngealization and glottalization can disappear (1988). Mock states that voice quality is subordinate to tone because only three of the four pitch accents occur on either glottalized or laryngealized morphemes (H, HL, and L occur on glottalized morphemes, whereas H, LH and L occur on laryngealized morphemes). When a laryngealized syllable receives a HL tone, instead of readjusting the tone, the voice quality changes to glottalized.

Although Mock presents a thorough analysis of Isthmus Zapotec tone, her idiosyncratic approach of classifying the language as a pitch-accent system is unusual. I can find no reason to classify SJMZ as a pitch-accent language; rather, I analyze SJMZ as a tone language.
John Alsop (p.c. 2004) further clarifies the tone system in Isthmus Zapotec with the following principles:

1. Words come in tone classes; the words in each tone class behave identically.

2. Verbs come in pairs; they have one tone pattern with one group of aspects and a separate tone pattern with another group of aspects.

3. The first person singular pronoun causes dramatic tonal shifts.

4. Tone sandhi is almost always rightward moving; the exception to this is with the plural marker ca’, which almost always causes tone perturbation on the preceding word.

5. Tonal perturbation is upward; that is, tones perturb to H.

6. Basic tone on words changes at the word level as a result of aspect markers, compounding rules, etc. After these basic tonal changes occur, a separate process of tone sandhi occurs when these modified words are strung together in larger phrases.

In the introduction to the 1999 San Lucas Quiavini (Valley) Zapotec dictionary (Munro and Lopez) tone is mentioned in passing. The authors state that, although San Lucas Quiaviní Zapotec is a tone language, tone is not primarily contrastive on any level. Tonal melodies are derived from the number and type of phonation on the vowels; specifically, two plain vowels together have a high tone, creaky vowels have a low tone, phrase-final breathy vowels have an extra-low tone, and the tone of checked and other breathy vowels is derived from their environment. Contour tones occur where differing vowel phonations are present in the same syllable nucleus. As will be
discussed, this direct dependence of tone on glottal features is not entirely true in SJMZ. Additionally, SJMZ with only one non-modal form of vowels lacks the rich laryngeal complexity of San Lucas Quiavini Zapotec with three non-modal vowel forms.

In San Dionisio Ocotepec (Valley) Zapotec, Esposito (n.d.11) observed a phrase initial high tone that docks onto the right-most toneless element of a phrase. She found that the third person pronoun has a polar tone, taking the opposite tone of the element that precedes it. The first person singular possessor pronoun, which is high-toned, deletes the tone of the noun it possesses, resulting in the default low tone on the noun; however, when phrase-initially, the phrase-initial high tone docks in place of the default low tone. Additionally, when the first person singular pronoun possesses a noun modified by an adjective, the pronoun takes a low tone instead of its usual high tone while the noun stem receives a high tone, regardless of its underlying tone. Esposito’s analysis of phrase level tones and of a changing first person tone is similar to some of the findings in SJMZ tone that will be presented in this thesis.

After a hiatus of seventy-five or more years since the last publication, Lowes (n.d.12) picked up the study of Teotitlán del Valle Zapotec tone. In her brief phonological analysis, she identifies four tones and two “glottal tones” (Lowes n.d.:23) that are interrupted by a glottal stop. In contrast to Munro and Lopez (1999) who analyze that phonation conditions tone in San Lucas Quiavini Zapotec, Lowes states that, in neighboring Teotitlán del Valle, tone conditions phonation. Low tone words

11 A probable date is the late 1990s.
12 No date is given in the publication; however, it was written after a 2002 fieldtrip to the language area.
may have breathy phonation and falling tones often have creaky phonation. The glottal
tones are high (or possibly high-rising) and low (or possibly falling).

Arellanes (2003) studied the Güilá (Valley) Zapotec tonal system to determine
if tone has its base on the entire syllable, the syllable nucleus, or the syllable rime. He
determines that the onset, even when it is a resonant, does not contribute to the overall
tonal shape of the word. The phonemic tone shape of words does, however, continue
onto any resonant fortis consonants in the coda. Since these codas are the only type that
phonetically can hold tone, Arellanes determines that the syllable rime is the locus for
tone in Güilá Zapotec. Like SJMZ, Güilá Zapotec has four distinctive tones: high, low,
falling, and rising. The high tone is least common, and the falling tone is largely
reserved for Spanish loan words. Arellanes also writes that the falling tone actually rises
prior to falling. He analyzes it as a falling tone, however, for three reasons:

1. There is no separate falling tone that would contrast with it.

2. When the vowel /i/ is in the nucleus it does not have the rise.

3. The fall has a much greater change in pitch than the rise.

In San Baltazar Chichicapan (Valley) Zapotec, Smith Stark (2003) observes one
level tone (low), two contour tones (rising and falling), and four vowel articulations
(simple, heavily checked, lightly checked, and creaky\textsuperscript{13}). He found that prefixes and
proclitics only allow simple vowels and low or rising tones. Suffixes and enclitics, on

\textsuperscript{13} "Heavily checked’ vowels have two vowel peaks with a hard, phonetically longer, interrupting glottal
stop. ‘Lightly checked’ vowels also have two vowel peaks, but the first peak is phonetically longer, and
the interrupting glottal stop is weak. ‘Creaky’ vowels have two lightly laryngealized vowel peaks with
an interrupting glottal stop that is intermediate between that for heavily checked and lightly checked
vowels” (Joe Benton, p.c. 2004).
the other hand, permit simple, heavily checked, and creaky vowels with any of the three tones, although checked vowels in final position only occur with a low tone. Smith Stark observes several tonal and laryngeal phenomena. First, when a rising-toned syllable is elided, the tone moves onto the previous syllable. Second, when a rising tone in a non-stressed syllable precedes a rising or falling tone, it becomes a low tone. Third, falling tones that occur anywhere but on the last stressed syllable of a phrase (the place of greatest stress in the phrase) become rising. Fourth, all three of the vowel modifications neutralize to creaky voice when not in the stressed syllable of a phrase.

As in Isthmus Zapotec, Esposito (2003) argues that in Santa Ana del Valle (Valley) Zapotec, tone is more basic than phonation because, while non-modal phonation may be weakened, or even disappear, tone remains. She found similarities with neighboring Teotitlán de Valle and San Lucas Quiavíní in that certain phonations only co-occur with certain tonal melodies. Specifically, Esposito found that creaky vowels always have a long, falling tone, breathy vowels have a shorter falling tone, and modal vowels have either a high or high-rising tone. Esposito found that phrase-medial tones, while maintaining their shape, are lower than the tones on the same words in isolation. Additionally, phrase-medial non-modal vocalic phonation is diminished or disappears completely even though the corresponding tone retains its shape. She found that sentence-finally, modal vowels begin to sound breathy in the speech of men and creaky in the speech of women, but maintain the tone shape found on modal vowels. Esposito argues against the checked phonation type, stating instead that the glottal stop
is a consonant phoneme. Despite the unusual distribution of the glottal stop, she argues that it is a consonant because it occurs following both modal and creaky vowels, without changing these phonations.

2.2.3 Western Zapotec analyses

Of the four Zapotec regions, the Western region is least documented. In this section, I outline what has been mentioned about the tone and laryngeal systems of Western Zapotecan languages.

In Ayoquesco Zapotec, MacLaury (1970) reports five pitch levels and two contour tones: falling (extra-high to high) and rising (high to extra-high). He mentions, however, that the extra-high pitch and the falling pitch are in near complementary distribution. Extra-high pitch occurs on “glottalized” and “interrupted” vowels, and falling pitch occurs on simple vowels, with only two exceptions. MacLaury observed both mechanical tone sandhi and morphotonemic classes, but he gives no analysis of these systems.

In Texmelucan Zapotec, Speck (1978) identifies three level tones (high, mid, and low) and one contour tone (falling). Phonetically, the high tone goes from mid to high, the mid tone goes from mid to low, the low tone rises slightly, and the falling tone falls from high to mid. Additionally he observes two non-modal vowel phonations: laryngealized and checked. All four tone shapes occur on modal vowels, while only mid and low tones occur on laryngeal vowels and only high and low tones contrast on checked vowels. Speck observes that some words can affect a low tone of a following
word; however, if the following word is laryngealized, checked, or mid-toned, its tone is not altered, rather the tone of the word that motivates the tonal alternation changes. Speck also notes that three pronouns, including the first person singular pronoun, cause additional irregularities, and two of these also alter laryngealization. In Texmelucan Zapotec, laryngeal vowels lower tone phonetically. Specifically, both high and falling tones are articulated as mid, and mid tones are articulated as low on laryngealized syllables. Checked syllables also lower a mid tone to a low. From this observation, Speck analyzes that neither checked nor laryngealized syllables have an underlying low tone. Speck also observes that high and falling tones neutralize on unstressed syllables. In the noun phrase, Speck notes that, with few exceptions, the tone on adjectives is neutralized to high following a noun of any tone. These adjectives, if laryngealized, lose their laryngealization due to their new tone. Verbs are divided into classes depending on the tone changes that they experience, be they caused by the pronoun, the aspect markers, or some combination of aspect markers and pronouns. As in SJMZ, a few Texmelucan Zapotec non-laryngealized morphemes cause a preceding falling-toned syllable to become laryngealized. He observes, however, that when these morphemes follow a morpheme that causes tonal perturbation, they themselves become laryngealized.

Speck presents an excellent, pre-autosegmental analysis of Texmelucan Zapotec tone. From his analysis, the interrelation between tone and laryngealization is apparent.
A reanalysis using autosegmental phonology would simplify some of his rules and make his analysis all the more enlightening.

2.2.4 Southern Zapotec analyses

In the Southern Zapotec family of languages, most tonal analyses come from the western half of the region, whereas SJMZ belongs to the eastern half. Following are highlights from pre- and post-autosegmental tonal analyses of Southern Zapotec.

In Coatlán Zapotec, Robinson (1963) cites four vowel modifications: nasalization, laryngealization, length, and tone. Coatlán Zapotec has three level tones and three contours. The high-low glide begins with an up-glode and usually is laryngealized. A low-high glide and a mid-low glide also occur. He observes no tonal perturbation with nouns. Robinson cites two environments in which phonetic laryngealization occurs. First, long vowels with a falling tone are articulated with laryngealization. Second, syllables whose final consonant is a glottal stop may have a laryngealized vowel (he does not, however, include the glottal stop in his consonant inventory).

In 2001, Benton presents a word-level reconstruction of Proto Southern Zapotec tone. (He includes Texmelucan Zapotec (from the Western region) in this reconstruction.) Because of the interrelationship of tone and laryngeal features, he also focuses a good deal of his paper on laryngealization. He states that Proto Southern Zapotec had two vowel modifications apart from simple vowels: checked and lengthened. Additionally, he attests for three tones, high (H), low (L), and rising (LH),
although he states that L probably had a long high-falling contour since it frequently correlates with vowel length. Benton also posits a contrast between high intensity and low intensity syllables, where high intensity syllables came from a final [h] or aspiration on the vowel. This syllable intensity closely reflects what has been termed “ballistic” syllables in the Chinantec (Merrifield 1968, Foris 2000) and Amuzgo language families, both of which belong to the Otomanguean stock. These high and low intensity syllables, along with laryngealization and open vs. closed syllables, conditioned Proto Southern Zapotec tone. He parallels the tones found on Proto Southern Zapotec high intensity syllables to the Texmelucan Zapotec tones that cause perturbation on the following syllable.

Benton further details his analysis of high and low intensity syllables in a separate paper that focuses on Coatecas Altas Zapotec (2002). Benton posits the high and low syllable intensity contrast because it allows six phonetic tones to be analyzed as three phonemic tones. In his analysis, Coatecas Altas Zapotec has three tone distinctions, high, low, and falling, in addition to predictable stress, laryngealization (checked vowels), and high and low intensity syllables. Vowel length, loudness, “articulatory pressure,” pitch, and final aspiration all play a role in determining high vs. low intensity syllables. The high and the falling tones display more difference between high and low intensity syllables than the low tone. High tones in high intensity syllables rise, whereas high tones in low intensity syllables are nearly level and at a slightly lower pitch. Falling tones in high intensity syllables start higher and drop off more quickly
than falling tones in low intensity syllables. Low tones in both high and low intensity syllables have a slight down-glide, although in high intensity syllables, this down-glide is slightly more pronounced.

San Agustín Mixtepec is a neighboring town of San Juan Mixtepec, however, the Zapotec language spoken there (or formerly spoken there—only one elderly fluent speaker remains) is more closely related to the Zapotec languages spoken in the western half of the Southern Zapotec region. In this language Beam de Azcona (2004, n.d.) accounts for three tones, high, low (phonetically mid-low), and falling. Vowels have a three-way contrast: plain, rearticulated, and checked. While all of the three tones occur on plain and checked vowels, only the level tones occur on rearticulated vowels. Beam de Azcona contrasts the tonal behavior of the first person singular pronoun in San Agustín Mixtepec Zapotec from that in other Zapotec languages. She states that, in most Zapotec languages a floating high tone attaches to verbs and nouns when the first person singular pronoun is the subject or possessor of these. In contrast, in San Agustín Mixtepec Zapotec when the stem ends in a high tone, the floating high tone from the first person singular pronoun causes the tone of the pronoun to change from low to rising. In other words, the floating high tone docks to the pronoun itself, but at the end, not the beginning of the pronoun. Sometimes, when a low-toned noun has the first person singular pronoun as a possessor, the floating high docks onto both the end of the noun stem and the end of the pronoun. As will be discussed in section 4.3 of this thesis, the first person singular pronoun in SJMZ also seems to dock onto two different ends of
certain words. Unfortunately, Beam de Azcona does not yet offer an analysis to explain the details of this tonal alternation. In an additional observation, Beam de Azcona found that a high tone in San Agustín Mixtepec Zapotec corresponds to a glottal feature in Coatlán-Loxicha Zapotec sixty percent of the time.

In her forthcoming dissertation, Beam de Azcona posits five tone classes in Coatlán-Loxicha Zapotec: high, low, falling, rising, and “glottal.” She explains that, in contrast to many other Zapotecan languages, syllables with a glottallic feature do not have contrastive tone; all glottalized syllables are pronounced with a short rising tone, and if pronounced with a different tone, no semantic change occurs. According to Beam de Azcona, pitch as well as duration and glottalization are features of tone. While glottalization plays a minor role in the other tones, it is the primary feature of the glottal tone. In the Coatlán communities, the falling tone has non-phonemic glottalization. Beam de Azcona argues that tone and glottalization are features of the syllable, not the segment, as seen in the fact that tone plays out over the entire sonorous portion of the syllable rime.

Beam de Azcona also writes about what she calls “tonal morphology” in Coatlán-Loxicha Zapotec (2004). She found that the potential aspect frequently causes low tones to change to rising and falling tones to change to high. These same two modifications occur in relation to inanimate nouns in SJMZ. She analyzes the potential aspect as having a floating high suffix tone that works with the prefix segment. This process is not universal, however, since in the largest class of verbs, it only occurs on
intransitive verbs. In a footnote she states that, in this same class of verbs, a similar floating high from the first person singular pronoun only affects the transitive verbs. She considers the change from falling (high-low) to high a process of tone contour simplification: HLH simplifies to HH, which then simplifies to H. This same simplification will be proposed in this analysis. Other verbs that are not affected by the final floating high tone of the potential aspect may instead be upstepped, in which case high tones are articulated with an incrementally higher pitch. She argues that here, the floating high tone is a prefix that goes along with the segmental prefix. To explain how these separate processes function, Beam de Azcona makes use of Register Tier Theory. The different pitch patterns are played out in two registers. Register can spread to the right, causing upstep, but will not spread leftward unless a tone with that register moves leftward, causing a falling tone to be high and a low tone to be rising. Beam de Azcona also finds that, although the glottal stop is not a consonant, it is moraic and blocks a floating high tone from docking. She also observes that in this language floating tones only spread to the left; they never spread rightward.

2.2.5 Summary

In summary, while many people have touched on tone in their analyses of Zapotecan languages, few have presented thorough analyses. Of the more thorough analyses that exist, most were completed before autosegmental phonology had made an impression. A revision of these analyses would likely prove to be enlightening synchronically in each of the languages where they have been done, comparatively in
understanding how the systems are similar, and diachronically in understanding Zapotec tone historically.

Although much analysis and reanalysis is necessary, several key points repeatedly come to the surface in the existent Zapotecan tone analyses. These similarities include the following:

1. The first person singular causes unusual tone patterns normally resulting in a high tone on the verb or noun stem to which it attaches.

2. Tonal alternations can be leftward moving or rightward moving, or both.

3. Tones generally change from low to high.

4. Unstressed stems in phrases and compound words frequently experience both tonal and laryngeal neutralization.

5. There seems to be an inherent correlation between a glottalic feature and falling tones.

6. In general, fewer tone shapes occur on laryngeally complex vowels than on modal vowels.

This thesis will touch upon many of these issues as they relate to SJMZ.
CHAPTER III

TONE ON NON-GLOTTALIZED WORDS

3.1 Introduction

Monosyllabic SJMZ words that are not glottalized divide into four tone classes: low (L), high (H), rising (LH), and falling (HL). Table 6 shows examples of words from different grammatical categories with each of the four tones.

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>High</th>
<th>Rising</th>
<th>Falling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nouns</td>
<td>gig</td>
<td>men</td>
<td>bæd</td>
<td>lar</td>
</tr>
<tr>
<td>Verbs</td>
<td>rban</td>
<td>rban</td>
<td>rlab</td>
<td>rban</td>
</tr>
<tr>
<td>Adjectives</td>
<td>guts</td>
<td>ni3</td>
<td>l03</td>
<td>bidż</td>
</tr>
</tbody>
</table>

Two of these tone classes frequently undergo a tonal change such that they appear with the tone from a different tonal class. Specifically, when not in phrase-final position, words that appear with a low tone in isolation frequently change to rising tone and words that appear with a falling tone in isolation frequently change to high tone. These tonal alternations occur regardless of the tone of the following word. For example, the word /tʃop/ ‘two’ has a low tone in isolation and preceding many nouns, as in (5) below.
(5) ʧəp[l mækʷɔ]  ‘two dogs’
ʧəp[l ngıd]^14  ‘two chickens’
ʧəp[l mki]  ‘two nits’
ʧəp[l ƞʷzan]  ‘two turkey hens’

In contrast, preceding many nouns it takes a rising tone, as in (6).

(6) ʧəp[l q'et]  ‘two tortillas’
ʧəp[l bay]  ‘two shawls’
ʧəp[l q'el]  ‘two anonas (fruit)’
ʧəp[l jag]  ‘two trees’

In (5) and (6), a noun of each of the four tone classes follows the word /ʧəp[l/ ‘two’. In (5), /ʧəp[l/ is articulated with a low tone preceding words of each of the four tone classes, whereas in (6), /ʧəp[l/ is articulated with a rising tone preceding each of the four tone classes.

It is not only numerals like /ʧəp[l/ ‘two’ that undergo a change in tone preceding certain nouns. Nouns and pronouns with a low tone in isolation also change to rising tone in the subject position of a VSO sentence preceding some, but not all, objects. In (7) and (8), the noun /mækʷɔ/ ‘dog’ and the pronoun used to refer to deities /neJ/ ‘Deity’ take a rising tone preceding the nouns from (6) above, even though in isolation they are articulated with low tone.

^14 In sonorant-obstruent onset clusters, the sonorant is articulated with the same pitch as that on the final tone of a preceding word, so the nasal of /ngıd/ is articulated with a low tone, from the word /ʧəp[l/. In isolation the sonorant is articulated with the default low tone.
(7)  \[ \text{row} \text{ mæk}^{w} \text{J g'etJ} \]  ‘the dog eats tortillas’
\[ \text{row} \text{ mæk}^{w} \text{J bajJ} \]  ‘the dog eats the shawl’
\[ \text{row} \text{ mæk}^{w} \text{J g'elJ} \]  ‘the dog eats annona (fruit)’
\[ \text{row} \text{ mæk}^{w} \text{J jaqJ} \]  ‘the dog eats wood’

(8)  \[ \text{row} \text{ neJ g'etJ} \]  ‘he (a god) eats tortillas’
\[ \text{row} \text{ neJ bajJ} \]  ‘he (a god) eats the shawl’
\[ \text{row} \text{ neJ g'elJ} \]  ‘he (a god) eats annona (fruit)’
\[ \text{row} \text{ neJ jaqJ} \]  ‘he (a god) eats wood’

In (9) and (10), the words /mæk^{w}J/ and /neJ/ are articulated with a low tone, as they are in isolation.

(9)  \[ \text{row} \text{ mæk}^{w} \text{J merJ}^{15} \]  ‘the dog eats the turkey’
\[ \text{row} \text{ mæk}^{w} \text{J ngidJ} \]  ‘the dog eats the chicken’
\[ \text{row} \text{ mæk}^{w} \text{J mkiJ} \]  ‘the dog eats the nit’
\[ \text{row} \text{ mæk}^{w} \text{J ŋ^{w}zanJ} \]  ‘the dog eats the turkey hen’

(10)  \[ \text{row} \text{ neJ merJ} \]  ‘he (a god) eats the turkey’
\[ \text{row} \text{ neJ ngidJ} \]  ‘he (a god) eats the chicken’
\[ \text{row} \text{ neJ mkiJ} \]  ‘he (a god) eats the nit’
\[ \text{row} \text{ neJ ŋ^{w}zanJ} \]  ‘he (a god) eats the turkey hen’

As mentioned, the SJMZ tonal alternation is not limited to low-toned words changing to rising tone. Isolation falling-toned words also change to high tone in the same environment. In the phrases in (11), an isolation falling-toned noun, /mzinJ/ ‘mouse’, maintains its falling tone preceding certain nouns. In (12) its tone changes to high preceding other nouns.

\[ ^{15} \text{To make a more natural-sounding sentence, the word /merJ/ ‘turkey’ replaces the low-toned word /mæk^{w}J/ of (5) as the object of the sentence; ‘the dog eats the turkey’ instead of ‘the dog eats the dog’}. \]
(11)  
row \ mzin \ merJ 
row \ mzin \ ngidJ 
row \ mzin \ mkiJ 
row \ mzin \ η"zanJ 
‘the mouse eats the turkey’
‘the mouse eats the chicken’
‘the mouse eats the nit’
‘the mouse eats the turkey hen’

(12)  
row \ mzinJ g'etJ 
row \ mzinJ bajJ 
row \ mzinJ g'elJ 
row \ mzinJ jaqJ 
‘the mouse eats tortillas’
‘the mouse eats the shawl’
‘the mouse eats annona (fruit)’
‘the mouse eats wood’

The low-to-rising and falling-to-high tonal alternations also occur on verbs in VS and VSO sentences. In (13), the verb /rekJ/ ‘burns’, articulated with a low tone in isolation, occurs with low tone preceding the noun /melJ/ ‘star’ and with rising tone preceding the noun /giJ/ ‘hill’.

(13)  
rekJ melJ 
rekJ giJ 
‘the star burns’
‘the hill burns’

Both the verb and the subject can undergo a tonal alternation in the same sentence. The phrases in (14) show first a VSO sentence in which all three of the words are articulated with their isolation tone, second, a VSO sentence in which only the verb undergoes a change in tone from its isolation form, and third, a VSO sentence in which both the verb and the subject differ in tone from their isolation forms.

(14)  
rapJ mæk"J mgidJ 
rapJ juJ mæk"J 
rapJ juJ lonJ 
‘the dog has fleas’
‘the house has a dog’
‘the house has a bed’

In these examples, all of the words are articulated with a low tone in isolation. The verb /rapJ/ ‘has’ maintains its low tone preceding /mæk"J/ ‘dog’, but is articulated with a rising tone preceding /juJ/ ‘house’. The noun /juJ/ ‘house’ has a low tone in isolation and preceding /mæk"J/ ‘dog’, but takes a rising tone preceding /lonJ/ ‘bed’.

47
Finally, the same tonal alternations occur in phrases of possession. In a possessive phrase, a prefix /ʃ-/ attaches to the possessed noun; the possessor noun or pronoun follows. The phrases in (15) show how the falling tone of /ma\ 'animal' with the /ʃ-/ prefix can maintain its isolation tone or it can change to high.

(15) ʃma\ ʒey\ 'the gentleman’s animal'
ʃma\ la\ ‘Oaxaca’s animal’

Obligatory possessed nouns behave the same way tonally, although they lack the sibilant prefix. In (16), a nonsense phrase ‘the table’s nose’ was constructed to illustrate this behavior. /gʒi\ 'nose’ is articulated with a low tone preceding /ʒej\ ‘man’; however, preceding /meʒ\ ‘table’, it takes a rising tone.

(16) gʒi\ ʒej\ ‘the man’s nose’
gʒi\ meʒ\ ‘the table’s nose’

While low- and falling-toned words change in tone, high- and rising-toned words do not experience any tonal alternation. This lack of alternation is illustrated in (17) and (18) with the rising-toned word /ngid\ ‘chicken’, and, in (19) and (20), with the high-toned word /meʒ\ ‘dove’.
(17) row\ ngid\ mer\ ‘the chicken eats the turkey’
    row\ ngid\ ngon\ ‘the chicken eats the cow’
    row\ ngid\ mkil\ ‘the chicken eats the nit’
    row\ ngid\ n’zan\ ‘the chicken eats the turkey hen’

(18) row\ ngid\ g’et\ ‘the chicken eats tortillas’
    row\ ngid\ baj\ ‘the chicken eats the shawl’
    row\ ngid\ g’el\ ‘the chicken eats anonna (fruit)’
    row\ ngid\ jag\ ‘the chicken eats wood’

(19) row\ me3\ mer\ ‘the dove eats the turkey’
    row\ me3\ ngon\ ‘the dove eats the cow’
    row\ me3\ mkil\ ‘the dove eats the nit’
    row\ me3\ n’zan\ ‘the dove eats the turkey hen’

(20) row\ me3\ g’et\ ‘the dove eats tortillas’
    row\ me3\ baj\ ‘the dove eats the shawl’
    row\ me3\ g’el\ ‘the dove eats anonna (fruit)’
    row\ me3\ jag\ ‘the dove eats wood’

Note that no tonal alternation occurs with the words /ngid\/ and /me3\/ when they precede the words that caused an alternation in tone above (as in (6)) and when they precede those that did not cause tonal alternation (as in (5)).

A closer look at the data reveals that the nouns that can be replaced by the cliticized pronoun /=a\/ ‘Third Person Inanimate’ exhibit the alternation of a previous tone. For example, in the phrase g3i\ me3\ ‘the table’s nose’, /g3i\/ occurs with a rising tone instead of its isolation low tone preceding the inanimate noun /me3\/ ‘table’. Since /me3\/ is inanimate, the pronoun that replaces it is the third person inanimate clitic /=a\/. On the other hand, words that can be replaced by any of the human pronouns, the animal pronoun /ma\/, or the deity pronoun /ne\/ do not exhibit a change in the previous word’s tone, as in g3i\ 3e\ ‘the man’s nose’. Here, since 3e\ ‘sir’ is an
animate noun, which cannot be replaced by the inanimate pronoun, the word /g3iJ/ ‘nose’ does not change in tone to rising; rather, it maintains its isolation low tone. So, only when the following word is an inanimate noun, according to SJMZ grammar as evidenced by the use of pronouns, is the tone of a previous word altered. An animate noun will not exhibit a change in tone of a preceding word.

These data can be explained by three separate analyses, to be discussed in detail in sections 3.2 and 3.3. First, it can be proposed that inanimate nouns bear an initial floating high tone that links to a previous word, causing a low tone on that word to become rising, and a falling tone to become high. If there is no preceding word, the high tone is deleted by Stray Erasure.

Alternatively, it can be proposed that SJMZ words have a final high tone that only appears when not in phrase-final position; when in phrase-final position, the floating high tone is deleted by Stray Erasure. Additionally, animate nouns have an initial floating low tone that ultimately cancels out a preceding floating high tone, thereby accounting for the absence of the low-to-rising and falling-to-high alternations with animate nouns.

Finally, it can be proposed that, when words are strung together to form phrases in SJMZ a floating high tone is inserted between each pair of words. This tone may only dock onto a preceding word. Additionally, as proposed in the second analysis, animate nouns have a floating low tone prefix that ultimately cancels out the inter-word floating
high tone, again accounting for the absence of the low-to-rising and falling-to-high alternations with animate nouns.

In sections 3.2 and 3.3, these analyses will be further developed and explained. The first analysis, that an initial floating high tone on inanimate nouns causes the tonal alternation of a previous word, will be shown to be superior. Note that in these analyses, contour tones are considered a compound of two level tones: rising is low-high; falling is high-low. As will become evident in these analyses and in chapter four, in SJMZ the flexibility to spread and delete portions of contour tones (and not the entire contour) is necessary.

3.2 Floating H prefix on inanimate nouns

Of the three proposed analyses, the simplest posits a floating high tone on the left edge of inanimate nouns. In SJMZ inanimate nouns are those that can be referred to with the inanimate pronoun /ə\v/. The remaining nouns in the language are referred to with any one of a number of animate pronouns\textsuperscript{16}. These animate nouns do not have a floating high tone prefix and therefore do not cause a tonal alternation of the preceding word.

Under this hypothesis, inanimate nouns take the forms diagramed in (21).

\textsuperscript{16} What is termed here “animate” in the SJMZ grammar does not always correspond to animate in an English-speaker’s worldview. The heavenly bodies (stars, constellations, the sun and moon), mushrooms, and an assortment of other “things” (seeds (for some speakers), split-ends in hair, rashes, shade, etc.) are classified as animate in SJMZ, as evidenced by the use of pronouns.
(21)  

<table>
<thead>
<tr>
<th>Low-toned (inan. noun)</th>
<th>Falling-toned (inan. noun)</th>
<th>High-toned (inan. noun)</th>
<th>Rising-toned (inan. noun)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[L]</td>
<td>H L</td>
<td>H</td>
<td>[L H]</td>
</tr>
</tbody>
</table>

In contrast, animate nouns have the forms shown in (22).

(22)  

<table>
<thead>
<tr>
<th>Low-toned (anim. noun)</th>
<th>Falling-toned (anim. noun)</th>
<th>High-toned (anim. noun)</th>
<th>Rising-toned (anim. noun)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>H L</td>
<td>H</td>
<td>[L H]</td>
</tr>
</tbody>
</table>

When inanimate nouns are in isolation or utterance-initial, the floating high tone deletes by the rule of Stray Erasure, shown in (23).

(23)  

**Stray Erasure:** Floating tones delete.  

\[\]

The process of Stray-Erasure in inanimate words from each tone class is illustrated in (24).

(24)  

<table>
<thead>
<tr>
<th>Low []</th>
<th>Falling []</th>
<th>High []</th>
<th>Rising []</th>
</tr>
</thead>
<tbody>
<tr>
<td>g[]et</td>
<td>jag</td>
<td>g[]el[]</td>
<td>baj</td>
</tr>
<tr>
<td>[L]</td>
<td>H L</td>
<td>H</td>
<td>[L H]</td>
</tr>
</tbody>
</table>

| Stray Erasure |
|---------------|-------------|
| g\[\]et | jag         | g\[\]el\[\] | baj\[\] |
| \[L\]   | H L         | H        | \[L H\]    |

<table>
<thead>
<tr>
<th>Phonetic form</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘tortilla’</td>
</tr>
</tbody>
</table>

The supposition of this hypothesis, that an initial floating high tone is present on inanimate nouns, violates the Obligatory Contour Principle (OCP) that states, “Adjacent identical tones are banned from the lexical representation of a morpheme” (Kenstowicz
The violation occurs with high- and falling-toned inanimate nouns since their docked high tone is preceded by a floating high tone.

One attempt to satisfy the OCP is to propose that high tones always spread leftward across a word boundary. In that case, no floating tone would be present on high- and falling-toned inanimate nouns, instead, their initial docked high tone would spread leftward, as in (25).

\[
\text{\textit{ti|op jaq}} \quad \rightarrow \quad \text{\textit{ti|op jaq}} \quad \text{‘two trees’}
\]

\[
\begin{array}{c}
L \quad H \quad L \\
/ \quad \backslash \\
\end{array}
\begin{array}{c}
L \quad H \quad L \\
/ \quad \backslash \\
\end{array}
\]

However, this becomes problematic upon trying to explain why the initial high tone of animate nouns does not spread backward onto the preceding word. The word \textit{ti|op.j/} ‘two’ in the phrase \textit{ti|op.j kok\l/} ‘two turtle doves’, is pronounced with a low tone instead of a rising tone, as would be expected if the initial docked high tone of \textit{kok\l/} spread leftward onto it.

Alternatively, to account for the violation of the OCP that occurs in this hypothesis, it could be proposed that in SJMZ docked high tones and floating high tones are allowed in adjacency. This rule exempts SJMZ from obeying the OCP in this instance. Even more simply, it could be argued that the OCP does not apply in SJMZ.

A final way to interpret the data so that the OCP is not violated is to consider the floating high tone a separate morpheme that is prefixed onto nouns to indicate

\[17\] Kenstowicz’s definition of the OCP, is more restrictive than others’ (Goldsmith 1990:23 says that adjacent identical autosegments do not occur unless separated by a word boundary; Yip 2002:99, basing on Leben (1973), says more generally that “adjacent identical elements are prohibited”). When upstep is introduced in section 3.2.3, we will see that there is some evidence for the least restrictive form of the OCP at work in SJMZ.
inanimacy. In that case, Kenstowicz’s version of the OCP is no longer violated because the adjacent high tones no longer belong to the same morpheme. More conservative versions of the OCP are, however, violated. This interpretation is plausible for three reasons. First, most animate nouns have a nasal initial that some Zapotecoanist linguists interpret as a morpheme (Beam de Azcona 1998, p.c. 2004); if animate nouns are marked by a prefix, it is plausible to propose that inanimate nouns would also be marked by a prefix, the floating high tone. Second, a floating high tone is added to even the most recent Spanish loanwords. The high tone, then, instead of being a remnant tone from some historical segment, is simply the speakers’ way of identifying and labeling nouns from the inanimate class. Third, some nouns when possessed take the syllabic prefix /iʃ-/. If the floating high tone on inanimate words were part of the noun stem itself, the floating high tone would be expected to affect the tone of the possession prefix and not the tone of a preceding word. However, data reveals that the floating high tone floats to the left of the possession prefix, affecting the tone of a preceding word, not the prefix. In (26), the floating tone of ‘banana’ affects the word ‘two’. In (27), the floating tone of ‘banana’ is deleted by Stray Erasure; it does not dock onto the prefix. In (28), the floating tone of ‘banana’ does not dock onto the prefix; rather, it docks onto the preceding word, ‘two’.
(26)  tʃop  bdio
  two  banana
  ‘two bananas’

(27)  ziɬ-bdio  mikw
  Possession-banana  monkey
  ‘the monkey’s banana’

(28)  tʃop  ziɬ-bdio  mikw
  two  Possession-banana  monkey
  ‘the monkey’s two bananas’

Analyzing the floating high tone as a morpheme allows for this flexibility. Instead of being part of the word itself, the floating high tone is a morpheme that is placed to the left of the inanimate noun stem, not the root.

The following sections outline the tonal alternation processes and rules for words of each of the four tone classes preceding inanimate nouns.

3.2.1 L-toned words preceding inanimate nouns

When a low-toned word precedes an inanimate noun, the low tone changes to rising tone. This happens because the inanimate floating high tone prefix docks onto the preceding word, creating a rising tone. The rule in (29), Leftward Tone Docking, accounts for this process. Note that since the prefix floating tone docks to the left, it never ends up on the morpheme (or cluster of morphemes) that sponsors it. It remains to be seen whether all floating tones in the language follow this pattern.
(29) **Leftward Tone Docking:** Dock a floating tone to a syllable on the left.

\[
\begin{array}{c|c}
\sigma & \sigma \\
\hline \\
T & T \\
\end{array}
\]

The derivations in (30) show the tonal alternation caused by LTD on low-toned words.

(30) \( \text{top g\textsuperscript{iet}} \) \( \text{row m\textsuperscript{æk} g\textsuperscript{iet}} \) Underlying

\[
\begin{array}{c|c|c}
L & H & L \\
\hline \\
L & H & L \\
\end{array}
\]

\( \text{top g\textsuperscript{iet}} \) \( \text{row m\textsuperscript{æk} g\textsuperscript{iet}} \) Leftward

\[
\begin{array}{c|c|c}
L & H & L \\
\hline \\
L & H & L \\
\end{array}
\]

\( \text{top g\textsuperscript{iet} \textsuperscript{\textdagger}} \) \( \text{row m\textsuperscript{æk} w\textsuperscript{\textdagger} g\textsuperscript{iet} \textsuperscript{\textdagger}} \) Phonetic form

‘two tortillas’ ‘the dog eats tortillas’

3.2.2 *H* - and LH-toned words preceding inanimate nouns

LTD also docks the inanimate floating high tone prefix onto a previous word with a high or rising tone. This results in two consecutive docked high tones (since rising tone is represented by LH). In this case, a rule coalesces the two high tones. This rule is presented in (31).

(31) **High Tone Coalescence:** Consecutive docked high tones coalesce.

\[
\begin{array}{c|c}
\sigma & \sigma \\
\hline \\
/ \backslash & \rightarrow \\
H H & H \\
\end{array}
\]

The process of high tone coalescence on a preceding rising-toned word and a preceding high-toned word is seen in (32).\(^\text{18}\)

\(^{18}\) An alternative analysis here is that a floating high tone stray erases when adjacent to (on the right side of) a high tone. While that analysis brings about the same results, two separate Stray Erasure rules would be necessary: The first that acts to stray erase only floating high tones that occur to the right of a high
(32) \[ \text{\textit{ts}on} \ g^i et \quad \textit{no} \ g^i et \quad \text{Underlying} \]

H L \quad L H \quad L L

\[ \text{\textit{ts}on} \ g^i et \quad \textit{no} \ g^i et \quad \text{Leftward} \]

H L \quad L H \quad L L

\[ \text{\textit{ts}on} \ g^i et \quad \textit{no} \ g^i et \quad \text{High} \]

H L \quad L H \quad L L

\[ \text{\textit{ts}on} \ g^i et \quad \text{\textit{g}^i et} \quad \text{Phonetic form} \]

‘three tortillas’ ‘there are tortillas’

3.2.3 \textit{HL}-toned words preceding inanimate nouns

When a falling-toned word precedes an inanimate noun, LTD causes the inanimate floating high tone prefix to dock onto it following the falling tone. This results in three tones on a single syllable, as in (33).

(33) \[ \text{\textit{row} \ mzin} \ g^i et \quad \text{\textit{LTD}} \quad \text{\textit{row} \ mzin} \ g^i et \quad \text{‘the mouse eats tortillas’} \]

H L L H \quad H L \quad H L \quad L L

SJMZ, however, only permits a maximum of two docked tones on any syllable. To resolve this problem, a two-step process of tone contour simplification and high tone coalescence occurs. A rule of tone contour simplification is presented in (34). Beam de Azcona (2003) presents the identical process for complex contours in Coatlán-Loxicha Zapotec.

---

 tone. The second that acts to stray erase undocked tones after LTD has occurred. In the next section we will see that the analysis presented above leads to a more unified account.
(34) **Tone Contour Simplification:** HLH simplifies to HH.

\[
\begin{array}{c|c|c}
\sigma & \sigma & \sigma \\
/\slash & /\slash & /\slash \\
H L H & H L H & H H \\
\end{array}
\]

The two high tones are then coalesced by the HTC rule. These rules are in a feeding relationship; observe their necessary order in (35).

(35) \[
\begin{array}{c|c|c|c|c}
\text{row mzin } g^i et & \text{Underlying} & \text{Representation} \\
/\slash & /\slash & / & H L H \\
\end{array}
\]

\[
\begin{array}{c|c|c|c|c}
\text{row mzin } g^i et & \text{Leftward} & \text{Tone} & \text{Docking} \\
/\slash & /\slash & / & H L H \\
\end{array}
\]

\[
\begin{array}{c|c|c|c|c}
\text{row mzin } g^i et & \text{Tone} & \text{Contour} & \text{Simplification} \\
/\slash & /\slash & / & H L H \\
\end{array}
\]

\[
\begin{array}{c|c|c|c|c}
\text{row mzin } g^i et & \text{High} & \text{Tone} & \text{Coalescence} \\
/\slash & /\slash & / & H L H \\
\end{array}
\]

\[
\begin{array}{c|c|c|c|c}
\text{row } \text{mzin } g^i et \text{l} & \text{Phonetic form} \\
/\slash & /\slash & / & H L H \\
\end{array}
\]

‘the mouse eats tortillas’

The same process of contour simplification and high tone coalescence occurs elsewhere in the language. When the inanimate pronoun clitic attaches to an open-syllable word, the /=a1/ changes to the consonant /=w/, however the high tone remains. When the word to which it attaches has a falling tone, the same HLH contour results, as in the question “is it rain?” Example (36) shows how the word /g^i et\l/ ‘rain’ has a falling tone in isolation; however, when the inanimate clitic /=w/ suffixes onto /g^i et\l/, a three-tone complex results.
(36)  
\[
\begin{align*}
\text{pe} & \quad \text{g}^1e \text{-a} \quad \text{LTD} & \quad \text{pe} & \quad \text{g}^1ew \quad \text{TCS, HTC} & \quad \text{pe} & \quad \text{g}^1ew \quad \text{pe}^1 \text{g}^1ew^1 \\
\text{H} & \quad \text{H} & \quad \text{L} & \quad \Theta & \quad \text{H} & \quad \text{H} & \quad \text{L} & \quad \Theta \\
\end{align*}
\]
\[\rightarrow \quad \text{‘is it rain?’}\]

(The language simplifies the constraint-breaking three-tone series by the same two-step process of TCS and HTC, resulting in [pe\textsuperscript{1} g\textsuperscript{1}ew\textsuperscript{1}].)

It is interesting to note here that, although the above resultant form (consecutive high tones across a word boundary) does not violate Kenstowicz’s version of the OCP, SJMZ looks for a way to differentiate the two high tones. It does this by slightly raising the pitch of each consecutive high tone. In contrast, when a single high tone spreads onto consecutive syllables, no upstep occurs. The phonetic process of upstep is presented in (37).\textsuperscript{19}

(37)  \textbf{Upstep:} Each consecutive high tone is raised in pitch.
\[
\begin{array}{c|c}
\sigma & \sigma \\
\hline
\text{H} & \text{H} \\
\end{array}
\]

The derivations in (38) show the four-step process again:

1. The floating high tone inanimate prefix docks onto the preceding word.
2. The three-tone contour simplifies to HH.
3. The high tones coalesce.
4. Consecutively articulated high tones are upstepped.

\textsuperscript{19}Keith Snider (p.c. 2004), as in his account of Acatlán Mixtec (1999:99-115) argues that this is actually a violation of the OCP because two identical tones (specifically a H tone and a h register) are linked to two consecutive syllables. Since SJMZ has a two-tone system with no other instances of upstep or downstep, I argue that the language does not need to specify register. Only in the case of consecutive high tones does the language raise the register on which the second high tone occurs to remedy an OCP violation.
Here, the inanimate words /lga3/ ‘fir tree’ and /g'el/ ‘anona (fruit)’ are nouns that possess the falling-toned word /midz/ ‘seed’.

\[(38)\]  
\[
\begin{array}{c|c}
\text{midz} & \text{midz} \\
\text{lga3} & \text{g'el} \\
/\ & /\ \\
H \ L \ H \ L & H \ L \ H
\end{array}
\]

Underlying Representation

Leftward Tone Docking

Tone Contour Simplification

High Tone Coalescence

Upstep

\[\text{midz} l\text{g'a}3\text{\vl} \quad \text{midz} \text{g'el}\text{\vl} \quad \text{‘fir seed’} \quad \text{‘anona (fruit) seed’}\]

### 3.2.4 Summary

To explain the processes at work in the data, this analysis posits a floating high tone prefix on inanimate nouns. Five ordered rules are necessary to account for the tonal alternations, and lack thereof, that occur on preceding words of the four tone classes, and on the inanimate noun itself when in isolation. The derivations in (39) show the process.

---

\[20\] /midz/ is not an obligatorily possessed noun since it can occur without a possessor; however, it contrasts to most alienably possessed nouns in that it does not need the possession prefix /f-/ (although it can optionally take the prefix).
Having developed the first proposed analysis in this section, the next section, number 3.3, will develop both the second and third proposed analyses for these data.

### 3.3 Alternate analyses with floating L prefix on animate nouns

Analyzing the tonal alternations presented in this chapter as a floating high tone on inanimate nouns initially appears to be straightforward; however, a diachronic and comparative look at Zapotec animal words brings different analyses to light. This section will first explain how looking at other Zapotecan languages calls for positing an
initial floating low tone on animate nouns, something both of the analyses presented in this section do. Then, the second analysis proposed above (that words have a final floating high tone that only appears when not in final position) will be developed. Finally, the third analysis proposed (that a floating high tone is inserted between words when they are strung together in phrases) will be presented.

3.3.1 *Historical syllable reduction on animate nouns*

The vast majority of animate nouns in SJMZ begin with a nasal consonant, and many of these begin with a nasal-obstruent syllable-onset cluster. Beam de Azcona (1998, p.c. 2004) considers these nasal consonants to be an animate prefix marker. Comparing these words with animal words from other Zapotec areas reveals that the nasal in SJMZ nasal-obstruent onset clusters is frequently a separate obstruent-vowel syllable in the Valley-Isthmus Zapotec languages. Table 7 compares animal words in SJMZ, Mitla (Valley) Zapotec, and Isthmus Zapotec. Syllable divisions are indicated by a period.
### Table 7 Animal words in three Zapotec languages

<table>
<thead>
<tr>
<th>SJMZ</th>
<th>Mitla Zapotec</th>
<th>Isthmus Zapotec</th>
<th>English meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>mdzinɬ</td>
<td>bi. dzin</td>
<td>bi. dʒim, naɬ</td>
<td>‘deer’</td>
</tr>
<tr>
<td>mzinɬ</td>
<td>bi. zin</td>
<td>bi. zil, naɬ</td>
<td>‘mouse’</td>
</tr>
<tr>
<td>miɬ</td>
<td>bi. sɬ</td>
<td>bi. sial</td>
<td>‘eagle’</td>
</tr>
<tr>
<td>mʒiɬdzɬ</td>
<td>bi. jidz</td>
<td>bi. sɬ, dʒiɬ</td>
<td>‘badger’</td>
</tr>
<tr>
<td>ṇw ráɬm</td>
<td>gu. ral</td>
<td>gu. ral, guʔɬ</td>
<td>‘lizard’</td>
</tr>
<tr>
<td>ṇw tsieɬtsɬ</td>
<td>gu. tiats</td>
<td>gu. tʃal.tʃiʔɬ</td>
<td>‘iguana’</td>
</tr>
<tr>
<td>ngupɬ</td>
<td>be. ggp</td>
<td>nguɬ, piɬ</td>
<td>‘armadillo’</td>
</tr>
</tbody>
</table>

Almost universally, the initial /bi/ in more conservative Isthmus and Mitla Zapotecs has been reduced to the nasal consonant /m/, and /gu/ has been reduced to the complex nasal consonant /ŋw/ in SJMZ. A few SJMZ place names reveal that historically, the vowel was deleted first, and then the obstruent became a nasal. One example is /kʃeɬ psil/ ‘Eagle Rock’, where /psil/ is an older form (presumably an intermediate form from the proto form <bisi>) of /msil/ ‘eagle’. In this older form of the word the vowel has been elided, but the consonant has not yet become a nasal.

It would not be surprising, that a tone has remained in the syllable reduction process. This tone, since the nasal is not a phonemic tone-bearing unit in SJMZ, floats to the left of the nuclear-linked tone. With this hypothesis, a reverse analysis of the tonal alternations presented in section 3.1 is called for: instead of proposing that inanimate nouns have a floating high tone prefix, animate nouns can be proposed to have an initial floating low tone, retained historically when the first syllable in animal words was reduced. This hypothesis alone, however, does not account for the low-to-rising and falling-to-high alternations that we see with inanimate nouns. To account for

---

21 Exact phonetic transcriptions are unavailable; these phonemic transcriptions are based on orthographic conventions from Vocabulario Zapotec de Istmo (Pickett, et.al. 1965) and Diccionario Zapoteco de Mitla, Oaxaca (Stubblefield, et.al. 1991). Surface tone is indicated only when marked in the publications.
the upward shift in tone that is present in the data (low-to-rising and falling-to-high) instead of a downward shift in tone that would be expected from a floating low tone, two analyses can be proposed. Either nearly all SJMZ words have a final floating high tone, or, in the process of stringing words together in SJMZ, a floating high tone is inserted between the words.

3.3.2 *Word-final floating high tone*

One way to account for the upward tonal alternations found in the data is to posit that most SJMZ words have a final floating high tone that deletes as a result of Stray Erasure when not followed by another word. The original Stray Erasure rule posited above works here. (Additionally, the proposed initial floating low tone on animate nouns deletes by stray erasure when no word precedes it.) Two words are derived according to this analysis in (40).

\[
(40) \quad \text{\texttt{t\textasciitilde}op} \quad \hdashrightarrow \quad \text{\texttt{mzin}}
\]

<table>
<thead>
<tr>
<th>Underlying Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>L  [ \text{H} ]</td>
</tr>
<tr>
<td>H L  [ \text{H} ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stray Erasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>L  [ \text{H} ]</td>
</tr>
<tr>
<td>H L  [ \text{H} ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phonetic form</th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{<code>two'} \quad \texttt{</code>mouse'}</td>
</tr>
</tbody>
</table>

The historic reason for positing a final floating high tone is that, as evidenced in Table 7, many words in Isthmus Zapotec (a more conservative variant) end with a vowel, whereas no such vowel exists in either Mitla Zapotec or SJMZ. In this analysis, the high tone present on many of the Table 7 Isthmus Zapotec final syllables remained
when the vowel was elided. As a result, SJMZ words have a final floating high tone that
only docks when not in phrase-final position. The Leftward Tone Docking rule from the
first analysis again works here, however, we must modify it slightly. The modified form
is presented in (41).

(41) **Leftward Tone Docking:** Dock a floating tone to a syllable on the left, only
when a word exists to the right.

\[ \sigma \xrightarrow{w[\sigma]} \hat{1} \]

The tone is only permitted to dock if a word is present on the right. If no word is present
on the right, the high tone is deleted by Stray Erasure; therefore, the low-to-rising and
falling-to-high tonal alternations do not occur. Contrast the isolation low-toned form
/tʃop]/ with the non-final, rising-toned form /tʃopəl gəet]/.

Here again, Tone Contour Simplification and High Tone Coalescence are
necessary to account for the tonal patterns that occur with all four of the tone classes.
The derivations in (42) show these rules.
(42)
\[
\begin{array}{cccccc}
\text{Underlying Representation} \\
\text{Leftward Toning} \\
\text{Stray Erasure} \\
\text{Tone Contour Simplification} \\
\text{High Tone Coalescence} \\
\text{Phonetic form} \\
\text{‘two tortillas’ ‘there are tortillas’ ‘three tortillas’ ‘tortilla’s face’}
\end{array}
\]

To account for the fact that no tonal alternation occurs preceding animate nouns, a floating low tone can be posited at the left edge of animate nouns. The floating low tone serves to “cancel out” the upward tonal alternation caused by the word-final floating high tone. To explain this, a Tone Contour Simplification rule followed by a Low Tone Coalescence rule (similar to the Tone Contour Simplification and High Tone Coalescence rules presented in sections 3.2.2 and 3.2.3) are needed. These rules are presented in (43) and (44).
(43) **Tone Contour Simplification 2:** LHL simplifies to LL.

\[
\begin{array}{c}
\sigma \\
/|\ \\
\hline
L H L
\end{array} \rightarrow \begin{array}{c}
\sigma \\
/\ |
\hline
L H L
\end{array} \rightarrow \begin{array}{c}
\sigma \\
/
\hline
L L
\end{array}
\]

(44) **Low Tone Coalescence:** Consecutive docked low tones coalesce.

\[
\begin{array}{c}
\sigma \\
/\ \\
\hline
L L
\end{array} \rightarrow \begin{array}{c}
\sigma \\
/
\hline
L L
\end{array}
\]

The phrase derived in (45) illustrates the tonal neutralization process:

(45) \(\text{\u0101op mdzi}\) \(\text{Underlying}

| \(\text{\u0101op mdzi}\) \(\text{Representation}

| \(\text{\u0101op mdzi}\) \(\text{Leftward}

| \(\text{\u0101op mdzi}\) \(\text{Tone}

| \(\text{\u0101op mdzi}\) \(\text{Docking}

| \(\text{\u0101op mdzi}\) \(\text{Stray}

| \(\text{\u0101op mdzi}\) \(\text{Erasure}

| \(\text{\u0101op mdzi}\) \(\text{Tone}

| \(\text{\u0101op mdzi}\) \(\text{Contour}

| \(\text{\u0101op mdzi}\) \(\text{Simplification 2}

| \(\text{\u0101op mdzi}\) \(\text{Low}

| \(\text{\u0101op mdzi}\) \(\text{Tone}

| \(\text{\u0101op mdzi}\) \(\text{Coalescence}

| \(\text{\u0101op mdzi}\) \(\text{Phonetic form}

\text{‘two deer’}

In this example the floating low animate tone docks onto the preceding word following the word-final floating high tone. With three docked tones, the two-tone-maximum-per-syllable constraint is violated, so tonal simplification and coalescence occur.
The phrase in (46), ‘the dog sees corn’, shows that more rules yet need to be developed.

(46) \[ \text{ran mæk}^w \text{ 30b} \]

Underlying

\[
\begin{array}{c}
\text{L H H} \\
\text{L H H} \\
\text{L H H}
\end{array}
\]

Representation

\[
\begin{array}{c}
\text{L H H} \\
\text{L H H} \\
\text{L H H}
\end{array}
\]

Leftward

\[
\begin{array}{c}
\text{L H H} \\
\text{L H H} \\
\text{L H H}
\end{array}
\]

Tone

\[
\begin{array}{c}
\text{L H H} \\
\text{L H H} \\
\text{L H H}
\end{array}
\]

Docking

\[
\begin{array}{c}
\text{L H H} \\
\text{L H H} \\
\text{L H H}
\end{array}
\]

Phonetic form

ran\text{mæk}^w 30b\text{I}

‘the dog sees corn’

In this example, the word /ran\text{I}/ ‘see’, after LTD has four tones linked to it when a maximum of two are allowed. The rules that we currently have to deal with extra tones docked onto a syllable will not produce the correct phonetic form. TCS deals with the tri-tone sequence of HLH, while TCS2 deals with the tri-tone sequence of LHL. Those sequences do not occur here, so the rules do not apply. If the High Tone Coalescence rule were used initially, the LHHL contour would become LHL. If TCS2 were to apply at this point, the result would be a low tone on /ran\text{I}/, instead of the correct rising tone.

A separate rule, developed in (47), deletes the two final tones.

(47) **Extra Tone Deletion:** If the total number of tones docked onto a syllable exceeds two, delete the most recently docked tone(s).

\[
\begin{array}{c}
\sigma \\
\text{T (T) T (T) T (T) T (T)} \to \\
\text{T (T) T (T)}
\end{array}
\]

This rule is odd in that it calls for the deletion of a tone that, according to the maximum number of tones permitted in a syllable, would be permitted; i.e., after LTD, a low- or
high-toned word preceding an animate noun has three docked tones (the original tone plus the word-final high tone (H) and animate low tone (L)). ETD says that the rightmost two tones (H and L) are deleted, even though the syllable would allow for the second tone (H). Additionally, this rule is unappealing because it refers to the history of the derivation, calling the rule to “remember” what has gone on previously in the derivation.

On a more positive note, ETD makes TCS and TCS2 unnecessary in this analysis. By deleting extra tones, no complex contours remain to be simplified. Instead of having two separate coalescence rules in this analysis, a separate rule that combines HTC and LTC can be proposed. Adjacent Tone Coalescence is presented in (48).

(48) **Adjacent Tone Coalescence:** Two adjacent identical tones docked onto the same syllable coalesce.

\[
\begin{array}{c}
\sigma \\
/ \setminus \ \rightarrow \\
T_1 T_1 \\
\end{array} \sigma \\
\begin{array}{c}
|
\\T_1
\end{array}
\]

The derivations in (49) show the rule progression. Observe again the feeding relationship that these rules have. They are presented in their necessary order.
3.3.3 Inter-word floating high tone

A final possible way to account for the upward tonal alternations found in the data is to posit that, when words are strung together in SJMZ, a floating high tone is inserted between them. This rule is shown in (50).

(50) **Inter-word High Tone Insertion:** Insert a high tone between words.

\[ \sigma_w \ w[\sigma] \rightarrow \sigma_w \ \wedge[\sigma] \]

As in the first and second analyses, the inter-word floating high tone causes a preceding low tone to change to rising, a preceding falling tone to change to high, and does not affect a H-final tone (high or rising). Additionally, as in the second analysis,
animate nouns have a floating low tone on their left end, which ultimately “cancels out” the inter-word floating high tone.

The processes in this third analysis are much the same as in the second analysis. The difference between the two analyses is that the floating high tone is not lexically associated with the end of a word; rather, it comes into play when words come together in utterances. It therefore does not exist on phrase-final words and so does not need to be deleted by the Stray Erasure rule.

The derivations in (51) demonstrate the tonal alternations that occur with a phrase-initial low-toned and high-toned word, and the difference between an animate and inanimate noun following another word.
This analysis is more appealing than the second analysis because, while the second analysis violated the OCP by positing words with underlying consecutive high tones and words with underlying consecutive low tones, this analysis does not posit a floating high tone on the word level. Only the initial floating low tone on animate nouns is posited on the word level, and this can be argued to be a morpheme marking animacy (as was argued with the floating high tone on inanimate nouns the first analysis). So, this analysis, like the first analysis, does not call for a violation of the OCP.

3.4 Discussion of the three analyses

While all three analyses have their strengths and weaknesses, I argue that the first analysis, that inanimate nouns have a floating high tone prefix, is superior.
3.4.1 *Strengths and weaknesses of the analyses*

All three analyses have an undesirable element in that they posit underlying tonal representations that are potentially in violation of the OCP. In the first analysis, inanimate words like those in (52) have underlying consecutive high tones:

\[(52) \; \begin{array}{c}
\text{H} \\
\vline \\
\text{g}^{\text{i}} \text{e} \text{l}
\end{array} \; \begin{array}{c}
\text{H} \\
\vline \\
\text{H} \; \text{L}
\end{array} \]

‘annona (fruit)’

In the second and third analyses, animate words like those in (53) have underlying consecutive low tones:

\[(53) \; \begin{array}{c}
\text{L} \\
\vline \\
\text{m} \text{e} \text{l}
\end{array} \; \begin{array}{c}
\text{L} \\
\vline \\
\text{L} \; \text{H}
\end{array} \]

‘star’

\[(54) \; \begin{array}{c}
\text{H} \\
\vline \\
\text{g}^{\text{i}} \text{e} \text{l}
\end{array} \; \begin{array}{c}
\text{L} \\
\vline \\
\text{L} \; \text{H} \; \text{H}
\end{array} \]

‘annona (fruit)’

The second analysis violates the OCP not only with the above example, but also with words like those in (54) that have a docked high tone followed by a floating high:

‘turtle’

Only by considering the word-initial floating tones as separate morphemes (either an inanimate morpheme in the case of the first analysis or an animate morpheme in the case of the second and third analyses), is the OCP constraint followed. However, there does not seem to be any way to get around violating the OCP in the second analysis that posits a word-final floating high tone.

Although the second and third analyses are attractive in that the floating low tone that exists initially on animate nouns can be explained by historic syllable
reduction, not all animate nouns exhibit this reduction. For example, the SJMZ word /mækʷ]/ ‘dog’ is pronounced [biʔku?] in the Isthmus and [bæʔkʷ] in Mitla, and SJMZ /meʔʃ]/ ‘skunk’ is pronounced [beʔteʔ] in the Isthmus and [baʔt] in Mitla. In these words, although the Isthmus cognates are disyllabic, it is the final syllable, not the initial syllable that has been reduced in SJMZ. While this final-syllable reduction adds support to the second analysis (that posits a word-final floating high tone), that analysis is also dependent on an initial floating low tone. Since there is no initial syllable reduction, a preceding floating low tone on animate nouns as a result of syllable reduction is less reasonable. It would, however, be reasonable to assume that the floating low tone is associated with the animate prefix (a nasal in SJMZ, but an obstructent in other Zapotec languages). Even here, though, animal words that come from Spanish and have no nasal prefix, like /tʃiβ]/ ‘goat (Sp. chivo)’ and /bʊɾ]/ or /bʊɾ]/ ‘donkey (Sp. burro)’, must have an initial floating low tone, according to these analyses. That implies that the floating low tone is not historically associated with the reduced nasal prefix; rather, it is an entity of its own.

While a historic floating low tone on animate nouns thus seems less plausible, there is reason to believe that SJMZ would have an initial floating high tone used as a classifier of inanimate nouns. SJMZ groups all inanimate nouns identifiable by the inanimate pronoun in a single class, whereas animate nouns do not fit into a single class that shares a pronoun. The animate pronouns divide into three sub-classes: human, animal, and deity, and no one pronoun covers all human beings; rather, the human
pronouns divide depending on number, person, gender, respect, etc. While they group naturally as animate in contrast to the inanimate nouns, the language does not have any other morphological strategy to classify animate nouns. While many begin with a nasal prefix, not all do. Since the inanimate nouns already form a separate class, it is plausible that this class would be identified not only through the pronoun, but also by means of a prefixed tone. Alternatively it could be argued that since the inanimate nouns already form a pronoun-based class, a low tone prefix unifies the otherwise divided animate class. In such an analysis, the language classifies as animate any noun that takes the floating low tone prefix, and as inanimate any noun without the tonal prefix (and referred to with the inanimate pronoun).

Considering the third analysis (that a floating high tone is inserted between words as they are strung together), the existence of an inter-word tone would be unusual. Phrase-level tones apparently exist in San Dionisio Ocotepec Zapotec (Esposito n.d.), however in that language a floating high tone marks the beginning of a phrase, not word boundaries within an utterance. To my knowledge, inserted inter-word tones do not exist in any Zapotec language.

The first analysis wins out by virtue of its simplicity and general plausibility. While all three analyses explain the data, the first explains the data by positing a single tonal phenomenon: inanimate nouns have a floating high tone prefix that links to a previous word or else is deleted by Stray Erasure. The second and third analyses are
more complex and less plausible because they require two separate tonal principles to explain the data:

1. Either all words have a final floating high tone, or when words are strung together, a floating high tone is inserted between words.

2. Animate nouns have a floating low tone that never appears; it only “cancels out” the upward tendencies of a previous floating high tone.

They are also based heavily on data from other language areas. While these data can be helpful, they do not necessarily reflect an historic or synchronically accurate picture.

A final argument in favor of the first analysis is that, if the second and third analyses are correct, the same inter-word or word-final floating high tone should appear between a noun and an adjective, causing the identical tonal alternations. However, the tonal alternations at work between nouns and adjectives appear to be more related to contour simplification, and do not show evidence for a universal word-final floating high tone or an inserted inter-word tone. Section 3.4.2 presents an analysis of the tonal alternations that occur with SJMZ adjectives.

3.4.2  Tone on the noun-adjective conjunct

When a falling-toned noun precedes an adjective of any tone, the noun’s tone changes to high. For example, in (55), the falling-toned noun /næz/ ‘road’ is articulated with a high tone preceding adjectives of each tone class.
(55)  nɛz\'ȵia\'l  ‘narrow road’
      nɛz\' gof\'l  ‘old road’
      nɛz\' mbe\'l  ‘clean road’
      nɛz\' n3en\'l  ‘wide road’

This behavior is in line with the second and third analyses proposed above in which words either have a final floating high tone or a floating high tone is inserted between words when they are strung together. The rules presented in the first analysis do not account for the tonal alternation presented here since in that analysis, only inanimate nouns have a floating high tone that docks onto a preceding word. To account for the adjective data using the first analysis, an initial floating high tone would have to be posited on adjectives, as well as on inanimate nouns. Observe in (56) how the rules from the third analysis explain the noun-adjective data below.
(56)

\[
\begin{array}{cccccc}
\text{næz nia} & \text{næz gof} & \text{næz mbe} & \text{næz n3en} & \\
/\backslash & /\backslash & /\backslash & /\backslash & \\
H L & L & H L & L H & H L & H L \\
\text{Underlying Representation} & \\
\hline
\text{næz nia} & \text{næz gof} & \text{næz mbe} & \text{næz n3en} & \\
/\backslash & /\backslash & /\backslash & /\backslash & \\
H L & H L & H L & H L & H L & H L \\
\text{High tone Insertion} & \\
\hline
\text{næz nia} & \text{næz gof} & \text{næz mbe} & \text{næz n3en} & \\
/\backslash & /\backslash & /\backslash & /\backslash & \\
H L & H L & H L & H L & H L & H L \\
\text{Leftward Tone Docking} & \\
\hline
\text{næz nia} & \text{næz gof} & \text{næz mbe} & \text{næz n3en} & \\
/\backslash & /\backslash & /\backslash & /\backslash & \\
H L & H L & H L & H L & H L & H L \\
\text{Stray Erasure} & \\
\hline
\text{næz nia} & \text{næz gof} & \text{næz mbe} & \text{næz n3en} & \\
/\backslash & /\backslash & /\backslash & /\backslash & \\
H L & H L & H L & H L & H L & H L \\
\text{Extra Tone Deletion} & \\
\hline
\text{næz nia} & \text{næz gof} & \text{næz mbe} & \text{næz n3en} & \\
/\backslash & /\backslash & /\backslash & /\backslash & \\
H & H & H & H & H L & H L & H L & H L \\
\text{Adjacent Tone Coalescence} & \\
\hline
\text{næz nia} & \text{næz gof} & \text{næz mbe} & \text{næz n3en} & \\
/\backslash & /\backslash & /\backslash & /\backslash & \\
H & H & H & H & H L & H L & H L & H L \\
\text{Upstep} & \\
\hline
\text{næz1 nia1} & \text{næz1 gof1} & \text{næz1 mbe1} & \text{næz1 n3en1} & \\
\text{‘narrow road’ ‘old road’ ‘clean road’ ‘wide road’} & \\
\hline
\end{array}
\]

By contrast, (57) shows that the rules from the first analysis do not bring about the tonal alternation without positing an initial floating high tone on adjectives.
(57)  

<table>
<thead>
<tr>
<th>næz nia</th>
<th>næz goʃ</th>
<th>næz mbe</th>
<th>næz n3en</th>
</tr>
</thead>
</table>
| /
H L L   | /
H L L H | /
H L H   | /
H L H L |

Underlying Representation  

<table>
<thead>
<tr>
<th>næz nia</th>
<th>næz goʃ</th>
<th>næz mbe</th>
<th>næz n3en</th>
</tr>
</thead>
</table>
| /
H L L   | /
H L L H | /
H L L H | /
H L L H |

Leftward Tone Docking  

<table>
<thead>
<tr>
<th>næz nia</th>
<th>næz goʃ</th>
<th>næz mbe</th>
<th>næz n3en</th>
</tr>
</thead>
</table>
| /
H L L   | /
H L L H | /
H L H   | /
H L H   |

Stray Erasure  

<table>
<thead>
<tr>
<th>næz nia</th>
<th>næz goʃ</th>
<th>næz mbe</th>
<th>næz n3en</th>
</tr>
</thead>
</table>
| /
H L L   | /
H L L H | /
H L H   | /
H L H |

Tone Contour Simplification  

<table>
<thead>
<tr>
<th>næz nia</th>
<th>næz goʃ</th>
<th>næz mbe</th>
<th>næz n3en</th>
</tr>
</thead>
</table>
| /
H L L H | /
H L H   | /
H L H   |

High Tone Coalescence  

<table>
<thead>
<tr>
<th>næz nia</th>
<th>næz goʃ</th>
<th>næz mbe</th>
<th>næz n3en</th>
</tr>
</thead>
<tbody>
<tr>
<td>*næz\n nia</td>
<td>*næz\n goʃ</td>
<td>*næz\n mbe</td>
<td>*næz\n n3en</td>
</tr>
</tbody>
</table>

‘narrow road’ ‘old road’ ‘clean road’ ‘wide road’  

Phonetic form  

Although the above falling-toned words that precede an adjective seem to have a word-final or inserted inter-word floating high tone, when a low-toned noun precedes an adjective, no evidence of floating high tones exists. A low-toned noun does not experience any tonal alternation whatsoever preceding an adjective of any tone. In the examples below, the low-toned noun /daɻ/ ‘mat’ precedes adjectives of each of the four tone classes. No tonal alternation occurs on either the noun or the adjective, as is apparent in (58).
(58) da l nia l  ‘narrow mat’
dal gof l  ‘old mat’
dal mbe l  ‘clean mat’
dal n3en l  ‘wide mat’

Using the rules presented in the second and third analyses results in an incorrect outcome in this case. The low-toned nouns would change to rising tone preceding the adjectives, as seen in (59).

(59) da nia  da gof l  da mbe  da n3en  Underlying
     |    |    |    |    | Representation
L L  L L H  L H  L H L

   da nia  da gof l  da mbe  da n3en  Inter-word
   |    |    |    |    | High tone

   da nia  da gof l  da mbe  da n3en  Leftward
   |    |    |    |    | Tone

   da nia  da gof l  da mbe  da n3en  Extra Tone
   |    |    |    |    | Deletion

   da nia  da gof l  da mbe  da n3en  Adjacent Tone
   |    |    |    |    | Coalescence

*dal nia l  *dal gof l  *dal mbe l  *dal n3en l  Phonetic form
‘narrow mat’ ‘old mat’ ‘clean mat’ ‘wide mat’

In contrast, the rules from the first analysis produce the correct results, as in (60).

80
Since no tonal alternation occurs to the low-toned nouns, it appears that the change from falling- to high-toned nouns preceding an adjective is not a result of a word-final high tone, an inserted inter-word tone, or an initial floating high tone on all adjectives; rather, the tone change seems to be the result of an adjective-specific rule (61) that simplifies falling tones on nouns preceding adjectives.

(61) **Adjective Falling Tone Simplification:** Preceding an adjective, simplify a noun’s falling tone to high.

\[
\sigma_{\text{Noun}} \sigma_{\text{Adj}} \xrightarrow{\text{}} \\
\text{H L} \xrightarrow{\text{}} \\
\]
Although falling tones simplify preceding an adjective, rising-toned nouns do not simplify, except preceding an adjective of the same tone shape. In (62), the tone of /bajM/ ‘shawl’ only changes from its isolation tone preceding the rising-toned adjective /gojM/ ‘old’, where it becomes high.

(62) bajM niaJ ‘narrow shawl’
bajM gojM ‘old shawl’
bajM mbeJ ‘clean shawl’
bajM n3enJ ‘wide shawl’

None of the three analyses presented account for this tonal behavior. To account for this alternation, a new rule (63) needs to be introduced that changes a rising-toned noun to high tone preceding a rising-toned adjective. While consecutive rising tones are permitted elsewhere in the language, they are banned between a noun and an adjective.

(63) **Adjective Rising Tone Simplification:** A rising-toned noun simplifies to high preceding a rising-toned adjective.

\[ \sigma_{\text{Noun}} \quad \sigma_{\text{Adj}} \]
\[ \begin{array}{c|c}
\hline
L & H \\
\hline
\end{array} \]

Note that when two rising-toned adjectives occur in sequence, they both maintain their rising shape, as in (64).

(64) tibJ mæk\textsuperscript{w}J g0xJ l03J [tiJ mæk\textsuperscript{w}J g0xJ l03J]
one dog old shaggy
‘a shaggy old dog’

As in the case of the low-toned nouns preceding an adjective of any tone, high-toned nouns never alter in tone preceding an adjective of any tone, as can be seen in (65). This would be expected with all three of the proposed analyses.
(65)  \( \text{bieg}^{\text{w}} \text{nial} \)  ‘narrow comb’
    \( \text{bieg}^{\text{w}} \text{gof}^{\text{f}} \)  ‘old comb’
    \( \text{bieg}^{\text{w}} \text{mbe}^{\text{l}} \)  ‘clean comb’
    \( \text{bieg}^{\text{w}} \text{n3en}^{\text{l}} \)  ‘wide comb’

The behavior of falling-toned nouns preceding adjectives initially seems to support the second and third analyses (in which a high tone floats at the end of a word or is inserted between words) because falling-toned words simplify to high in this context. The first analysis, which proposes that inanimate nouns have an initial floating high tone that docks onto a previous word, does not account for why an adjective would cause the same tonal alternation to a previous word, without the addition of an adjective-specific rule. The first analysis, however, is the only analysis of the three that correctly predicts the behavior of low-toned nouns preceding adjectives. Finally, none of the three analyses explain the tonal simplification of a rising-toned noun preceding an adjective of the same tone, without the addition of an adjective specific rule.

Considering that falling-toned nouns are simplified to high preceding any adjective and rising-toned nouns simplify to high preceding a rising-toned adjective, the underlying principle at work with adjectives seems to be contour simplification. Why the rising tone only simplifies preceding rising-toned adjectives and not preceding any other adjective is motive for further investigation.\(^{22}\)

---
\(^{22}\)A possible interpretation of these data is that the noun and adjective are closely bound such that the language treats them as a single compound word. In section 4.3.4 we will examine the behavior of compound words. It will be shown that contour tones in the first stem of a two-stem compound word simplify: rising tones becomes high and falling tones becomes low. If these noun-adjective phrases truly functioned as compound words, we would expect rising-toned nouns to simplify to high preceding adjectives of all the tone classes. We would also expect falling-toned nouns to simplify to low, not high, preceding adjectives.
3.5 Summary

Positing a floating high tone prefix on inanimate nouns best accounts for the data at hand. While the other analyses seem to be persuasive because of historical and comparative evidence, the simplicity and plausibility of the first analysis wins out. Additionally, although the first analysis does not fully explain the tonal behavior at work between nouns and adjectives, it does not motivate incorrect tonal alternations. The other analyses, on the other hand, predict incorrect tonal alternations on the noun-adjective conjunct. In summary, although the second and third analyses seem plausible historically, the system has shifted so that they are not the best synchronic analyses.
CHAPTER IV
TONE AND GLOTTALIZATION

4.1 Introduction

SJMZ vowels occur with either modal phonation or laryngealization. Laryngealized vowels are altered by a glottal stop, either \([V^r]\) in open syllables and preceding lenis consonants or \([V_f]\) preceding fortis consonants. This chapter will examine the tonal phenomena that occur on glottalized vowels, with close attention to the first person singular pronoun.

As seen in section 3.1, non-glottalized vowels can occur with one of four tone shapes. In contrast, monosyllabic glottalized words only occur with three possible pitch shapes: rising, low, or falling. In section 4.2, I show that words that are glottalized with a rising pitch in isolation have a phonemic rising tone; words that are glottalized with a low pitch in isolation are underlyingly toneless, not low-toned as would be expected; and words that are glottalized with a falling pitch in isolation have an underlying falling tone. Additionally, section 4.2 shows that glottalized words with a falling pitch shape that are not in isolation may have either a phonemic falling tone or a phonemic high tone. Table 8 shows words of varying syllable structures pronounced with the different pitch patterns that occur on glottalized vowels.
Table 8 Glottalized nouns from each pitch shape

<table>
<thead>
<tr>
<th></th>
<th>Rising</th>
<th>Low</th>
<th>Falling</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV^t</td>
<td>mæ^t</td>
<td>‘moon’</td>
<td>do^t</td>
</tr>
<tr>
<td>CV^tC</td>
<td>bæ’l</td>
<td>‘meat’</td>
<td>gi’n</td>
</tr>
<tr>
<td>CVC</td>
<td>ptj[u_]‘f</td>
<td>‘tomato’</td>
<td>ndzo’p</td>
</tr>
<tr>
<td>CVV</td>
<td>bia’</td>
<td>‘caucus’</td>
<td>bzia’</td>
</tr>
</tbody>
</table>

4.2 Analysis of the tone on glottalized words

4.2.1 LH-toned glottalized words

The rising pitch shape on glottalized words varies depending on whether or not the vowel is rearticulated. When the rising tone occurs on a glottalized vowel that is not rearticulated, the rising pitch shape occurs before the glottal closure, as shown on the left side of Figure 6. When the vowel is rearticulated after the glottal closure, the rising tone straddles the glottal stop, articulating as a low tone before and an extra-high tone after the glottal closure, as shown on the right in Figure 6.

![Figure 6 Rising pitch on glottalized words](image)

Words of this tone class behave identically to non-glottalized rising-toned words. Like non-glottalized rising-toned words, inanimate nouns have an initial floating high tone that docks onto a preceding word. The derivation in (66) shows this behavior.

---

23 This diagram is based on one speaker’s pronunciation of several rising-toned glottalized words, repeated three times each.
Additionally, when a floating high tone docks onto the right edge of a glottalized rising-toned word, no change in tone occurs, as in (67).

(67)  \text{row ndzo}^{\ddag} \text{p g'et} & \text{Underlying} \\
      /\ /\ | & \text{Representation} \\
      H L L H \overline{H} L \\
      \text{row ndzo}^{\ddag} \text{p g'et} & \text{Leftward} \\
      /\ /\ | & \text{Tone} \\
      H L L H \overline{H} L \\
      \text{row ndzo}^{\ddag} \text{p g'et} & \text{High} \\
      /\ /\ | & \text{Tone} \\
      H L L H L \\
      \text{row ndzo}^{\ddag} \text{p} \text{g'et} & \text{Coalescence} \\
      \text{‘the girl eats tortillas’} \\

4.2.2 Toneless glottalized words

The “low” glottalized tone occurs with a low pitch both in isolation and following low- and falling-toned words. However, when a word of this class follows a high- or rising-toned word, it is articulated with a falling tone shape. This change occurs with animate nouns, so it is not related to an inanimate floating high tone. The phonetic forms of phrases in (68) show the tonal change.

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Initially this tonal alternation is disturbing. Why would a low-toned word change to falling at the end of some phrases? As will be discussed in section 4.2.3, both high- and falling-toned glottalized words are articulated with a falling pitch shape. Since a falling pitch shape may underlyingly be a high tone, it is reasonable to consider these “low” glottalized tones as phonemically toneless. When in isolation, a toneless syllable takes the default (low) tone. When following another word, the final tone of the preceding word spreads onto the toneless syllable. These two phenomena can be accounted for by two rules, one that spreads a tone rightward onto a toneless syllable (69) and another that inserts the default low tone onto a toneless syllable (70).

(69) **Rightward Tone Spread:** Docked tones spread rightward to toneless syllables.

\[
\sigma \rightarrow T \sigma
\]

(70) **Default Low Insertion:** The default low tone docks onto a toneless syllable.

\[
\sigma \rightarrow L \sigma
\]

The derivations in (71) show these rules in their necessary order.
### (71)

<table>
<thead>
<tr>
<th></th>
<th>mæ²’d</th>
<th>tʃ̩op mæ²’d</th>
<th>ɹson mæ²’d</th>
<th>rdz̩ag mæ²’d</th>
<th>rda mæ²’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>\</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>\</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Rightward Tone

<table>
<thead>
<tr>
<th></th>
<th>mæ²’d</th>
<th>tʃ̩op mæ²’d</th>
<th>ɹson mæ²’d</th>
<th>rdz̩ag mæ²’d</th>
<th>rda mæ²’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>\</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>\</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Default Insertion

<table>
<thead>
<tr>
<th></th>
<th>mæ²’d</th>
<th>tʃ̩op mæ²’d</th>
<th>ɹson mæ²’d</th>
<th>rdz̩ag mæ²’d</th>
<th>rda mæ²’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Low Insertion

<table>
<thead>
<tr>
<th></th>
<th>mæ²’d</th>
<th>tʃ̩op mæ²’d</th>
<th>ɹson mæ²’d</th>
<th>rdz̩ag mæ²’d</th>
<th>rda mæ²’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Phonetic Form

- ‘child’
- ‘two children’
- ‘three children’
- ‘the child tires’
- ‘the child weakens’

An important piece of evidence that /mæ²’d/ shares a single high tone in /ɹson mæ²’d/ and /rda mæ²’d/ is that no upstep occurs between the words (as would happen if the second word were underlyingly high- or falling-toned). The lack of upstep is because there is no occurrence of consecutively docked high tones. For upstep to occur, two separate docked high tones must occur in sequence (see discussion in section 3.2.3). In this case, however, a single high tone is linked to the different syllables.

When the toneless glottalized word is an inanimate noun, it has the floating high tone prefix discussed in section 3.2. Since floating high tones dock to the left (Leftward Tone Docking), the inanimate floating high tone prefix cannot dock onto its own inanimate noun, even if the noun is underlyingly toneless. As shown in section 3.2, undocked floating tones are deleted by Stray Erasure. With no tone docked onto the

---

24 This form shows the resultant tone on the word. The “phonetic form” is altered to show that high-toned glottalized words are articulated with a falling pitch shape and the vowel is rearticulated preceding a lenis consonant or in an open syllable.
syllable, the default low tone is inserted. The inanimate toneless glottalized word /di²b/ ‘feather’ is derived in (72). (Again, note that in SJMZ, floating tones do not dock onto the morpheme that sponsors them.)

(72) \( \text{di}^2\text{b} \) Underlying Representation

\[ \hat{H} \]

\[ \text{Leftward Tone Docking} \]

\( \text{di}^2\text{b} \) Stray Erasure

\[ \hat{H} \]

\[ \text{Rightward Tone Spread} \]

\( \text{di}^2\text{b} \) Default Low Insertion

\[ L \]

\( \text{di}^{\text{at}}\text{b} \) Phonemic form

\( \text{di}^{\text{at}}\text{b} \) Phonetic form

‘feather’

When a word precedes an inanimate toneless glottalized noun, however, the floating high tone docks onto the end of the preceding word (by LTD). That docked high tone then spreads rightward by RTS, resulting in a high tone (phonetic falling pitch) on the inanimate toneless glottalized noun, as seen in (73).
Again, no upstep occurs because there is no instance of consecutively docked high tones,\textsuperscript{25} as would be the case if the glottalized word were underlyingly marked for high tone.\textsuperscript{26}

4.2.3 \textit{HL-toned glottalized words}

As mentioned in section 4.1, the third tone that occurs on glottalized words in isolation has a falling pitch pattern.\textsuperscript{27} Since no level high pitch exists on glottalized

\textsuperscript{25} Actually, a slight lowering of the high tone on the glottalized word occurs. In SJMZ, glottalization in a phrase-medial context seems to cause a decline in tone. The details of this phenomenon will be left for further investigation.

\textsuperscript{26} The data and analysis presented in this section deal with what generally happens in this tone class; however, exceptions occur. For example, when a toneless glottalized noun, animate or inanimate, is in the subject position of a VSO phrase, it occasionally takes a rising tone preceding an inanimate object, instead of the expected high tone. The data is not consistent, however. The same speaker alternates between the high and the rising tone.

\textsuperscript{27} When in isolation, the pitch preceding fortis consonants is occasionally level high.
words, the phonemic tone of these falling-pitched glottalized words is uncertain. We have already seen how a high tone can spread onto a toneless word, resulting in a phonemic high tone (but a phonetic falling pitch). Do glottalized words in isolation with a falling pitch have a phonemic high tone, or are they phonemically falling-toned? Reeck implies that both high- and falling-toned glottalized words exist, but not necessarily underlyingly, in his statement, “the contrast between high and falling tones in syllables with glottalized vowel nuclei is neutralized to a phonetic falling tone” (1991:264).

In order to determine if glottalized words with a falling pitch in isolation are phonemically high- or falling-toned, we must observe the tone that a toneless word takes following the falling-pitched word. Since toneless glottalized words receive their tone as a result of Rightward Tone Spread, if the preceding word has an underlying falling tone, the following toneless word will be articulated with a low tone (since the final L will spread by RTS onto the following word). On the other hand, if the preceding word has an underlying high tone (even though it is be articulated with a falling pitch), the following toneless word will receive a high tone by RTS (which, since the toneless word is glottalized, will be articulated with a falling pitch). To avoid interference from the floating high tone of inanimate nouns, a phrase, ‘the frog eats the snake’, literally ‘eat frog snake’, was constructed. Example (74) shows the phonemic forms of ‘eats’ and ‘snake’, and the phonetic form of ‘frog’.

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(74) /row\l/ ‘eats’  
[mbi'^\l] or [mbi'^\l] ‘frog’  
/me^\l/ ‘snake’

Since the word /mbi'^\l/ ‘frog’ has a falling or high pitch shape in isolation (the high pitch shape is due to its un-rearticulated vowel), its underlying tone is either high or falling. Since the animate noun /me^\l/ ‘snake’ is toneless and does not have the inanimate floating high tone prefix, its tone is determined by the final underlying tone of the previous word. Phonetically, the phrase is pronounced [row\l mbi'^\l\l me^\l\l]. Since /me^\l/ is articulated with a low tone following /mbi'^\l/, we know that /mbi'^\l\l/ underlyingly has a falling tone, not a high tone. The derivation in (75) shows the process.

(75) row mbi'^\l\l me^\l\l \hspace{1cm} Underlying  
/\ \ /\ \ \hspace{1cm} Representation  
H L H L

\hspace{1cm} row mbi'^\l\l me^\l\l \hspace{1cm} Rightward  
/\ \ /\ \ \hspace{1cm} Tone  
H L H L \hspace{1cm} Spread

\hspace{1cm} row\l mbi'^\l\l\l me^\l\l\l \hspace{1cm} Phonemic and  
‘the frog eats snake’  
\hspace{1cm} Phonetic form

As this example shows, a glottalized word in isolation with a falling pitch shape has an underlying falling tone.\(^{28}\) While it is possible that other words with this pitch shape

\(^{28}\) It is possible that the phonetic low tone of a high-toned *mbi'^\l\l/ ‘frog’ spreads onto the toneless word. Example (77), however, shows that a high tone can iteratively spread onto two toneless words, resulting in a falling pitch shape (but high tone) on both of the underlyingly toneless words. That confirms then that it is the phonemic low tone of /mbi'^\l\l/ ‘frog’ that spreads onto the toneless word, not the phonetic low pitch.

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have an underlying high tone, none have yet been observed. If words of this tone class do exist, the result would be a more symmetric inventory.

In section 4.2.2, it was shown that words with the glottalized falling pitch shape can also bear a high tone, although not underlyingly and not in isolation. There, the high tone came as a result of Rightward Tone Spread. Additionally, Leftward Tone Docking can cause a glottalized toneless word to receive a high tone that is articulated with a falling pitch. First, an additional example of a toneless word taking a phonemic high tone (and articulated with a falling tone) via Rightward Tone Spread will be presented. Then, an example of a falling-toned word changing to high tone via LTD (but keeping its falling pitch) will be presented. Finally, a toneless word that takes a high tone via LTD will be presented.

An additional example of a toneless word taking a high tone by RTS is /bələ] lu̯ʱ/ ‘your sister’. Since the second person singular pronoun /lu̯ʱ/ is underlyingly toneless, it receives a high tone by RTS, as in (76).
(76) $\text{be} \text{I} \text{lu}^2$ Underlying Representation
    $\text{H}$

$\text{be} \text{I} \text{lu}^2$ Rightward Tone Spread
    $\text{H}$

$\text{be} \text{I} \text{I} \text{lu}^2 \text{I}$ Phonemic form
$\text{be} \text{I} \text{I} \text{lu}^\text{u\text{i}} \text{I}$ Phonetic form
‘your sister’

The second person singular pronoun /lu$^2$/ is underlyingly toneless, receiving either a
default low tone when in isolation, or, as in (76), a high or low tone from the preceding
word. Here, since the high tone spreads onto the toneless word /lu$^2$/; the pitch shape of
/lu$^2$/ is falling. To confirm that /lu$^2$/ has truly taken on a high tone and not a falling tone,
we can look at the pitch of another toneless word following the now high-toned /lu$^2$/: In
the following sentence, the high-toned word /be$\text{I} \text{I}$/ ‘sister’ spreads its tone onto toneless
/lu$^2$/: Since the following word is also toneless (and has no floating tones), the high tone
keeps on spreading onto the animate toneless glottalized word /m$\text{i} \text{i} \text{d} \text{z}$/ ‘badger’.
Rightward Tone Spread is shown to be an iterative rule in (77).
(77) \[\begin{array}{c}
\text{row bel lu}^9 \text{ m3i}^9 \text{dz} \\
/\ \ \ | \\
H \ L \ H
\end{array}\]
Underlying Representation

\[\begin{array}{c}
\text{row bel lu}^9 \text{ m3i}^9 \text{dz} \\
/\ \ \ | \\
H \ L \ H
\end{array}\]
Rightward Tone Spread

---

\[\begin{array}{c}
\text{upstep} \\
\text{row bel lu}^9 \text{ m3i}^9 \text{dz} \\
\text{row bel lu}^9 \text{ m3i}^9 \text{dz} \\
\text{‘your sister eats badger’}
\end{array}\]
Phonemic form

Phonetic form

The final word has the same falling-pitch shape instead of a low pitch. This reconfirms that, although /lu\textsuperscript{9}/ has a falling-pitch shape following /be\textsuperscript{1}/, it has taken on a high tone, not a falling tone.

After showing how a toneless glottalized word can take a phonemic high tone and yet be articulated with a falling pitch via RTS, (78) shows how a falling-toned glottalized word can receive a high tone via LTD. If a falling-toned glottalized word precedes an inanimate noun, the inanimate floating high tone docks onto the falling-toned glottalized word. This results in a three-tone contour, which is prohibited in SJMZ. Section 3.2.3 shows how a non-glottalized falling tone word changes to high preceding inanimate nouns. The data in (78) shows how the same pattern works with glottalized words.\(^{29}\)

\(^{29}\) Again, while this seems to be generally the case, sometimes these toneless words are articulated with a rising tone instead of a high tone. The tonal alternation seems to vary freely, however, as the same speaker occasionally says these words with a high tone and occasionally says them with a rising tone.
After demonstrating how a falling-toned glottalized word can change to high as a result of LTD (although the high tone continues to be articulated with a falling pitch), we will now see how a toneless glottalized word can take a high tone by LTD. In (79), /t\tsi\:\ ‘ten’ is toneless. /g\et\:\ ‘tortilla’ is an inanimate noun, and therefore has the floating high tone inanimate prefix.
(79) 

\[ \text{tsi}^2 \ g'\text{et} \]

Underlying
Representation

\[ \text{tsi}^2 \ g'\text{et} \]

Leftward
Tone
Docking

Rightward Tone Spread

\[ \text{tsi}^2 \ g'\text{et}\]

Phonemic form

\[ \text{tsi}^2 \ g'\text{et}\]

Phonetic form

\[ \text{tsi}^2 \ g'\text{et}\]

‘ten tortillas’

4.2.4 Summary

In summary, monosyllabic glottalized words underlyingly have one of three tone possibilities: toneless, falling, or rising. A level tone may not occur underlyingly on a glottalized word. Additionally, if a monosyllabic glottalized word is specified for tone underlyingly, it must have a contour tone. Glottalized words that receive a high tone as a result of phonemic processes are pronounced with the same falling pitch shape as glottalized words with a phonemic falling tone.

4.3 The first person singular pronoun

Having presented the basics of the tonal phenomena that occur on glottalized words, the topic of discussion will shift to the tonal behavior associated with one glottalized word in particular, the first person singular pronoun /na/. In the Zapotec family of languages, the first person singular pronoun is notorious for the seemingly non-paradigmatic tonal changes that it causes (see section 2.2).

The first person singular pronoun is different from the other SJMZ animate pronouns in that it can cause a previous word to change in tone. In many cases, the first
person singular pronoun behaves tonally like toneless glottalized inanimate nouns. In isolation it is articulated with a low tone [na[:]]1. When preceded by a low-toned word, the first person singular pronoun, like an inanimate noun, causes the preceding low-toned word to change to rising. Likewise, when preceded by a falling-toned word, the first person singular pronoun causes that word to change to high. In both of these contexts, the first person singular pronoun is then articulated with a high tone, as shown in the data in (80). This is identical to the behavior of the toneless inanimate noun /di^b/ ‘feather’ seen in section 4.2.2 example (72).

<table>
<thead>
<tr>
<th>(80)</th>
<th>mæk^w^ ]</th>
<th>‘dog’</th>
<th>[pæk^w^ ] na^l</th>
<th>‘my dog’</th>
</tr>
</thead>
<tbody>
<tr>
<td>lo^l</td>
<td>‘face’</td>
<td>lo^ ] na^l</td>
<td>‘my face’</td>
<td></td>
</tr>
<tr>
<td>rladz^]</td>
<td>‘want’</td>
<td>rladz^ ] ga^l na^l</td>
<td>‘I want to go’</td>
<td></td>
</tr>
</tbody>
</table>

It appears, then, that the first person singular pronoun /na^]/, like inanimate nouns, has an initial floating high tone that docks onto a previous word by LTD. The pronoun itself does not have a pre-associated tone. Since the first person singular pronoun gets its tone as a result of RTS (or by Default Low Insertion when in isolation), it very frequently has a high tone. Additionally, like with inanimate nouns, the initial floating high tone of the pronoun docks onto a preceding word, causing a preceding falling-toned word to change in tone to high, a preceding toneless word to also become high-toned, and a preceding low-toned word to become rising.

The derivations in (81) show the parallel behaviors of the first person singular pronoun and an inanimate toneless glottalized noun in isolation and following a noun.

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30 Frequently the first person singular pronoun loses its glottal stop when not in isolation. The details of this laryngeal simplification are left for future publications.
Like the inanimate toneless glottalized nouns that have a floating high tone prefix and no associated tones, the floating high tone of the first person singular pronoun docks

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31 The lexical item /midZ\ ‘seed’ seems to be in transition from being considered animate to being considered inanimate. At times speakers refer to it with the pronoun for animals, at times with the inanimate pronoun. At times it has the floating high tone inanimate prefix, other times, no. Regardless, the presence or lack of a floating high tone in these examples has no tonal effect. No word precedes it, so the floating high tone would be deleted by stray erasure.
onto a previous word (by LTD) and then spreads onto the pronoun (by RTS). When in isolation, the floating high tone is deleted by Stray Erasure and, since the pronoun is toneless, the default low tone is inserted (by DLI).

Although the data as summarized above seem to confirm that the first person singular pronoun functions as an inanimate noun in SJMZ, analyzing it as such would be unusual. As a pronoun for human beings, it is technically animate, not inanimate. If speakers of SJMZ chose to classify it as inanimate, it could only be explained as a unique politeness strategy in which the speaker humbles himself by associating himself with objects instead of beings. A more likely reason why the first person singular pronoun would behave like an inanimate noun is coincidence.

Further data also call into question classifying the first person singular pronoun with inanimate nouns. The possession prefix /ʃ/- takes the allomorph /ʒiʃ/- preceding complex-onset nouns, as in (82). 

(82)  

\begin{align*}
\text{mgag} & \text{ ‘acorn’ } \quad \text{ʒiʃmgag} \text{ ‘the lady’s acorn’ } \\
\text{mgin} & \text{‘bird’ } \quad \text{ʒiʃmgin} \text{‘the lady’s bird’ } \\
\text{ndziz} & \text{‘squirrel’ } \quad \text{ʒiʃndziz} \text{ ‘the lady’s squirrel’ } \\
\text{ηʷtseb} & \text{‘scarecrow’ } \quad \text{ʒiʃηʷtseb} \text{ ‘the lady’s scarecrow’ } \\
\end{align*}

When inanimate nouns possess the above words, the expected tonal alternations occur: the root noun with a low tone changes to rising and the falling-toned root noun becomes high-toned, as shown in (83).

\footnote{Although the examples are all SJMZ animate nouns, many complex-onset inanimate nouns also take the /ʒiʃ/- allomorph. In that case, the inanimate floating high tone floats to the left of the prefix, causing a tonal alternation on a preceding word, but not on the low-toned prefix. See section 3.2.}
(83) \(\text{3i\text{lmgag}l jaq\text{V}}\) ‘the tree’s acorn’
\(\text{3i\text{lmgin}l jaq\text{V}}\) ‘the tree’s bird’
\(\text{3i\text{jnd\text{\text{d}}ziz}l jaq\text{V}}\) ‘the tree’s squirrel’
\(\text{3i\text{j\text{\text{t}}seb}l\text{ dan}l}\) ‘the field’s scarecrow’

Above, the inanimate nouns /jaq\text{V}/ ‘tree’ and /dan\text{V}/ ‘field’ have an initial floating high tone that docks onto the previous word, causing the low- and falling-toned words, ‘acorn’ and ‘bird’ to change in tone (low-to-rising and falling-to-high). The rising- and high-toned words ‘squirrel’ and ‘scarecrow’ do not alter in tone. (See section 3.2 for this analysis.)

In contrast to what we would expect if the first person singular pronoun were categorically the same as the inanimate nouns, the tonal patterns of the above phrases when the first person singular pronoun fills the possessor slot differ from those seen above. In the phrases in (84), observe the contrasting tonal patterns between an inanimate noun and the first person singular pronoun in the possessor position.

(84) \(\text{3i\text{lmgag}l jaq\text{V}}\) ‘the tree’s acorn’ \(\text{3i\text{lmgag}l na}\text{l}\) ‘my acorn’
\(\text{3i\text{lmgin}l jaq\text{V}}\) ‘the tree’s bird’ \(\text{3i\text{l mgin}l na}\text{l}\) ‘my bird’
\(\text{3i\text{jnd\text{\text{d}}ziz}l jaq\text{V}}\) ‘the tree’s squirrel’ \(\text{3i\text{l nd\text{\text{d}}ziz}l na}\text{l}\) ‘my squirrel’
\(\text{3i\text{j tseb}l\text{ dan}\text{l}}\) ‘the field’s scarecrow’ \(\text{3i\text{l\text{\text{t}}seb}l\text{ na}\text{l}}\) ‘my scarecrow’

In these examples, the left-hand column shows the tonal alternations that occur with inanimate nouns. The right-hand column shows the tonal behavior of nouns that have the first person singular pronoun as possessor.

The first person singular pronoun is inherently different from the inanimate nouns, as seen in the above phrases. First, the low-toned prefix appears with a high tone when the first person singular pronoun follows the stem; it maintains its underlying low
tone when an inanimate noun acts as possessor. Second, when the first person singular pronoun follows the noun stem, the low-toned noun does not change to rising tone as it does when an inanimate noun follows. Third, when the root noun is falling-toned, both the prefix and the noun change in tone to high when followed by the first person singular pronoun. These tonal behaviors are disturbing: the first and second because it appears that the initial floating high tone of the first person singular skips over the root and docks onto the prefix, the third because it appears that the floating high tone affects both the prefix and the right edge of the noun stem, as illustrated in (85).

\[(85)\]

\[
\begin{array}{c}
\text{zi-mgq} \quad \text{na}^g \\
\text{L} \quad \text{H}
\end{array}
\]

\[
\begin{array}{c}
\text{zi-mg\text{\v{}}} \quad \text{na}^g \\
\text{H} \quad \text{L} \quad \text{H}
\end{array}
\]

These simultaneous local and non-local tonal phenomena are highly disturbing because they violate autosegmental generalizations that say that association lines cannot cross. They are not, however, unique to SJMZ. Beam de Azcona (2004) observes local and non-local tonal effects with the first person singular pronoun in neighboring (but linguistically more removed) San Agustín Mixtepec. In this dialect, the first person singular floating high tone can cause a low-toned root noun to change to rising while simultaneously causing the low-toned pronoun to change to rising. She observes, however, that not all low-toned nouns undergo such local and non-local tonal alternations. In SJMZ, in contrast to San Agustín Mixtepec Zapotec, words from each tone class seem to behave in a uniform manner. The problem in SJMZ is accounting for the different tonal effects that the first person singular pronoun has on words of

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differing tonal classes, specifically, low-toned root nouns vs. falling-toned root nouns.

Four possible solutions can be proposed.

4.3.1 Toneless root noun analysis

One analysis that can be proposed is that the root noun and prefix are actually toneless. The floating high tone would then dock as far left as possible, onto the toneless prefix /zi-/, as in (86).

\[
\begin{array}{cccc}
\text{3i-mgag na} & \text{3i-mgin na} & \text{3i-ndziz na} & \text{3i-ŋtseb na} \\
\hline
\text{Underlying} & \text{Representation} & \text{Leftward} & \text{Docking} \\
\text{3i-mgag na} & \text{3i-mgin na} & \text{3i-ndziz na} & \text{3i-ŋtseb na} \\
\text{3i-mgag na} & \text{3i-mgin na} & \text{3i-ndziz na} & \text{3i-ŋtseb na} \\
\text{3i-mgag na} & \text{3i-mgin na} & \text{3i-ndziz na} & \text{3i-ŋtseb na} \\
\end{array}
\]

\[
\begin{array}{cccc}
*\text{3i}l\text{-mgag}l\text{ na} & \text{3i}l\text{-mgin}l\text{ na} & \text{3i}l\text{-ndziz}l\text{ na} & \text{3i}l\text{-ŋtseb}l\text{ na} \\
\hline
\text{Phonetic form} & \text{‘my acorn’} & \text{‘my bird’} & \text{‘my squirrel’} & \text{‘my scarecrow’} \\
\end{array}
\]

In this derivation, Rightward Tone Spread results in the correct form for both /3i̲l-mginl na/’ ‘my bird’ and /3i̲l-ŋtsebl na/’ ‘my scarecrow’, but an incorrect form for both /3i̲l-mgagl na/’ ‘my acorn’ and /3i̲l-ndzizl na/’ ‘my squirrel’. To achieve the correct form of /3i̲l-mgagl na/’, Default Low Insertion would have to precede RTS, as in (87).
This change in rule ordering results in the correct form for /ʒiˈl-mgagˈ naʔ/ ‘my acorn’, but incorrect forms for the other three words. Additionally, we still have not achieved the correct form for /ʒiˈl-ndʒizˈ naʔ/ ‘my squirrel’ in which the rising tone on the root is maintained.

This analysis is faulty in three ways. First, it fails to account for the /ʒiˈl-ndʒizˈ naʔ/ ‘my squirrel’ data. Second, it calls for different rule ordering for the different tone classes of the root nouns. Third, it fails to account for the tonal behavior that occurs with inanimate nouns. The floating high tone of a following inanimate noun does not dock all the way onto the prefix of the possessed noun, rather it docks onto the end of the possessed noun, causing a rising tone on low-toned root nouns and a high tone on falling-toned root nouns. The tonal alternations that occur when an inanimate noun possesses another noun occur only when the inanimate floating tone docks onto
the end of the root noun. This analysis is therefore inadequate because it does not account for the different tonal patterns that occur with the first person singular pronoun, nor does it account for the differences in tonal behavior that occur between the inanimate noun data and the first person singular pronoun data.

4.3.2 Tone docking constraints analysis

An alternative analysis can be proposed for dealing with the tonal alternations caused by the SJMZ first person singular pronoun, based on a suggestion from Yip’s (2002:230-1) presentation of the tonal alternations caused by the first person singular pronoun in Sierra Juárez Zapotec. She states that high tones are drawn to stressed syllables and edges. Could the floating high tone of the SJMZ first person singular pronoun be following such a constraint? The answer must be no. In contrast to Sierra Juárez Zapotec, the floating high tone of the first person singular pronoun in SJMZ does not (only) dock onto the stressed syllable. In the data above, it is the root noun that bears the stress, not the prefix. Alternatively, if the floating high tone is attracted to the edge (in this case the prefix /3i-/), why does the inanimate floating high tone dock onto the immediately preceding (and stressed) root syllable, and not the edge (prefix) syllable?

Simply presenting a constraint that says that high tones are attracted to certain types of syllables does not account for the differences between the data found with the first person singular pronoun and the inanimate noun. With Yip’s suggestion, the floating high tone of the first person singular pronoun and the floating high tone of
inanimate nouns would need to be distinguished: the floating high tone of the first
person singular pronoun is attracted to the edge (and in one case the root as well),
whereas the floating high tone of inanimate nouns is attracted to the stressed syllable.
Yip’s account, therefore, must be rejected.

4.3.3 Circumfixal pronoun analysis

A third analysis that could be proposed to account for the data is that the first
person singular pronoun is actually a circumfix: it has a floating high tone that acts as a
prefix to the root and a segmental portion /na\#/ that acts as a suffix or following word.
(This is the hypothesis that Bickmore and Broadwell (1998) argue against.) The
diagram in (88) shows the difference in underlying form of the first person singular
pronoun and a toneless glottalized inanimate noun /do\#/ ‘rope’.

(88) \begin{align*}
\text{-na}\# & \quad \text{do}\# \\
\text{{\textbullet}} & \quad \text{{\textbullet}}
\end{align*}

Since floating tones dock leftwardly, if the floating high tone of the pronoun is
to have an effect, it must float as far left as possible, but to the right of the prefix /zi-/. If
it floated to the left of the prefix, the tone would not be able to dock and would be
deleted by Stray Erasure, having no effect on the tone of the prefix. Observe how the
placement of the floating high tone can result in a correct or incorrect form in the phrase
‘my acorn’ in (89).
This analysis adequately deals with the presence of the high tone on the prefix of words from each tone class. It does not, however, explain why a falling-toned root noun changes to high tone preceding the first person singular pronoun.

4.3.4 Morphemic Tier Hypothesis analysis

A final analysis that can be proposed to account for the first person singular pronoun data is based on the Morphemic Tier Hypothesis (MTH). Bickmore and Broadwell (1998) used MTH to analyze the tone of the first person singular pronoun in Sierra Juárez Zapotec. This hypothesis, as outlined in Bickmore and Broadwell (1998), calls for each morpheme to be represented initially on a separate tier. The tiers conflate at a later point in the derivation, thereby accounting for non-local tonal effects. The underlying representation of ‘my acorn’ as analyzed with the MTH is shown in (90).
(90)

\[
\begin{array}{c}
\text{zi-mgag na}^a \\
\text{L}
\end{array}
\]

A rule of tier conflation is included in the derivations in (91).

(91)

\[
\begin{array}{cccc}
\text{Underlying} & \text{Representation} & \text{Tone} & \text{Docking} \\
\text{zi-mgag na}^a & \text{zi-mgin na}^a & \text{zi-ndziz na}^a & \text{zi-ŋtseb na}^a \\
\text{L} & \text{H L} & \text{L H} & \text{H} \\
\text{Leftward} & \text{Conflation} & \text{Tier} & \text{Rightward} & \text{Tone} & \text{Spread} \\
\text{zi-mgag na}^a & \text{zi-mgin na}^a & \text{zi-ndziz na}^a & \text{zi-ŋtseb na}^a & \text{zi-ŋtseb} & \text{na}^a \\
\text{H L} & \text{H H L} & \text{H L H} & \text{H H} & \text{H} & \text{H} \\
\text{‘my acorn’} & \text{‘my bird’} & \text{‘my squirrel’} & \text{‘my scarecrow’} & & \\
\end{array}
\]

This analysis, like the circumfix analysis, accounts for the high tone that appears on the prefix of noun stems that precede the first person singular pronoun. It, like the circumfix analysis, fails in that it does not account for the change of falling-toned root nouns to high.
4.3.5 Tone on compound and polysyllabic words

In these analyses, for simplicity it has been assumed that the prefix /\textipa{\textipa{\textipa{\textipa{3}}}i-\textipa{}/} is toneless. If it were toneless, it would take the default low tone when initial in a phrase. When following another word, it would receive its tone by Rightward Tone Spread. However, the data in (92) show that /\textipa{\textipa{\textipa{\textipa{3}}}i-\textipa{}/} does not take a high tone following high- and rising-toned words (except when possessed by the first person singular pronoun).

\begin{equation}
\begin{array}{ll}
\text{row} & n\text{gid} \text{3j-bdiol} \text{mikʷ}\text{l} \\
\text{eats} & \text{chicken} \text{poss.-banana} \text{monkey} \\
\text{‘the chicken eats the monkey’s banana’}
\end{array}
\end{equation}

The sentence in (92) shows that the prefix /\textipa{\textipa{\textipa{\textipa{3}}}i-\textipa{}/} has an underlying low tone. The final high tone of /n\text{gid}/ ‘chicken’ does not spread rightward onto the possession prefix. Since /\textipa{\textipa{\textipa{\textipa{3}}}i-\textipa{}/} maintains its low tone, it cannot be toneless.

Why, then, does the presence of the first person singular pronoun change the tone of the prefix to high, not to rising or falling? The answer lies in the tonal behavior of compound words. In compound words that consist of two roots, only the stressed root (the ultimate) can bear a contour tone. Unstressed contour tones are simplified: a rising tone simplifies to high and a falling tone simplifies to low. For example, /baj/ ‘shawl’ and /qet/ ‘tortilla’ compound to form /bajɬqet/ ‘tortilla cloth’, whereas /jaq/ ‘tree’ and /dur/ ‘pine needle’ compound to form /jaqɬdur/ ‘pine tree’. A rule that motivates this behavior is developed in (93).
(93) **Unstressed Contour Reduction:** In unstressed syllables of polysyllabic nouns, contour tones lose their first tonal element.

\[
\begin{array}{ccc}
\sigma \sigma & \Rightarrow & \sigma \sigma \\
\left\begin{array}{c}
T_1T_2 \\
T_1T_2
\end{array}\right. & \Rightarrow & T_2
\end{array}
\]

(The underlined syllable is stressed.)

Assuming this simplification of contours occurs in all polysyllabic words, /ʒiʃ-/ will become a high tone only if it simplifies from a rising tone. For the low tone to become a rising tone, a high tone must dock following its low tone. In the circumfix analysis, it was mentioned that the floating high tone had to come between the prefix and the root noun so that Leftward Tone Docking could have effect. Since the prefix has a low tone underlyingly, the docking of the high tone in this manner would cause a rising tone, which then simplifies to high. This is shown in (94).
This also goes along with the Morpheme Tier Hypothesis. In Bickmore and Broadwell (1998), the analysis had to specify that the first person singular pronoun tone conflates to the left side of the existent tone. In this case, the opposite is true: it must be specified that the first person singular pronoun tone conflates to the right side of the existent tone. This derivation is shown in (95).
4.3.6 Summary

When the first person singular pronoun follows a monosyllabic stem, the tonal alternations it causes are identical to those of toneless inanimate glottalized nouns. However, when the stem that precedes the first person singular pronoun is polysyllabic, no adequate analysis has yet been found to account for all the data. While the tonal alternations that the inanimate nouns cause are straightforward according to the analysis presented in section 3.2, the alternations in tone that the first person singular pronoun
causes cannot, at this time, be fully explained. None of the four proposed analyses completely accounts for the data at hand. Both the circumfix and the MTH analyses come close, but as of yet, there is still no way to account for forms such as /3i\-mgin\ na^\]/ ‘my bird’ in which the prefix takes a high tone and the tone of the root noun changes from falling to high. Like many other Zapotecan languages, the tonal behavior of the first person singular pronoun in SJMZ is unusual and, as of yet, not fully explainable.
CHAPTER V
SUMMARY AND CONCLUSIONS

This thesis has dealt with some of the most prominent tonal phenomena in San Juan Mixtepec Zapotec. Following is a summary of the findings of this study.

SJMZ contour tones were analyzed as a sequence of two level tones. On syllables without glottalization, four tones occur: high, low, rising (low-high), and falling (high-low). In contrast, words with glottalization can be phonemically toneless (with no docked tone), rising-toned (low-high), or falling-toned (high-low). Glottalized words that receive a high tone as a result of phonemic processes are articulated with the same falling pitch shape as the underlyingly falling-toned glottalized words.

The most significant finding in this study is that inanimate nouns have a floating high tone prefix that causes significant tonal alternations in SJMZ. The inanimate floating high tone prefix precedes any other prefixes that may occur on the noun stem. The floating high tone is never realized when an inanimate noun is in isolation; rather, it only docks onto a preceding word. The resultant alternation is that low tone changes to rising and falling tone changes to high. This finding, which has not been documented in any other Zapotec language, is vitally important to the study of tone in Southern Zapotecan languages, and could likely bear consequences in other Zapotecan and even Otomanguean languages. In studying Zapotecan tone, attention needs to be given to
animate versus inanimate nouns, as it is likely that similar tonal effects occur widespread in the language family.

In addition to analyzing the tonal alternations caused by inanimate nouns, this thesis highlights several other tonal phenomena at work in the language. One finding is that when a noun precedes an adjective in a phrase, there seems to be motivation to simplify contour tones on the noun. Both high- and low-toned nouns maintain their tone preceding adjectives; however, falling-toned nouns change to high tone preceding an adjective of any tone. Rising-toned nouns simplified to high tone when they precede a rising-toned adjective, but not preceding adjectives of any of the other tones. While consecutive rising tones are permitted elsewhere in the language, SJMZ prohibits them from occurring in the noun-adjective conjunct.

Additionally, it was observed that when SJMZ compound words are formed, contour tones in unstressed syllables simplify to level tones. Rising-toned roots simplify to high and falling-toned roots simplify to low. This same phenomenon was observed when a syllabic prefix takes on a contour tone because of phonological processes: the contour tone in the unstressed syllable simplifies, maintaining only the leftmost tone.

Finally, this thesis examined the tonal patterns caused by the first person singular pronoun. As in many other Zapotecan languages, the first person singular pronoun in SJMZ is a primary motivator for tonal alternation. In many cases, the first person singular pronoun in SJMZ appears to behave like any toneless glottalized inanimate noun. Since the pronoun, like inanimate nouns, has an initial floating high
tone, in many cases the first person singular pronoun causes the preceding word’s tone to change from low to rising or from falling to high. However, when a polysyllabic word precedes the first person singular pronoun, the tonal behavior is less straightforward. In this case, the first person singular pronoun caused both local and non-local tonal alternations. While the circumfix analysis and the Morphemic Tier Hypothesis account for the data by showing how the first person singular pronoun high tone can have non-local effects, no analysis proposed accounts for the simultaneous local and non-local effects that occur with falling-toned root nouns. Further study is necessary to come to a decisive conclusion about the tonal behavior of the first person singular pronoun.
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