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The phonology of Texmelucan Zapotec verb irregularity

Charles H. Speck

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THE PHONOLOGY OF TEXMELUCAN
ZAPOTEC VERB IRREGULARITY

by
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Bachelor of Arts, California State
University at Northridge, 1969

A Thesis
Submitted to the Graduate Faculty
of the
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This Thesis submitted by Charles H. Speck in partial fulfillment of the requirements for the Degree of Master of Arts from the University of North Dakota is hereby approved by the Faculty Advisory Committee under whom the work has been done.

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Degree Master of Arts

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Signature Charles H. Speck

Date July 17, 1978

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ABSTRACT

The phonological rules governing Texmelucan Zapotec verb allomorphy are presented here as part of the phonological component of a generative grammar of the type conceived of by Chomsky and Halle but modified by Stampe, Rhodes and others. This modified theoretical framework has been referred to as natural phonology. Basic to the theory of natural phonology is Stampe's observation that two distinctive types of phonological principles operate in natural languages: natural processes which are innate and rules which are learned. The natural phonemic level is seen to relate to these principles.

In section 1: Lower Level Phonology, those principles which operate below the natural phonemic level are discussed. They are natural processes. In section 2: The Phonology of Verb Irregularity, those principles which operate above the natural phonemic level are discussed. Segmental phonology is discussed first. Then suprasegmental phonology is discussed. Phonological principles which operate above the natural phonemic level are of three types: syntactico-phonological rules, phonological rules, and natural processes. Natural processes which operate above the natural phonemic level all involve contextual neutralization. In section 3: Morpheme Structure, surface structure constraints are

discussed. These are often violated in the underlying form and provide motivation for phonological rules. Thus they are expressed at the natural phonemic level.

The theoretical framework in which this thesis is written has given insight into some problem areas in Zapotec morphology. Of special interest is the section on suprasegmental phonology. In this section the phonological principles of tone perturbation which operate over the whole of the grammar are related to grammatical principles operating on verbs. A relationship is seen to exist between tone, laryngealization, glottalization and stress. This relationship led to an abstract analysis for tone on laryngealized and glottalized syllables.

0. INTRODUCTION

0.1 Texmelucan Zapotec

Texmelucan Zapotec (hereafter TZ) is spoken by about three thousand people in the municipio of San Lorenzo Texmelucan, District of Sola de Vega, Oaxaca, Mexico. The municipio is composed of one town, San Lorenzo Texmelucan, and six smaller settlements: El Río Nube, El Carrizal, Palo de Lima, Rancho de Talea, El Zúchil, and El Arador. Almost all of the speakers of TZ live in this municipio, and no Spanish speakers live among them. This fact along with geographical isolation probably contributes to an extremely high degree of monolingualism.

The closest linguistic neighbors of TZ are Zaniza Zapotec and Elotepec Zapotec.¹ These dialects have been referred to as Papabuco in the literature (Upson and Longacre, 1965; Harvey, 1968; Rendón, 1971). They diverge so considerably from other Zapotecan languages that Rendón considers them to be distinct.

Como dijimos al principio del artículo, podemos considerar que el papabuco es un idioma indepen-

¹The only dialects of Zapotec that the people of San Lorenzo recognize as being the same language as their own are Zaniza Zapotec and Elotepec Zapotec. Their evaluation of the situation is confirmed by the results of dialect intelligibility testing of the Summer Institute of Linguistics (on file in Mexico City) and by comparison of word lists (see Appendix III).

dente tanto del zapoteco como del chatino; pero queda incluido dentro de la misma familia que integran éstos. (1971: 221-222)

Although Rendón does not mention TZ as being a dialect of Papabuco, I include a list of equivalents for the forms cited by Rendón in Appendix III to show the relationship.

0.2 Zapotec Verb Morphology

In 1955, Velma Pickett published the first extensive study of Zapotec verb morphology. In the paper she presents a detailed study of the structure of the Isthmus Zapotec verb, many of the characteristics of which carry over into all Zapotecan languages. In 1964 Larry Lyman published a detailed study of the Choapan Zapotec verb. He makes many of the same generalizations as does Pickett. A major contribution is made, however, in the identification of the "impersonal syntagmeme" and the "infinitive syntagmeme" neither of which occur in the Isthmus. Two additional characteristics of the Choapan Zapotec verb do not occur in the Isthmus. The first is recurrent aspects distinct from primary aspects. The second is overtly marked subject orientation. In May of 1976 Donna Marks completed her M.A. thesis on Sierra Juarez Zapotec Verb Morphology. In it she nicely summarizes Pickett and Lyman and discovers a similar structure for the verbs of Sierra Juarez Zapotec. One feature of Sierra Juarez that may be especially significant is what Marks calls "subject orientation". "These verbs express some kind of emotional or a mental or physical

condition... The subject-oriented verb stem (SO^S) is derived by the suffixation of $\{-n\}$ to the subject-oriented root (SO^R). (Marks: 48-50). This differs from what Lyman calls subject orientation both in terms of the morphology and in terms of semantics. The marking for subject orientation in Choapan is preposed to the stem and semantically it seems to express 'benefactive'. A morpheme similar to Marks' "subject-orientation", although not reported in the literature for any other Zapotecan language, has been reported for Chatino (Pride: 25). Marks' major contribution to Zapotec verb morphology, however, lies in her section on tonomechanics. This is the first really serious attempt to describe tone substitutions on Zapotec verbs. Two of her generalizations seem to be especially significant as they operate in TZ as well. First, "the first person singular... has, in its morphologically regressive perturbing affect, a raising influence upon the verb stem..." (Marks: 100). Second is the raising influence of potential aspect on the first syllable of the verb stem (Marks: 104).

Inez Butler has forthcoming a fourth detailed analysis of the Zapotec verb. "La Grammatica del Zapoteco de Yatzachi el Bajo" is especially valuable for the large amount of data it presents. Yatzachi Zapotec differs from the others mentioned in several respects. Butler identifies a plural morpheme which is preposed to the verb stem. There is also a skewing of negative and aspect

not found in the others. Other studies have appeared over the years, but these four have been the most extensive. In them we see the basic structure of the Zapotec verb, dialectical differences being seen in the number of aspects overtly marked, in the number of pronominal categories and in several grammatical categories that seem to have a sparse distribution among Zapotecan languages.

The present study contributes to the understanding of the Zapotec verb in several ways. First, it should be of interest to the linguist interested in comparative or historical study inasmuch as it contains a considerable amount of data from a Zapotecan language that diverges considerably from those already published. In order to make the paper more useful in this respect I have included in Appendix I sixty-six full verb paradigms representing every alternation I have noted thus far. In Appendix II I have also included a list of one syllable single morpheme nouns and adjectives as evidence for contrast and morpheme structure.

In terms of verb morphology, TZ is unique among the Zapotecan languages in that there is a skewing between form and meaning in negative-aspect sequential limitations. This is discussed in section 2.1.2. The discussion of verbs derived from adjectives, (sections 2.1.6 and 2.1.7), is also not mentioned in previous works.

Probably the most significant contribution of this study, however, is in the area of tone. In this section I present the phonological principles operating over the whole of the grammar and relate them to grammatical principles operating on verbs and adjectives. The grammatical principles, while differing in detail from those expressed by Marks, are seen to be similar in other respects. In this section I also describe a relationship between laryngealization and tone that has not been reported for Zapotec.

This study represents the only attempt to describe Zapotec verb irregularity from within the framework of generative phonology. Thus, I arrive at solutions to some problems that are quite different from those proposed in earlier papers. Although this analysis presents potential solutions to many problems, TZ is quite different from other Zapotec languages, and these solutions will have to be confirmed by the detailed study of the phonology of each individual language. Nevertheless, two aspects of the analysis presented in this paper seem to be so widespread that I suggest certain refinements in the earlier studies. The first aspect is with respect to only a single principle: round vowels never follow /b/ or /m/ in native words. In section 2.2.2.2, I suggest that certain alternations in verb stems which have been treated as morphologically defined alternations are really the automatic result of a very regular principle. In the

second case, I suggest a reinterpretation of certain phonological sequences and morpheme breaks different from those made in earlier studies. Zapotec is an example of a language where there is strong phonological pressure for a unit interpretation of labialized and palatalized velar obstruent stops, but where the unit interpretation greatly complicates the morphophonemics. Within the framework of generative phonology, there is no problem since in the UF, where one is dealing with morphophonemes, a sequence interpretation can be used. Then at some point in the derivation, interpretation can be switched to a unit interpretation. In section 2.2.1 I show that the unit interpretation for labialized velars by Pickett, Lyman, Marks, and Butler has caused them to overlook an important phonological generalization resulting in a complicated morphophonemics, in failure to identify one of the allomorphs of causative and in one case in an incorrect phonemic analysis. In Yatzachi Zapotec *b* and *w* are in complementary distribution, hence, they are allophones of the same phoneme. Thus g^w , k^w , R^w do not have phonemic status.

0.3 Natural Phonology

The phonological rules governing T2 verb allomorphy are presented here as a part of the phonological component of a generative grammar of the type conceived by Chomsky and Halle but modified by Stampe, Pyle, Kiparsky, Rhodes and others. His modified theoretical framework has been

referred to as natural phonology. There has been a considerable amount of material published on this model and I will not repeat it all here. Rather, I will discuss certain basic assumptions that relate to technical aspects of the phonological component of a grammar of TZ presented in this study.

0.3.1 Phonological Rules

Basic to the theory of natural phonology is Stampe's observation that two distinctive types of phonological rules operate in natural languages: natural processes (hereafter "processes" for the language-specific case) and learned rules (hereafter "rules"). Processes are innate physiologically or mentally motivated substitutions that operate to make pronunciation easier. They are not antifeeding opaque. Hence they do not tolerate exceptions, antifeeding orders or global reference. They may be optional but are nonsuspendable.¹ Rules are learned. Phonological motivation may be obscure. They tolerate exceptions and grammatical restriction. They are not optional but may be suspended. They follow the alternation condition (Rhodes 1973: 530).

While the theory makes specific claims about the general characteristics of rules and processes, certain specific properties of rules are yet controversial. Hence I discuss the assumptions made in this study.

¹For further discussion of Stampe's concept of natural process see Bjarkman (1975).

Although Stampe and Bjarkman suggest that processes may not be extrinsically ordered (Bjarkman 1975: 68), for purposes of this study, I assume that rules and processes are partially ordered. Appendix IV summarizes the constraints on rule order. I also assume that rules have the ability to look back at the underlying form: i.e., phonological environments may be global. See section 2.2.2.3 for an example of such an environment. I also assume that rules have the ability to apply iteratively reading from left to right or from right to left. Although these issues affect the form in which the rules are written, they should not affect the analysis.

0.3.2 Natural Phonemic Level

Early generative phonology recognized only two significant levels of phonological representation. The most abstract level they called the "systematic phonemic level". I refer to this level as underlying form (UF). The least abstract level they refer to as the "systematic phonetic level". Concerning this level, Schane makes the following observation:

Interestingly, these derived representations are amazingly similar to taxonomic phonemic representations, precisely because the phonological rules found in the literature map abstract underlying segments specified with binary features into less abstract surface segments also specified with binary features, segments which contrast on the surface. This similarity between "quasi-abstract" derived representations and traditional taxonomic phonemic representations has not been appreciated in current generative phonological discussions. (1973, 98)

Thus in actual practice early generative phonologists have been concerned primarily with morphophonemics: i.e., they have been concerned with rules that govern morpheme alternation. This is what Kiparsky notices when he recognizes an intermediate level such that all phonological principles applying above that level obey the alternation condition: i.e., they do not affect segments that don't alternate (Kiparsky 1968). Kiparsky thought that this intermediate level was the phonemic level of structural linguistics. Rhodes (1973: 530) shows that the level differs from the autonomous phonemic level at least in that there are certain types of neutralization that are allowed below the level. He suggests that the level is the Natural Phonemic level. I refer to this level as surface form (SF).

One characteristic of the Natural Phonemic level is that there are no rules ordered after it. At the present time there is controversy as to whether or not context sensitive processes may be ordered above it. Rhodes (1973) claims that they may not. Whenever a context sensitive natural process is ordered above the Natural Phonemic level, it is acting as a rule: i.e., it is learned. Bjorkman (1975), however, following Stampe, contends that some context sensitive natural processes are ordered above the Natural Phonemic level and some below it.

In the present study, there are phonological

principles applying above the Natural Phonemic level that in terms of the metatheory are clearly natural processes. The one thing they all have in common and the reason for occurring above the Natural Phonemic level is that they all involve contextual neutralization. I have called these principles processes.

0.3.3 Non-phonological Aspects of Rules

Unlike processes, rules may be grammatically restricted in their application. Rules may be restricted by syntactic structure. For example, Rule 7: Adjectival Tone states that tone of an adjective in the noun phrase is high tone. Rules may also be restricted by syntactic features. For example, Rule 10: Potential tone adjustment states that tone on the first syllable becomes [+T hi] in the potential aspect. Rules may be restricted by morphological features. For example, Rule 22: b-lenition applies only to native morphemes. Rule 45: Progressive perturbation applies only in the presence of a morpheme marked with the diacritic [+P], the class of perturbers. I follow the convention of writing morpheme feature as if they were a part of the segment.

Sometimes rules apply only to a small section of the lexicon. These rules are called Minor rules and I follow the plus rule convention for such. Also, unlike processes rules tolerate exceptions. I follow the minus rule convention for indicating exceptionality. Those morphemes which fail to condition a certain phonological

rule are marked [-ctxt R...]. Those morphemes that fail to undergo a phonological rule are marked [-chng R...].

Following Pyle (1973), I assume that boundaries are not a part of the phonological string. They are indicated only in UF and I assume that the theory has some means, like global reference, of referring back to them. I also follow a system of degraded boundaries. When boundaries are present in a rule, this means the rule applies only in the presence of at least that boundary. If the boundary is +, the rule will apply in the presence of any boundary. If the boundary is ≠, the rule will apply in the presence of any boundary except +. If the boundary is #, the rule will apply only in the presence of #. Only three grammatical boundaries are used in this study: +, ≠, #. If a rule is constrained not to apply across a boundary, this is stated as a condition on the rule. In the phonemic transcription, a space indicates a word or clitic boundary that has not been obscured by contraction.

1. LOWER LEVEL PHONOLOGY

1.1 Phonemes

1.1.1 Features

Phonemic distinctions are adequately expressed in terms of binary distinctive features. Most of these features are used in the ordinary way and require no further comment. [nasal], [laryngeal], and [check], however, require an explanation. I will discuss these features in their respective order.

I posit a series of nasalized vowels as phonemes in TZ, in spite of the fact that some generative phonologists have claimed that surface nasalized vowels should always be treated as an underlying sequence of an oral vowel and a nasal consonant. For example, Harms writes, "the nasal contrast is not known to occur with vowels at the phonemic level. In the systematic phonemic analysis of languages with nasal vowels (such as French, Igbo), the interpretation of these as vowel plus nasal consonant has consistently proved superior to the unit nasal vowel solution." (1969: 36). In TZ, however, v is in contrast with both Vn and Vn. Consider the following examples.

ʧe'

'dog'

be'n

'alligator'

k ^w aan	'medicine'
yaan	'corn silk'
ri	'I will arrive'
rin	'We will arrive'

The interpretation of y as nV is unlikely and that too can be ruled out by contrast.

g ^y ik ^y a	'I will do'
g ^y ik ^y na	'We will do'
i	'my salary'
ni	'this'

A syllable nucleus in TZ may be either unmodified, laryngealized or glottalized, as the following illustrate.

za	'lard'
zaa	'beans'
za'	'fresh corn'
yu	'dirt'
yuu	'cargo'
yu'	'house'

Laryngealization (marked VV) will be designated by the vowel feature [laryngeal]. Glottalization (marked V') will be designated by the vowel feature [check]. I consider glottal to not enter into linear sequence with other segments for the following two reasons. First, the rules do not treat the glottal as a [-syllabic] segment. Person markers, for example, do not contract on stems ending in [-syllabic] segments. (section 2.2.2.6). They do however, contract on glottal-final stems just as they do on other

[+syllabic]-stems. Note the following.

SF	UF	
zaay mi	(k+zaay mi)	'she will smoke'
^y sab mi	(^y sab mi)	'her clothes'
lom	(lo mi)	'her face'
yaam	(yaa mi)	'her hand'
yu'm	(yu' mi)	'her house'

Second, the rules group glottalization and laryngealization together. For example, mid tone lowers on both glottalized and laryngealized vowels (section 2.3.1.2). Thus, I wish to refer to glottalization and laryngealization in the same way: with a vowel feature.

1.1.2 Interpretation

Interpretation of sequences is based first of all on the requirements of phonological rules and secondly on pattern pressure. Pattern pressure would suggest that /k^y, k^w, g^y, g^w, l^y, n^y/ need to be interpreted as units. Given this interpretation, there would be no consonant clusters morpheme final in native words since the only possible final clusters are /k^y, g^y, l^y, n^y/. Also there would be no initial clusters of three or more phonemes since the only possible three consonant morpheme initial clusters in native words are /pk^y, bl^y, pk^w, ng^w/. The rules also give strong support for the unit interpretation. A rule that deletes velar obstruents, for example, also deletes /g^y/ (section 2.2.2.1). Also, /n/ assimilates to the point of articulation of the following consonant

(section 2.2.2.7). However /n/ becomes /n^y/ before /g^y/, not /ŋ/. One rule, however, views these phonemes as clusters. Also, there are many clear instances of morpheme boundaries which interrupt the clusters. Thus, in the underlying form and early in the phonological component, I refer to these segments as sequences. Rule 27, however, switches the interpretation. Late rules and all processes refer to the segments as units.

1.1.3 Matrices

Consonant

[illegible]

Vowel

	i	e	a	o	u	y	w	VV	V'	<u>V</u>	<u>VV</u>	<u>V'</u>
consonant	-	-	-	-	-	-	-	-	-	-	-	-
syllabic	+	+	+	+	+	-	-	+	+	+	+	+
high	+	-	-	-	+	+	+					
front	+	+	-	-	-	+	-					
round	-	-	-	+	+	-	+					
nasal								-	-	+	+	-
laryngeal								+	-	-	+	-
check								-	+	-	-	+

Tone

	high	fall	mid	low
T high	+	+	-	-
T low	-	+	-	+

/f/ and /h/ occur primarily in words clearly of Spanish origin. I know of only one native word with /h/: /n^huh/ 'drop'. /p, ʔ, n/ when not in a cluster occur only morpheme final in native words. Since there are no final clusters in native words, there is no contrast between /n/ and /ng/. I treat /ŋ/ as a phoneme rather than as an allophone of /n/; otherwise I would be required to posit a unique morpheme final cluster /ng/ with later deletion of the /g/ and I wish to avoid this abstract analysis.

1.2 Processes¹

1.2.1 d-lenition

/d/ becomes [+cont] following a vowel.

P6: d-lenition

$$d \longrightarrow [+cont] / v \underline{\hspace{1cm}}$$

Condition: morpheme bounded

/wadedə/ [wade'da] 'I will not cross'

(UF: wa+ded+a)

/bed/ [be·e]² 'Pedro'

/bidr/ [bi·θR] 'jar'

The first /d/ in the first example was not affected by P6 because the rule is morpheme bound. /d/ is only followed by a vowel, a word boundary, or an /r/.

1.2.2 Fortis-lenis

Velma Pickett (1968) refers to Isthmus Zapotec consonants as being divided into two major contrastive groups: fortis and lenis. The following four processes characterize this contrast in TZ.

P7: sibilant lengthening

$C \longrightarrow [+long] / \text{---}\#$

¹I discuss tone processes in section 2.3.1. Up until that point, I do not write tone on illustrations as it does not enter into the discussion. Tone is written on each form in the appendix.

²Vowel lengthening and obstruent devoicing are discussed below.

P8: aspiration

C → [+aspirate] / _____#
[-sib]
[-vd]

P9: vowel lengthening

a. $V \longrightarrow [1 \text{ long}] / \frac{\quad}{\begin{bmatrix} +\text{stress} \\ -\text{check} \end{bmatrix}} \begin{bmatrix} -\text{syl} \\ +\text{vd} \end{bmatrix}$

b. $V \longrightarrow [2 \text{ long}] / \frac{\quad}{\begin{bmatrix} + \text{ stress} \\ - \text{ check} \end{bmatrix}} \neq$

P10: obstruent devoicing

C \longrightarrow [-vd] / _____#

+obs
+vd

Word initial contrast is characterized by the feature [voiced]. P7 states that word final voiceless sibilants are long. P8 states that word final voiceless stops are aspirated. P9 states that vowels are long word final or before voiced consonants. P10 states that obstruents are devoiced word final, thus neutralizing a major distinctive characteristic of obstruent phonemes. Contrast is preserved, however, by consonant length, aspiration and vowel length.

/bič/	[bič ^Y]	'rabbit'
/biǰ/	[bi·č ^Y]	'cat'
/biš/	[biš ^Y]	'termite'
/biž/	[bi·š ^Y]	'desirous'
/bes/	[bes ^Y]	'welt'
/bez/	[be·s]	'fox'
/bit/	[bit ^h]	'skunk'
/bid/	[bi·θ]	'tar'

/bek/	[bek ^h]	'necklace'
/beg/	[be·k]	'comb'
/tub/	[tu·p]	'one'

As P9 indicates, two degrees of nonphonemic length need to be recognized. Note the following:

SF	UF	
čĩn ^y [čĩ:n ^y]	čĩnyi	'It is soft'
čĩn ^y [čĩ·n ^y]	čĩny	'good quality'
čĩt [čĩt ^h]	čĩt	'red-headed woodpecker'

The vowel of the first example is [2 long] because it precedes a clitic boundary which has been obscured by contraction (section 2.2.2.6)¹. In the second example, the vowel is [1 long] because it precedes a voiced consonant. In the third example, the vowel is [-long] because it precedes a voiceless consonant.

P7, P8, P9 must precede P10. P7 and P8 are in antifeeding order with P10 since P10 would create the environment upon which P7 and P8 could operate, but does not.

	/bi ^y /	/bid/
P10	bič	bit
P7	*bič·	---
P8	---	*bit ^h

P9 and P10 are in antibleeding order as P10 would destroy the context which would allow P9 to apply.

¹For a discussion of how Natural Processes relate to boundaries see Rhodes (1974).

/biʒ/

P10 *biʒ

P9 ---

P6: d-lenition is in antibleeding order with P10 which would destroy the context to which P6 applies.

/bed/

P9 be.d

P10 *be.t

P6 ---

1.2.3 Palatalization

There is no contrast between velar obstruents and their palatalized counterparts before front vowels. only palatalized velar obstruents occur in that position.

P1: palatalization

$$\begin{bmatrix} +\text{obs} \\ -\text{cor} \\ -\text{ant} \end{bmatrix} \text{ ----- } \begin{bmatrix} +\text{hi} \\ +\text{frt} \\ -\text{rnd} \end{bmatrix} / \text{ ----- } \overset{\text{V}}{[+\text{frt}]}$$

In the phonemic transcription, I write palatalization before front vowels for two reasons. First, it is often indicated in the underlying form: UF: k+yiky+a becomes SF: /gʸikyʌ/ 'I will do'. Second, native reaction is that palatalization is "there".

1.2.4 Diphthongization

Vowels glide to a high front position before palatalized consonants.

P11: diphthongization

$$\emptyset \text{ ----- } y / \text{ V } \text{ ----- } \overset{\text{C}}{\begin{bmatrix} +\text{hi} \\ +\text{frt} \end{bmatrix}}$$

/nan ^y /	[na·yn ^y]	'inside'
/nan/	[na·n]	'soot'
/lak ^y /	[layk ^y ^h]	'flat'
/lag ^y /	[lay·k ^y]	'liver'
/mbal ^y _a /	[mbay·l ^y _a]	'my compadre'

1.2.5 r-devoicing

/r/ is devoiced word final or word initial preceding a consonant.

P12: r-devoicing

$$r \longrightarrow [-vd] / \left\{ \begin{array}{c} \# \text{---} C \\ \text{---} \# \end{array} \right\}$$

/rlag ^y _a /	[Rlā ^y ·k ^y _a]	'I want...'
/bidr/	[bi·θR]	'jar'
/s _o ru/	[s _o ·ru]	'hello'
/tir/	[ti·R]	'bullet'
/rana/	[ra·na]	'I am hungry'

1.2.6 Palatal Fronting

In TZ, there is no contrast between velar stops and alveolar stops before /y/. Allophonically, however, palatalized velars are fronted before round vowels.

P19: Palatal fronting

$$\begin{array}{c} C \\ \left[\begin{array}{c} +obs \\ -sib \\ +hi \\ +frt \\ -rnd \end{array} \right] \end{array} \longrightarrow \begin{array}{c} \left[\begin{array}{c} +ant \\ +cor \end{array} \right] / \text{---} \begin{array}{c} V \\ \left[\begin{array}{c} +rnd \end{array} \right] \end{array}$$

/g ^y uba/	[d ^y u·ba]	'I will ride'
/k ^y up/	[t ^y up ^h]	'two'

/g ^y oo/	[d ^y oo:]	'river'
/k ^y ooſ ^y /	[t ^y ooſ ^y]	'god'

The last example shows that in borrowing the Spanish dios, it was perceived as being initiated by a velar. Although these stops are perceived as being articulated at a position forward in the mouth, strong native reaction is that they are velar.

1.2.7 Initial Glottal Insertion

An initial glottal is inserted in words that are vowel initial in their UF's.

P14: Initial glottal insertion

~~0~~ → 0 / # V

/i/	['i:]	'salary'
/u ^Y ₂ /	['u ^Y :']	'fine-grained'

1.2.8 Non-obstruent Glottalization

The feature [+check] of a vowel is transferred to a following word final {m, n, n^y, l, y, w}. The vowel then loses the feature.

P15: Glottalization

$$\{m, n, n^y, l, y, w\} \longrightarrow [+check] / \begin{array}{c} v_ \\ [+check] \end{array} \#$$

P16: Glottal deletion

$$[+check] \longrightarrow [-check] / \text{---} [+check]$$

/zi'l/	[zil']	'only'
/yu'n/	[yun']	'our house'
/yu'n ^y /	[yun ^y ']	'her house'
/yu'm/	[yum']	'her (resp) house'

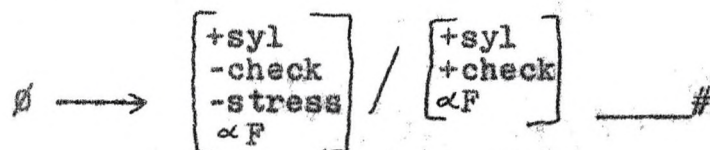
/yu'y/	[yuy']	'his house'
/yu'r/	[yu'R]	'your house'

All non-obstruents with the exception of /r/ combine with [check] in this way. The features fail inasmuch as they do not group these non-obstruents together.

1.2.9 Echo

Word final checked vowels are optionally rearticulated.

Pl7: Echo



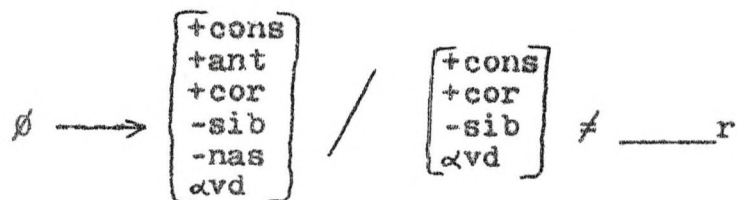
Conditions: (1) optional
(2) utterance final

bi' <u>or</u> bi'i	'flea'
če' <u>or</u> če'e	'dog'
za' <u>or</u> za'a	'fresh corn on the cob'
lo' <u>or</u> lo'o	'fence'
yu' <u>or</u> yu'u	'house'

1.2.10 d-epenthesis

An alveolar obstruent stop is inserted between {n, l, n^y, l^y, k^y, g^y} and a clitic or word beginning with /r/.

Pl8: d-epenthesis



gan ru [ga.ndru]	'you will handle'
gul ru [gu.ldru]	'your grandfather'
nan ^y ru [na ^y .n ^y dru]	'your abdomen'
bil ^y ru [bi ^y .l ^y dru]	'your sister (of a woman)'
g ^y ik ^y ras yu [g ^y i ^y k ^y h ^y tras.yu]	'he will torment' (lit: do torment he)
lag ^y ru [la ^y .k ^y tru]	'your liver'

2.0 THE PHONOLOGY OF VERB IRREGULARITY

2.1 Verb Morphology

TZ verb morphology, to a large extent, is typical of that described by Velma Pickett (1955) for Isthmus Zapotec and by Larry Lyman (1964) for Choapan Zapotec. The main differences are in the number of grammatical categories overtly expressed in the verb and in the phonological shape each category assumes. Isthmus Zapotec, for example, overtly makes eight aspectual distinctions. TZ on the other hand makes only four. Isthmus Zapotec does not have a passive morpheme. TZ and Choapan do. Bearing these kinds of differences in mind, the following statements summarize typical Zapotec verb structures.

Verbs with intransitive stems:

$$(N), ASP, (CAUS), IV-STEM, (ADV), \left\{ \begin{array}{c} S-PRO \\ NP \end{array} \right\}, \left(\left\{ \begin{array}{c} O-PRO \\ NP \end{array} \right\} \right)$$

(Causative increases transitivity.)

Verbs with transitive stems:

$$(N), ASP, (PASS), (CAUS), TV-STEM, (ADV), \left\{ \begin{array}{c} S-PRO \\ NP \end{array} \right\}, \left(\left\{ \begin{array}{c} O-PRO \\ NP \end{array} \right\} \right)$$

(Passive decreases transitivity.)

Verbs with derived stems:

$$(N), ASP, \left\{ \begin{array}{c} INCEP \\ VERBAL \end{array} \right\} + ADJ, (ADV), \left\{ \begin{array}{c} S-PRO \\ NP \end{array} \right\}$$

Motion orientation:

$$(N), ASP, MOT.AUX, \left\{ \begin{array}{c} T-VERB \\ IT-VERB \end{array} \right\} \text{ inflected with potential aspect}$$

In the discussion that follows, my primary intent will not be to repeat in great detail what has been said about Zapotec verb morphology. Rather, I will limit my discussion to issues immediately relevant to TZ phonology. This goal will involve identification of morphemes, a statement of what underlying forms are and illustration of surface structures that will need to be accounted for by the phonological rules in the following sections. I will, however, point out outstanding differences between the verb morphology of TZ and other Zapotecan languages.

2.1.1 Aspect

I consider that TZ regularly marks four aspectual categories in the verb: potential (P), habitual-continuative (H), completive (C), and unreal (U). The underlying form for the potential aspect is {k+}. Note the following surface manifestations of this form:

SF	UF	
g ^y ik ^y <u>a</u>	k+yiky+ <u>a</u>	'I will do'
k ^w ig ^y <u>a</u>	k+bigy+ <u>a</u>	'I will thirst'
y ^y <u>ca</u>	k+ya+ <u>a</u>	'I will go'
zaka <u>a</u>	k+zak+ <u>a</u>	'I will see'

The underlying form for the habitual aspect is {r+}.

Note the following surface manifestations of this form:

SF	UF	
rzaka <u>a</u>	r+zak+ <u>a</u>	'I see'
rza <u>a</u>	r+ya+ <u>a</u>	'I go'
rik ^y <u>a</u>	r+yiky+ <u>a</u>	'I do'

ryuba _a	r+yub+a	'I seek'
ren ^y _a	r+yeny+a	'I understand'
yeta _a	r+yett+a	'I descend'

The underlying form for the completive aspect is {gb+}.

Note the following surface manifestations of this form:

SF	UF	
bzaka _a	gb+zak+a	'I saw'
bik ^y _a	gb+yiky+a	'I did'
mnuuza _a	gb+nuuz+a	'I planted'
g ^w _a	gb+ya+a	'I went'
gu ^s pkaala _a	gb+as ^y #pkaal+a	'I fell asleep'
wi _a	gb+zi+a	'I bought'
weeza _a	gb+yez+a	'I was anchored'

The underlying form for the unreal aspect is {ngy+}.

Note the following surface manifestations of this form:

SF	UF	
nzaka _a	ngy+zak+a	'I should have seen'
mbig ^y _a	ngy+bigy+a	'I should have been thirsty'
nguu _a	ngy+guu+a	'I should have lied'
n ^y n ^y _a	ngy+nya+a	'I should have guarded'
n ^y g ^y as ^y pkaala _a	ngy+as ^y #pkaal+a	'I should have fallen asleep'

The allomorph in the last example occurs on all [-cons] initial stems and its presence constitutes one test for determining whether a stem is [-cons] initial or [+cons] initial.

Isthmus Zapotec marks four additional aspectual

categories on the verb: incomplete, perfective, continuative (distinct from habitual), and stative. Nothing in TZ corresponds to the Isthmus Zapotec "incomplete" or "perfective". In a few TZ verbs, the distinction between continuative and habitual is marked. Note go I 52:

P	g ^y <u>a</u>
cont	y <u>aa</u>
hab	ry <u>aa</u>
C	by <u>aa</u>
U	n ^y g ^y <u>aa</u>

In all verbs of this type, habitual is marked with the prefix /r+/ and continuative with \emptyset . Since verbs making this distinction are few in number, I do not include them in this study.

A few TZ verbs have forms corresponding to Isthmus Zapotec category "stative". Note the following.

	'It is....'	'It will....'	'I will....it'
close	noow n ^y i	g ^y oow n ^y i	soowa n ^y ii
open	naal n ^y i	g ^y al n ^y i	saala n ^y ii
sleep	nas n ^y i	gas n ^y i	gaasa n ^y ii
empty	naat n ^y i	-----	laata n ^y ii
handle	nan n ^y i	-----	dana n ^y ii
hear	nen ^y n ^y i	-----	ren ^y a n ^y ii

Although these words clearly correspond to Isthmus Zapotec statives, I do not consider the category to be a productive one since these forms are rare. I have therefore omitted these forms from the following discussion also.

2.1.2 Negation

The most outstanding difference between TZ and other Zapotecan languages is in the sequential limitations between the negative and aspect prefixes. In TZ the negative prefix precedes the aspect prefix and is marked by underlying {wa+}. The two allomorphs that occur are illustrated by the following examples.

SF	UF	
waduta	wa+dut+a	'I will kill'
wut ru	wa+dut/ru	'You will kill'

Both forms are uninflected for aspect--a fact about the morphology that will be discussed below.

In Isthmus Zapotec, and in Cheapan Zapotec, negation is fairly straight forward. With the exception of completive aspect, negation is accomplished by merely adding the negative morpheme to the verb. In the case of completive aspect, the unreal morpheme replaces the completive morpheme in negative forms.

In TZ, however, there is a skewing between form and meaning. In negating the potential idea, the verb is uninflected for aspect. (Hence, this form constitutes a second test for identifying the initial margin of the verb stem.) Thus it is glossed N. In negating the habitual idea, the verb is inflected with the potential morpheme. Thus it is glossed N+P. In negating the completive idea, the verb is inflected with the unreal morpheme followed by the potential morpheme. Thus it is

glossed N+U+P. The interplay between aspect and negative is illustrated by do 3.

	SF	UF	
P	g ^y ik ^y _a	k+yiky+a	'I will do'
H	rik ^y _a	r+yiky+a	'I do'
C	bik ^y _a	gb+yiky+a	'I did'
U	n ^y g ^y ik ^y _a	ngy+yiky+a	'I should have done'
N	wayik ^y _a	wa+yiky+a	'I will not do'
N+P	wag ^y ik ^y _a	wa+k+yiky+a	'I do not do'
N+U+P	wang ^y ik ^y _a	wa+ngy+k+yiky+a	'I did not do'

The negative aspect interrelation just described is regular, occurring in all verbs. Thus the basic verb paradigm consists of the seven forms illustrated by do 3 for each subject person. I will throughout the paper consistently use the morpheme glosses introduced above since the English translation does not adequately reflect the morphology.

2.1.3 Motion Auxiliary

A motion auxiliary can typically be bound to the Zapotec verb to indicate "movement to do." In TZ it consists of the entire stem of go II 10. It requires the stem of the main verb to be inflected with the potential aspect.

P	^y ca g ^y ik ^y _a	k+ya k +yiky+a	'I will go to do'
H	rza g ^y ik ^y _a	r+ya k +yiky+a	'I go to do'
C	g ^w a g ^y ik ^y _a	gb+ya k +yiky+a	'I went to do'

On [+cons] initial stems, potential aspect is indicated

by the devoicing of the stem initial consonant.

P ^VCa tuta k+ya~~k~~+dut+a 'I will go to kill'

2.1.4 Causative

One characteristic of the Zapotec verb is its ability to morphologically increase transitivity. In TZ this is done by a set of first order prefixes, some of which are suppletive. I take suppletive to mean that no phonological generalization is to be made. The suppletive members of the set will be supplied by spelling rules and will thus be part of the underlying form. Underlying forms, therefore, consist of the following set: {t+, k+, ^Vc+, s+, z+, ^Vs+, l+}. Note the following illustrations. Underlying forms are in parenthesis.

	non-caus.	caus.
fold	rac ^V k ^V up n ^V i (r+ac ^V #kyup /nyi)	rtuc ^V k ^V up n ^V i (r+t+ac ^V #kyup /nyi)
eat	ron ^V (r+dow /nyi)	rgoow n ^V i (r+k+dow /nyi)
thirst	rbig ^V n ^V i (r+bigy /nyi)	rk ^w iig ^V n ^V i (r+k+bigy /nyi)
be afraid	rjib n ^V i (r+jib /nyi)	r ^V ciib n ^V i (r+k+jib /nyi)
scatter	ryac ^V n ^V i (r+yac ^V /nyi)	r ^V caac ^V n ^V i (r+c+yac ^V /nyi)
close	ryoow n ^V i (r+yoow /nyi)	rsoow n ^V i (r+s+yoow /nyi)
make	ryaan ^V	rzaan ^V

	(r+yaa ny i)	(r+z+yaa ny i)
descend	yet n ^y i	r ^y set n ^y i
	(r+y et ny ^y i)	(r+s+y et ny ^y i)
		rlet n ^y i
		(r+l+y et ny ^y i)

The subset {^yC+, s+, z+, ^yS+, l+} occurs only on /y-/ initial stems. Phonetic similarity within the set indicates that the members probably come from a common historical source. It is usually the case that wherever {l+} occurs {^yS+} is an alternative for the same speakers.

2.1.5 Passive

In TZ, transitivity can be morphologically decreased with the passive prefix {du+}. Isthmus Zapotec has no passive but Choapan does. Lyman calls it "impersonalizer" (23).¹ Eat illustrates the passive with a transitive verb and with a verb that has been causativized.

SF	UF	<u>eat</u> 26
gor	k+dow ru	'You will eat'
dugon ^y	k+du+dow ny i	'It will be eaten'
goow ru	k+k+dow ru	'You will feed'
dugoow ru	k+du+k+dow ru	'You will be fed'

2.1.6 Inceptive

In TZ, but not in Isthmus Zapotec, the stem of go I 9 {ya} can be bound to a stative form to indicate

¹The passive morpheme is never used with intransitive verbs to indicate unspecified subject as in 'someone sang.' Its function always involves a decrease in transitivity.

'entrance into a state.'

	ADJ	'It became....'
bald	yag ^y	byayag ^y n ^y i
tight	nik ^y	byanik ^y n ^y i
blind	ka'lo	byaka'lon ^y
deaf	go'	byago'n ^y

2.1.7 Verbalizer

A small class of adjectives can be made into verbs with the prefix [a+]. Note the following where underlying form is in parenthesis.

	'...person'	'he will be....'
bored	mbek ^y sed	gazeed yu
	(mbeky#zeed)	(k+a+zeed/yu)
angry	mbek ^y zi lag ^y	gazi lag ^y yu
	(mbeky#zi#lagy)	(k+a+zi#lagy/yu)
hot	mbek ^y zig	gazig yu
	(mbeky#zig)	(k+a+zig/yu)
sick	mbek ^y rat	garat yu
	(mbeky#rat)	(k+a+rat/yu)
thin	mbek ^y rit	garit yu
	(mbeky#rit)	(k+a+rit/yu)

2.1.8 Pronouns

There are seven subject pronouns in T2, six of which contract to form alternates.

		<u>cross</u> 24	<u>guard</u> 49
lp sg	{+a}	deda	n ^y a

1p pl inc	{#na}	ded na	n ^y an
2p	{#ru}	ded ru	n ^y ar
3p mas	{#yu}	ded yu	n ^y ay
3p fem	{#nyi}	ded n ^y i	n ^y an ^y
3p fem resp	{#mi}	ded mi	n ^y am
3p animal	{#ma}	ded ma	n ^y a ma

Object pronouns are the same as subject pronouns except for 1p sg which is {#ya}. It is a free form and never contracts. 2p object, although phonetically identical to 2p subject, also does not contract. I suggest accounting for this by positing different boundaries for the two forms. Note the following list of object pronouns with boundaries and illustration of contraction.

		'he will kill...'
1p sg	{#ya}	kut yu <u>ya</u>
1p pl inc	{#na}	kut yun
2p	{#ru}	kut yu ru
3p mas	{#yu}	kut yuy
3p fem	{#nyi}	kut yun ^y
3p fem resp	{#mi}	kut yum
3p animal	{#ma}	kut yu ma

2.1.9 Plural

TZ optionally marks plural on nouns and pronouns with a prefix {de+}.

bez	'fox'
debez	'foxes'

Pronouns contract with the plural prefix in the normal way.

1p sg	de
1p pl inc	den
2p	der
3p mas	dey
3p fem	den ^y
3p fem resp	dem
3p animal	de ma

A noun or pronoun not marked for plural is unspecified for number.

2.1.10 Adverb

Bound adverbs can occur between the stem and the subject pronoun.

		'he will ... eat'
really	{#gaal}	gow gaal yu
more	{#zir}	gow zir yu
inappropriately	{#ton}	gow ton yu
again	{+ga'}	gowa'y
only	{#zi'l}	gow zi'l yu
just	{#zi}	gow ziy
emphatically [+L]	{#la}	gow laay
before [+L]	{#gala}	gow gaalay
willfully	{#nap+la}	gow nap lay
still	{#ru'}	gow ru'y
soon	{#guly}	gow gul ^y yu
to fullest extent {#za'}		gow za'y
very	{#ga}	gow ga'y
excessively	{# ^y saad}	gow ^y saad yu

well

[ʔbaa]

gow baay

2.2 Segmental Phonological Rules

Rules of the segmental phonology are of two types: syntactico-phonological rules and phonological rules. Syntactico-phonological rules occur early in the phonological component and are usually ordered before the phonological rules. By definition they operate in a grammatically defined environment whereas phonological rules do not: i.e., syntactico-phonological rules refer back to the syntactic structure. In TZ, they are largely concerned with verb stem alternants and therefore include what have been called stem formation rules. Although phonological rules never refer to syntactic structures, they often refer to boundaries, to exception markings, and to other markings that restrict the application of the rules. Rules tolerate exceptions. Rules are often restricted in their application. These are two ways in which they differ from processes. In the discussion that follows, I will discuss syntactico-phonological rules first and then phonological rules.

2.2.1 Syntactico-phonological Rules

Alternations in the verb stem may involve either the initial syllable margin or the syllable nucleus. A verb stem may be vowel initial or consonant initial. Although the stem may be initiated by virtually any consonant, only three /d, l, r/ ever have irregular alternants. Furthermore,

these three consonants may alternate in only one of three ways: they may be deleted, they may be replaced by /k/, or they may be replaced by /b/. I first discuss rules deleting stem initial consonants.

The initial consonant /d, r/ of a verb stem may be deleted in forming the second and third person stem.

Sing 31 and beat 61 illustrate this deletion.

<u>sing</u> 31			<u>beat</u> 61		
	1p			1p	
	SF	UF		SF	UF
P	dula	k+dul+a	ruza	k+ruz+a	
H	rdula	r+dul+a	druza	r+ruz+a	
C	bdula	gb+dul+a	bruza	gb+ruz+a	
U	ndula	ngy+dul+a	nruza	ngy+ruz+a	
N	wadula	wa+dul+a	waruza	wa+ruz+a	
N+P	wagdula	wa+k+dul+a	wagruza	wa+k+ruz+a	
N+U+P	wandula	wa+ngy+k+dul+a	wanruza	wa+ngy+k+ruz+a	
	2p			2p	
P	gul ru	k+dul#ru	gaz ru	k+ruz#ru	
H	rul ru	r+dul#ru	laz ru	r+ruz#ru	
C	biil ru	gb+dul#ru	guz ru	gb+ruz#ru	
U	n ^y g ^y uul ru	ngy+dul#ru	n ^y g ^y az ru	ngy+ruz#ru	
N	wul ru	wa+dul#ru	waz ru	wa+ruz#ru	
N+P	wagul ru	wa+k+dul#ru	wagaz ru	wa+k+ruz#ru	
N+U+P	wangul ru	wa+k+ngy+dul#ru	wangaz ru	wa+ngy+k+ruz#ru	

/l/ is not known to delete in this way. One complication of this rule is illustrated by catch 30.

catch 30

	1p		2p	
	SF	UF	SF	UF
P	duba <u>a</u>	k+dub+a	kub ru	k+dub / ru
H	rduba <u>a</u>	r+dub+a	rub ru	r+dub / ru
C	bduba <u>a</u>	gb+dub+a	bdub ru	gb+dub / ru
U	nduba <u>a</u>	ngy+dub+a	n ^v g ^y uub ru	ngy+dub / ru
N	waduba <u>a</u>	wa+dub+a	wub ru	wa+dub / ru
N+P	wagduba <u>a</u>	wa+k+dub+a	wakub ru	wa+k+dub / ru
N+U+	wanduba <u>a</u>	wa+ngy+k+dub+a	wankub ru	wa+ngy+k+dub / ru

The deletion occurs here in every form in the second and third person paradigm except for C. Two rules account for these stem changes.

MR2a: deletion 1

{d} → ø / + _____ V in {2p, 3p}, not C stem

MR3: deletion 2

$\left\{ \begin{matrix} d \\ r \end{matrix} \right\} \longrightarrow \emptyset / + \underline{\hspace{1cm}} \text{V in } [2p, 3p], \text{ C stem}$

Call 60 and wait 51 require the application of both rules.

Catc. 30 requires the application of only the first rule.

The rules are both minor since not all stem initial /d, r/
delete: e.g., cross 24 and arrive 55.

Deletion of the stem initial consonant occasionally occurs in forming the causative stem. Eat 26 illustrates the operation of this principle.

<u>eat</u> 26				
	lp		2p	
	SF	UF	SF	UF
P	<u>daw</u>	k+daw+a	gor	d+dow#ru
H	rdaw	r+daw+a	ror	r+dow#ru
C	bdaw	gb+daw+a	bdor	gb+dow#ru
N	wadaw	wa+daw+a	wor	wa+dow#ru
N+P	wagdaw	wa+k+daw+a	wagor	wa+k+dow#ru
N+U+P	wandaw	wa+ngy+k+daw+a	wangor	wa+ngy+dow#ru
lp caus				
	SF	UF		
P	<u>goowa</u>	k+k+dow+a		
H	rgoowa	r+k+dow+a		
C	bgoowa	gb+k+dow+a		
U	ngoowa	ngy+k+dow+a		
N	wagoowa	wa+k+dow+a		
N+P	wagoowa	wa+k+k+dow+a		
N+U+P	wangoowa	wa+ngy+k+k+dow+a		

An alternative analysis would be to consider the initial stem consonant as being replaced by /g/ in forming the causative. The fact that stem initial consonants sometimes alternate with /k/ (see discussion of k-substitution below) would suggest this as a possibility. Causative, however, is in other cases a first order prefix. One allomorph of this prefix is /x+/ as thirst 18 illustrates.

thirst 18

	lp		lp caus	
	SF	UF	SF	UF
P	k ^w ig ^y <u>a</u> ¹	k+bigy+a	k ^w iig ^y <u>a</u>	k+k+bigy+a
H	r ^y big ^y <u>a</u>	r+bigy+a	rk ^w iig ^y <u>a</u>	r+k+bigy+a
C	big ^y <u>a</u>	gb+bigy+a	pk ^w iig ^y <u>a</u>	gb+k+bigy+a
U	m ^y big ^y <u>a</u>	ngy+bigy+a	nk ^w iig ^y <u>a</u>	ngy+k+bigy+a
N	wabig ^y <u>a</u>	wa+bigy+a	wak ^w iig ^y <u>a</u>	wa+k+bigy+a
N+P	wak ^w ig ^y <u>a</u>	wa+k+bigy+a	wak ^w iig ^y <u>a</u>	wa+k+k+bigy+a
N+U+P	wank ^w ig ^y <u>a</u>	wa+ngy+k+bigy+a	wank ^w iig ^y <u>a</u>	wa+ngy+k+k+bigy+a

The principle which voices {k+} in eat 26 is needed independently of present considerations. Should the alternative be chosen, however, the causative of eat 26

¹Accurate morpheme breaks cannot be made on the surface in TZ. Here, for example, a phoneme would have to be broken up as the labialization of /k^w/ clearly comes from the /b/ that initiates the verb stem. In other cases coalescence destroys the boundary between two morphemes (see MR23: vowel raising and rounding and R25: w-deletion in section 2.2.2.2 below), or epenthesis adds a segment that does not belong on either side of the boundary. (See R39: y-epenthesis in 2.2.2.5.) Perhaps it is because of this fact that Pickett (1955: 228), Lyman (1964: 34), Butler (1976: 82) and Marks (1976:) all make the morpheme break before the /k^w/ on forms such as k^wig^ya 'I will thirst.' Thus, they miss the very regular generalization

b → w / k

(for further discussion of this rule in TZ see section 2.2.2.1) and complicate their morphophonemics by concluding that there are two morphologically conditioned allomorphs of verb stems like thirst 18: k^wig^y and big^y.

Although there is strong phonological evidence for the unit interpretation in TZ, this is one case where the unit interpretation complicates the morphology from the structural point of view. The ramifications of the unit interpretation are especially significant for Yatzachi Zapotec since [b] and [w] are in complementary distribution and hence allophones of the same phoneme. The unit interpretation has therefore led to an incorrect phonemic analysis.

would not be a prefix. I have, therefore, rejected this solution in favor of the first. The following rule accounts for this deletion.

MR6: deletion 3

$d \longrightarrow \emptyset / + ______ V$ in caus stem

The second type of alternation that may occur is a replacement of the initial consonant /r, l/ by /b/ in forming the second and third person stems. Call 60 and wait 51 illustrate this alternation.

call 60

1p

SF

UF

P	re _Y a	k+re _Y +a
H	dre _Y a	r+re _Y +a
C	bre _Y a	gb+re _Y +a
U	nre _Y a	ngy+re _Y +a
N	ware _Y a	wa+re _Y +a
N+P	wagre _Y a	wa+k+re _Y a
N+U+P	wanre _Y a	wa+ngy+k+re _Y +a

2p

P	k ^w e _Y ru	k+re _Y ≠ru
H	rbe _Y ru	r+re _Y ≠ru
C	bre _Y ru	gb+re _Y ≠ru
U	mbe _Y ru	ngy+re _Y ≠ru
N	wabe _Y ru	wa+re _Y ≠ru
N+P	wak ^w e _Y ru	wa+k+re _Y ≠ru
N+U+P	wank ^w e _Y ru	wa+ngy+k+re _Y ≠ru

wait 51

1p

SF

UF

leza	k+lez+a
rleza	r+lez+a
bleza	gb+lez+a
nleza	ngy+lez+a
waleza	wa+lez+a
wagleza	wa+k+lez+a
wanleza	wa+ngy+k+lez+a

2p

k ^w ez ru	k+lez≠ru
rbez ru	r+lez≠ru
blez ru	gb+lez≠ru
mbez ru	ngy+lez≠ru
wabex ru	wa+lez≠ru
wak ^w ez ru	wa+k+lez≠ru
wank ^w ez ru	wa+ngy+k+lez≠ru

Again, the alternant does not occur in the second and third person completive forms. /d/ is not known to alternate with /b/. The following rule accounts for this stem formation process.

MR4: b-substitution

$\begin{Bmatrix} r \\ l \end{Bmatrix} \longrightarrow b / + ______ V \text{ in } \{2p, 3p\}, \text{ not C stem}$

The third type of alternation that may occur is the replacement of /d, l, r/ with /k/. This alternation occurs in some forms of the second and third person stem. Fill 33, distribute 52, and set 59 illustrate these alternations.

fill 33

	lp		2p	
	SF	UF	SF	UF
P	du'	k+du'+a	ku'r	k+du'≠ru
H	rdu'	r+du'+a	rgu'r	r+du'≠ru
C	bdu'	gb+du'+a	bdu'r	gb+du'≠ru
U	ndu'	ngy+du'+a	ngu'r	ngy+du'≠ru
N	wadu'	wa+du'+a	wu'r	wa+du'≠ru
N+P	wagdu'	wa+k+du'+a	waku'r	wa+k+du'≠ru
N+U+P	wandu'	wa+ngy+k+du'+a	wanku'r	wa+ngy+k+du'≠ru

distribute 52

	lp		2p	
	SF	UF	SF	UF
P	leza	k+leez+a	k ^y ez ru	k+leez≠ru
H	rleza	r+leez+a	rg ^y eez ru	r+leez≠ru
C	bleza	gb+leez+a	bleez ru	gb+leez≠ru
U	nleza	ngy+leez+a	n ^y g ^y eez ru	ngy+leez≠ru

N	waleza	wa+leez+a	wayez ru wa+leez/ru
N+P	wagleza	wa+k+leez+a	wak ^y eez ru wa+k+leez/ru
N+U+P	wanleza	wa+ngy+k+leez+a	wank ^y eez ru wa+ngy+k+leez/ru

set 59

	lp		2p
	SF	UF	SF UF
P	ri ^y sa	k+ri ^y +a	k ^y i ^y s ru k+ri ^y /ru
H	dris ^y a	r+ri ^y +a	rg ^y i ^y s ru r+ri ^y /ru
C	bris ^y a	gb+ri ^y +a	brii ^y s ru gb+ri ^y /ru
U	nris ^y a	ngy+ri ^y +a	n ^y g ^y i ^y s ru ngy+ri ^y /ru
N	waris ^y a	wa+ri ^y +a	wayi ^y s ru wa+ri ^y /ru
N+P	wagris ^y a	wa+k+ri ^y +a	wak ^y i ^y s ru wa+k+ri ^y /ru
N+U+P	wanris ^y a	wa+ngy+k+ri ^y +a	wank ^y i ^y s ru wa+ngy+k+ri ^y /ru

In verbs of this type, /d, l, r/ are replaced by /k/ in forming the second and third person stems for P, H, U, N+P and N+U+P. /d, l, r/ are deleted in forming the stem of second and third person for N. Again, the alternate form does not occur in the second and third person of C. The fact that /d, l, r/ are deleted in one form would suggest an alternative analysis: that the three consonants are deleted in forming the second and third person stem in all forms except for C. The /k/ in P, N+P, and N+U+P would then be a prefix for the potential aspect. /ng/ would be the prefix for second and third person unreal. The /g/ in the second and third person habitual forms, however, would be problematic. It appears to be a stem

consonant. Furthermore, in verbs with vowel initial stems, potential aspect {k⁺} is always voiced. While there are a few exceptions to this rule among verbs in which the stem initial consonant is deleted, in verbs of the type under discussion, this /k/ is never voiced. This is what one would expect if the /k/ is a stem consonant. Also, second and third person unreal is problematic for the alternative analysis. The allomorph of unreal that occurs in all clear cases of vowel initial stems is /n^yg^y/. For consonant initial stems, it is /n/. Hence, were the stem initial consonant deleted one would expect *n^yg^yu'r 'you should have filled.' ngu'r is what one would expect with a consonant initial stem. I, therefore, reject the alternative analysis in favor of the first analysis, which is expressed by the following rule.

MR2b: k-substitution

$$\begin{Bmatrix} d \\ l \\ r \end{Bmatrix} \longrightarrow \begin{Bmatrix} k \\ \emptyset \end{Bmatrix} / + \text{---} V \text{ in } \left[\begin{array}{l} \{2p, 3p\}, \text{ not } \{C, N\} \\ \{2p, 3p\}, N \end{array} \right]$$

For some of the same verbs as undergo deletion l or k-substitution, /d, l, r/ are replaced by /g/ in forming the passive stem as is illustrated by strike 22.

strike 22

lp			2p	
	SF	UF	SF	UF
P	di	k+di+a	k ^y ir	k+di/ru
H	rdi	r+di+a	rg ^y ir	r+di/ru
C	bdi	gb+di+a	bdir	gb+di/ru

U	ndi	ngy+di+a	n ^y g ^y ir	ngy+di/ru
N	wadi	wa+di+a	wayir	wa+di/ru
N+P	wagdi	wa+k+di+a	wak ^y ir	wa+k+di/ru
N+U+P	wandi	wa+ngy+k+di+a	wank ^y ir	wa+ngy+k+di/ru

lp pass

P	dug ^y i	k+du+di+a
H	rdug ^y i	r+du+di+a
C	bdug ^y i	gb+du+di+a
U	ndug ^y i	ngy+du+di+a
N	wadug ^y i	wa+du+di+a
N+P	wagdug ^y i	wa+k+du+di+a
N+U+P	wandug ^y i	wa+ngy+k+du+di+a

Handle 25 and drill 56 show that the principle operating in forming the passive stem is not the same as the one operating in forming the second and third person active stem because distinct processes apply to each.

handle 25

	lp		lp pass	
	SF	UF	SF	UF
P	dana	k+dan+a	dugana	k+du+dan+a
H	rdana	r+dan+a	rdugana	r+du+dan+a
C	bdana	gb+dan+a	bdugana	gb+du+dan+a
U	ndana	ngy+dan+a	ndugana	ngy+du+dan+a
N	wadana	wa+dan+a	wadugana	wa+du+dan+a
N+P	wagdana	wa+k+dan+a	wagdugana	wa+k+du+dan+a
N+U+P	wandana	wa+ngy+k+dan+a	wandugana	wa+ngy+k+du+dan+a

	2p		2p pass
P	gan ru	k+dan/ru	dugan ru k+du+dan/ru
H	ran ru	r+dan/ru	rdugan ru r+du+dan/ru
C	bdan ru	gb+dan/ru	bdugan ru gb+du+dan/ru
U	n ^y g ^y an ru	ngy+dan/ru	ndugan ru ngy+du+dan/ru
N	wan ru	wa+dan/ru	wadugan ru wa+du+dan/ru
N+P	wagan ru	wa+k+dan/ru	wagdugan ru wa+k+du+dan/ru
N+P+U	wangan ru	wa+ngy+k+dan/ru	wandugan ru wa+ngy+k+du+dan/ru

drill 56

	1p		2p
	SF	UF	SF UF
P	rida	k+riid+a	k ^y id ru k+riid/ru
H	drida	r+riid+a	rg ^y iid ru r+riid/ru
C	brida	gb+riid+a	briid ru gb+riid/ru
U	nrida	ngy+riid+a	n ^y g ^y iid ru ngy+riid/ru
N	warida	wa+riid+a	wayid ru wa+riid/ru
N+P	wagrida	wa+k+riid+a	wak ^y iid ru wa+k+riid/ru
N+U+P	wanrida	wa+ngy+k+riid+a	wank ^y iid ru wa+ngy+k+riid/ru

3p pass

P	duriid n ^y i	k+du+riid/nyi
H	rduriid n ^y i	r+du+riid/nyi
C	bduriid n ^y i	gb+du+riid/nyi
U	nduriid n ^y i	ngy+du+riid/nyi
N	waduriid n ^y i	wa+du+riid/nyi
N+P	wagduriid n ^y i	wa+k+du+riid/nyi
N+U+P	wanduriid n ^y i	wa+ngy+k+du+riid/nyi

The stem is uniform throughout the passive paradigm. The important thing to note about handle 25 is that the stem rule acting on active forms is one of deletion while the rule in forming the passive stem is one of replacement. Drill 56 shows that a stem rule may act on an active form and not on a passive form. Clearly then, the rule governing stem changes in passive constructions is different from k-substitution, although they are similar in appearance. The following rule expresses this replacement.

MR5: g-substitution¹

$$\begin{Bmatrix} d \\ l \\ r \end{Bmatrix} \longrightarrow g / + ______ V \text{ in pass stem}$$

Alternations may also occur in the verb stem nucleus. These may involve either vowel quality or laryngealization. I discuss laryngealization under Suprasegmental Phonology (section 2.3.3) since there is a relationship with tone which needs to be expressed. Before looking at the alternation in vowel quality, I first consider a word with an /a/ initial stem.

fall asleep 2

lp

SF

P	ga ^V pkaala	k+as ^V ##pkaal+a
H	ra ^V pkaala	r+as ^V ##pkaal+a

¹It is impossible to determine whether or not this /g/ could be an underlying /k/ since all such stem consonants are voiced in the passive stem (section 2.2.2.3).

C	gu ^V pkaala	gb+as ^V #pkaal+a
U	n ^V g ^V as ^V pkaala	ngy+as ^V #pkaal+a
N	wa ^V pkaala	wa+as ^V #pkaal+a
N+P	wagas ^V pkaala	wa+k+as ^V #pkaal+a
N+U+P	wangas ^V pkaala	wa+ngy+k+as ^V #pkaal+a

The alternation that stands out is in the vowel quality of the completive form. This comes from coalescence of /a/ with /gw+/ 'completive.' This will be discussed in a later section (section 2.2.2.1).

The only place where a grammatically-conditioned vowel change occurs is in the same words where the initial consonant of the verb stem is deleted. A common vowel change is illustrated by beat 61.

beat 61

	1p	2p	1p caus
P	ruza	gaz ru	gaaza
H	druza	raz ru	rgaaza
C	bruza	guz ru	bgaaza
U	nruza	n ^V g ^V az ru	ngaaza
N	wa ^V za	waz ru	wagaaza
N+P	wagruza	wagaz ru	wagaaza
N+U+P	wanruza	wangaz ru	wangaaza

In some verbs with an underlying /d, r/ initial stem /u/ becomes /a/ in forming the second and third person stem and in forming the causative stem. I have no examples of a verb requiring this change that can be passivized. Although one might think the change did not take place

in the completive form, I consider that all forms change, but that the completive form later undergoes the coalescence illustrated by fall asleep 2 above.

MRI: a-substitution

u → a / + _____ V in {2p, 3p caus} stem

MR1 is ordered before MR2a: deletion 1. MR2a: deletion 1 and MR2b: k-substitution can now be stated with greater generality. After the vowel change of MR1, MR2b: k-substitution occurs only before {i, e, u}. MR2a: deletion 1 occurs only before {a, o} and before some /u/'s. These /u/'s will be marked with the diacritic [+M]. This diacritic serves two purposes. It provides a way of indicating exceptional behavior of these segments with respect to the stem formation rules. It will also be seen in a later section of the paper that these segments act exceptionally with respect to the rules which produce allomorphy in the completive aspect (section 2.2.2.1). MR2a: deletion 1 and MR2b: k-substitution can now be revised as follows.

MR2: deletion l and k-substitution

$$\begin{Bmatrix} d \\ l \\ r \end{Bmatrix} \rightarrow \frac{\begin{bmatrix} k \\ \emptyset \end{bmatrix}}{\emptyset} / \left[\begin{array}{l} + \text{---} [i, e, u]_{[-M]} \text{ in } \left\{ \begin{array}{l} [2p, 3p], \text{ not} \\ \{C, N\} \text{ stem} \\ [2p, 3p], N \text{ stem} \end{array} \right\} \\ + \text{---} [a, o, u]_{[+M]} \text{ in } [2p, 3p], \text{ not } C \text{ stem} \end{array} \right]$$

There are several other syntactico-phonological rules involving morphemes other than verb stems. Because the analysis presented in the next section is crucial to

their understanding, they will not be discussed here.

2.2.2 Phonological Rules

Phonological rules function to adjust sequences so that they conform to the acceptable patterns defined by surface conditions. This may be done in one of two ways. First, they may break up sequences through deletion or epenthesis. Secondly, they may change the feature specifications of the segments so that they conform to acceptable patterns. In the presentation that follows, I will not discuss rules in the order in which they occur in the grammar, but rather rules will be grouped together that perform a similar function or seek to accomplish a similar goal.

2.2.2.1 Principles constraining velar initial clusters

In TZ velar obstruent steps cannot initiate a consonant cluster within the syllable.¹ Two rules present the different ways of achieving this goal. The first rule has already been seen in call 60 and wait 51 since it is fed by the syntactico-phonological rules. /b/ becomes /w/

¹Although the concept of syllable is never referred to formally in the rules, two principles for syllabification could be formulated. First, syllable breaks always correspond to clitic boundaries, or word boundaries. Second, otherwise word medial clusters are to be interpreted as follows. The first consonant of a cluster belongs to the preceding syllable. The remaining consonants belong to the following syllable. The two rules that refer to syllables in this way are R38: velar-deletion 1 and P5: nasal assimilation.

R22: b-lenition

$$b \longrightarrow w / \begin{matrix} C \\ [+cbs] \end{matrix} \text{_____} [-cons]$$

The operation of this rule is seen on all /b/ initial stems. Note thirst 18.

P	k ^w ig ^y _a	N	wabig ^y _a
H	rbig ^y _a	N+F	wak ^w ig ^y _a
C	big ^y _a	N+U+P	wank ^w ig ^y _a
U	mbig ^y _a		

The underlying stem initial /b/ becomes /w/ in each form in which the potential {k+} occurs. R22 is fed by MR4: b-substitution as the following partial derivation shows.

'you will call'

UF	k+re ^y _{ru}
MR4	k be ^y _{ru}
R22	k we ^y _{ru}
R27	k ^w e ^y _{ru}
SF	k ^w e ^y _{ru}

The second rule deletes syllable initial velar obstruents.

R38: velar deletion¹

$$\begin{Bmatrix} k \\ g \\ g^y \end{Bmatrix} \longrightarrow \emptyset / \begin{Bmatrix} \neq \\ [+cons] \end{Bmatrix} \text{_____} [+cons]$$

¹I have noticed some cases in which the rule is suspended. It would be possible to treat the suspension as optional. I consider suspension of this rule to be grammatically motivated for the following reasons. First, suspension is rare. Second, native speakers do not allow me to delete velar obstruents where they have suspended the rule. Third, native speakers do not allow me to suspend the rule where they have deleted

Note the operation of this rule in kill 32.

SF	UF	
duta	k+dut+a	'I will kill'
wagduta	wa+k+dut+a	'I do not kill'
wanduta	wa+ngy+k+dut+a	'I do not kill'

Note that a following /y/ and /w/, since they are [-cons], do not condition this change.¹

SF	UF	
g ^y a	k+ya+a	'I will go'
g ^w a	gb+ya+a	'I went'

Velar stops can initiate a two-consonant cluster word medially since the rules view the first consonant as part of the preceding syllable and the second consonant as part of the following syllable. The only exceptions to this is where clitic or word boundaries are involved. These boundaries always correspond to syllable breaks.

SF	UF	
wagduta	wa+k+dut+a	'I do not kill'
Ca tuta	k+ya/k+dut+a	'I will go kill'

/k/ is not deleted in the first example because the rule sees it as part of the first syllable. In the second example, however, the clitic boundary forces the syllable

the velar obstruent. Thus, although I cannot define the conditions for deletion, I consider it to be a case of suspension, and I consider R38 to be correctly stated.

¹This is not true of one word only. Compare ride 16 and seek 17. Segmentally, their stems are identical: [ab]. They differ only in that seek 17 triggers deletion and ride 16 does not.

break to be made before the /k/. Since it is now seen as initiating a consonant cluster within the syllable, it is deleted.

R38 and R22: b-lenition are in antibleeding order as the following partial derivations show.

UF	k+bigy+a	UF	k+bigy+a	'I will thirst'
R28	bigya	R22	kWigya	
R22	*bigya	R38	kWigya	

R22 and R38 have been shown to account for alternations involving the potential prefix {k+}. They also account for alternations of the unreal aspect {ngy+}. /n^yg^y/ occurs on [-cons] initial stems. Fall asleep 2 illustrates the unreal aspect on a vowel initial stem.

n^yg^yas pkaala 'I should have fallen asleep'
Eat 26 shows that this allomorph occurs on vowel initial stems derived by MR2: deletion 1 and k-substitution.

SF	UF	
ndaw	ngy+daw+a	'I should have eaten'
n ^y g ^y or	ngy+dow/ru	'you should have eaten'

/n/ occurs on consonant initial stems, the g^y being deleted by R38.

The same rule, R38: velar deletion 1, leads me to posit {gb+} as the underlying form for the completive aspect. While it may seem strange to posit an underlying cluster that is not possible on the surface, the analysis has clear advantages. Of the two completive allomorphs, /b/

and /g^w/. /g^w/ occurs only on [-cons] initial stems.¹

Given {gb+} as the underlying form, this is just what

R22: b-lenition and R38: velar deletion would lead one to expect.

UF	gb+V	gb+C
R22	gwV	---
R38	---	bC

Similarly, in verbs where the stem process MR2 deletes an initial consonant in the second person, there is often an accompanying change in the allomorph of the completive aspect. This is what one would expect given an underlying {gb+} 'completive,' as the following partial derivation from beat 61 shows.

	'I beat'	'You beat'
UF	gb+ruz+a	gb+ruz#ru
MR1	---	gb raz ru
MR2	---	gb az ru
R22	---	gw az ru
R38	bruza	---

SF	bruza	guz ru

There are exceptions to the application of R22: b-lenition as /biil ru/ 'you sang' illustrates. Had the rule applied

¹I am aware of one consonant-initial stem that takes the allomorph /g^w/: /gujiba/ 'I was afraid.' This may have been historically a derived stem: (UF: gb+a+jib+a). It is now analyzed as being consonant initial and is marked [+ctxt R22] in the lexicon.

in the way one would have expected, the surface form of 'you sang' would have been /*gul ru/. Sing 31, however, failed to condition R22: b-lenition. Since the same words that act exceptionally with regard to R22 act exceptionally with regard to MR2: deletion 1 and k-substitution, the same diacritic [+M] can be used to mark the exceptions in both cases. R22 is then reformulated as follows.

R22: b-lenition

$$b \longrightarrow w / \begin{array}{c} C \\ [+obs] \end{array} \text{ — } \begin{bmatrix} -cons \\ -M \end{bmatrix}$$

The final rule of this set is a syntactico-phonological rule. One way in which the causative is formed is by devoicing the stem initial consonant. I posited an underlying {k+} 'causative' as being the source for this devoicing. This analysis is supported by several facts about the language. First, in all other cases, when transitivity is morphologically increased, it is done by a first order prefix on the verb stem. Secondly, two allomorphs of this prefix are /k/ on / initial stems and /g/ on vowel initial stems. (Remember thirst 18 and eat 26, section 2.1.3 and section 2.2.1.) Progressive devoicing (section 2.2.2.3) is needed apart from consideration of causative. The apparatus for deletion of this prefix is available in every context but one. Note bend 39.

bend 39

lp caus

P	<u>Coona</u>	N	wa ^Y Coona
H	r ^Y Coona	N+P	wak ^Y Coona

C p^Ycooŋa N+U+P wan^Ycooŋa
 U n^Ycooŋa

Underlying {k+} 'causative' will be automatically deleted in every form except for N by R38: velar deletion. Hence, I need a rule to effect the following change:

wa+k^Ycooŋa > wa^Ycooŋa 'I will not bend'

While such a rule is ad hoc, I argue it is the kind of thing one might expect to occur in languages. N is uninflected for aspect. Historically, however, this was probably not the case. One evidence of this is the fact that tone perturbs on N. A historical aspect prefix probably caused this perturbation. Although this prefix has been lost, its affect on adjacent syllables remains. What was once phonologically conditioned tone perturbation has now been reanalyzed as grammatically conditioned perturbation. Similarly, the deletion of /k/ may have once been the automatic result of a principle like R38: velar deletion 1 conditioned by this historical morpheme. The morpheme has been lost, but /k/ continues to be deleted as if it were there. Thus the deletion of /k/, while once phonologically conditioned, has now been reanalyzed as grammatically conditioned. The following rule expresses this reanalysis.

R14: velar deletion 2

k → ∅ / +_____+C in the N stem

The alternative would be a stem formation rule which devoices the stem initial consonant in forming the

causative stem.

2.2.2.2 Principles constraining vowel tongue position

Three rules affect vowel tongue position. The first one states that only front vowels can follow /b/ in native words.

R28: vowel fronting

$$\begin{matrix} V \\ [+rnd \\ +native] \end{matrix} \longrightarrow \begin{matrix} [+frt \\ -rnd] \end{matrix} / b ____$$

R28 is fed by MR3: deletion 2 as the following partial derivations illustrate.

	'I sang'	'you sang'	'I relate'	'you relate'
UF	gb+dul+a	gb+dul/ru	gb+do#du+a	gb+do#nu/ru
MR3	---	gb ul ru	---	gb o nu ru
R28	---	gb il ru	---	gb e nu ru
R38	b dul a	b il ru	b do nu a	b e nu ru

SF	bdula	biil ru	bdo du	bee nur

R28 does not apply to non-native words.

bur	'burro'
boo	'carbon'

I am also aware of a few exceptions to the rule.

rboor	'you remove'
-------	--------------

Remove 54 is marked [-R28] in the lexicon. The alternative would be to call R28 a minor rule; however, since the exceptions to the rule are rare in native words, I mark the exceptions.

The second rule states that nasalization can cause a high front vowel to lower.

MR48: vowel lowering

$$\begin{matrix} V \\ [+frt] \end{matrix} \longrightarrow [-hi] / \begin{matrix} \boxed{+nas} \end{matrix}$$

The following illustrate the operation of this rule.

SF	UF	
<u>nee</u>	k+nii+a	'I will speak'
nii ^r	k+nii/ru	'you will speak'
<u>ne</u>	ni+a	'mine'
nir	ni/ru	'yours'
<u>guzee</u>	gb+a+zii+a	'I thought'
guziir	gb+a+zii/ru	'you thought'

This rule is minor since there are many exceptions.¹

Note the following exceptions.

SF	UF	
<u>i</u>	i+a	'my salary'
<u>di</u>	k+di+a	'I strike'
<u>sii</u>	k+sii+a	'I extract'
<u>jii</u>	jii	'mountain pass'

An alternative analysis would be to claim that vowel lowering is a result of contraction with [+a] 'lp sub.' I consider this alternation to be a reflex of nasalization primarily because it is a natural process and because it

¹In the idelect of a few speakers this is a major rule operating without exception. With these speakers nasalization lowers back vowels as well as front vowels yu' > yo' 'my house', etc.

always applies in the presence of syllable initial nasal consonants. The third and fourth rules state that /w/ coalesces with a following vowel when preceded by a consonant.

MR23: vowel raising and rounding

$$\begin{matrix} V \\ [-\text{rnd}] \end{matrix} \longrightarrow u / Cw \underline{\quad}$$

R25: w-deletion

$$w \longrightarrow \emptyset / C \underline{\quad} \begin{matrix} V \\ [+ \text{rnd}] \end{matrix}$$

MR23 is a minor rule. Note, for example, its failure to apply in /g^wa/ 'I went' and in /g^wen^ya lag^ya/ 'I believed.' MR23 is ordered before R25 having an antibleeding relationship with it. They are fed by R22: b-lenition as the following partial derivations show.

	'you ground'	'you cleared'	'I fell asleep'
UF	gb+do ^r ru	gb+du'n ^r ru	gb+as ^y #pkaal+a
MR1	---	gb da'n ru	---
MR3	gb o ru	gb a'n ru	---
R22	gw o ru	gw a'n ru	gw as ^y pkaal a
MR23	---	gw u'n ru	gw us ^y pkaala
R25	g o ru	gu'n ru	g us ^y pkaala
SF	goor	gu'n ru	gu ^y s pkaala
	'I will return'	'I will cause to return'	'I will be thirsty'
UF	k+bis ^y #kya+a	k+t+bis ^y #kya+a	k+bigy+a
R22	k wi ^y s kya a	k t wi ^y s kya a	k wigy a
MR23	k wus ^y kya a	k t wus ^y kya a	---
R25	k us ^y kya a	k t us ^y kya a	---

...

Return 19 illustrates the operation of the rules on /b/ initial stems. Thirst 18 shows that there are exceptions to the rules. Although application of MR23 is widespread, there are many exceptions. Therefore it is minor.

The next set of rules I will discuss are the rules governing voicedness. Bend 39 illustrates some of the alternations that must be accounted for.

	<u>bend</u> 39	
	SF	UF
	lp	
P	Y _o ŋa	k+Y _o ŋ+a
H	rY _o ŋa	r+Y _o ŋ+a
C	bY _o ŋa	gb+Y _o ŋ+a
U	nY _o ŋa	ngy+Y _o ŋ+a
N	waY _o ŋa	wa+Y _o ŋ+a
N+P	wakY _o ŋa	wa+k+Y _o ŋ+a
N+U+P	wanY _o ŋa	wa+ngy+k+Y _o ŋ+a

	lp caus	
P	$\check{y}oon\bar{a}$	$k+k+\check{y}on+a$
H	$r\check{y}oon\bar{a}$	$r+k+\check{y}on+a$
C	$p\check{y}oon\bar{a}$	$gb+k+\check{y}on+a$
U	$n\check{y}oon\bar{a}$	$ngy+k+\check{y}on+a$
N	$wa\check{y}oon\bar{a}$	$wa+k+\check{y}on+a$
N+P	$wak\check{y}oon\bar{a}$	$wa+k+k+\check{y}on+a$
N+U+P	$wan\check{y}oon\bar{a}$	$wa+ngy+k+k+\check{y}on+a$

I posit an underlying $\{k+\}$ for the potential morpheme because of devoicing of the stem-initial consonant in the negative forms in which the potential occurs. Similarly, as discussed earlier, I posit an underlying $\{k+\}$ as the source for devoicing the stem-initial consonant in the causative. This stop is deleted in every environment in bend 39. I showed, however, that it is not deleted where the verb stem is vowel initial or $/b/$ initial. The principle operating in bend 39 is one of progressive devoicing.

In bend 39 the initial consonant of the verb stem in the causative is devoiced in every environment. This is not true of the noncausative forms. The analysis claims that the difference between the initial consonant of $/\check{y}on\bar{a}/$ and that of $/\check{y}oon\bar{a}/$, for example, is caused by the difference between an underlying $\{k+\}$ 'potential aspect' in the first case and $\{k+k+\}$ 'potential+caus' in the second. $\{k+k+\}$ triggers devoicing word initial whereas $\{k+\}$ does not. This difference will be brought out by

the following rule.

R30: velar-voicing 1

$k \longrightarrow g / \# \text{---} \begin{bmatrix} +\text{obs} \\ +\text{vd} \end{bmatrix}$

then progressive devoicing may be stated as follows.

R33: progressive devoicing

$[+\text{obs}] \longrightarrow [-\text{vd}] / \begin{bmatrix} +\text{obs} \\ -\text{vd} \end{bmatrix} \text{---}$

Condition: operates across word boundaries

R30 bleeds R33 in the case of /Yona/ but not /Yoona/ as the following partial derivations illustrate.

	'I will be bent'	'I will bend'
UF	k+Yon+a	k+k+Yon+a
R30	g Yon a	---
R33	---	k k Yon a
R30	Yon a	Yon a
SF	Yona	Yoon

R22: b-lenition applies before R33 bleeding it.

SP	UF	
k ^w iig ^y a	r+k+bigy+a	H+caus+ <u>thirst</u> 18+lp

R33 operates across word boundaries.

gazeed yu	'He will be bored.'
mbek ^y sed	'bored person'

The following derivations show that R33 needs to apply before R38: velar deletion.

	'I will see'	'I did not see'	'I do not see'
UF	k+zak+a	wa+n+k+zak+a	wa+k+zak+a
R30	g zaka	---	---

R33	---	wa n k saka	wa k sak a
R38	zaka	wansaka	---

In verbs with /d/ initial stems, progressive devoicing is optional. Note kill 32.

	SF	UF
P	duta	k+dut+a
H	rduta	r+dut+a
C	bduta	gb+dut+a
U	nduta	ngy+dut+a
N	waduta	wa+dut+a
N+P	wagduta/waktuta	wa+k+dut+a
N+U+P	wanduta/wantuta	wa+ngy+k+dut+a

The following optional rule accounts for this optionality.

R32: velar voicing 2¹

$k \longrightarrow \epsilon / \left\{ \begin{matrix} V \\ C \end{matrix} \right\} \text{---} d$

Conditions: (1) clitic-bounded

(2) optional

R32 is ordered before R33 bleeding it should the option be chosen.

UF	wa+k+dut+a	wa+k+dut+a	'I do not kill'
R32	wagduta	---	
R33	---	waktuta	

R32 is clitic bound since /d/ is always devoiced in forms involving the motion auxiliary.

¹What I am here calling optional may in all actuality be a case of phonetic neutralization. The optionality, then would be a reflex of the speaker's uncertainty in having to phonemicise segments that are not clearly voiced nor clearly voiceless.

SF

UF

ʔa tuta

k+ya/k+dut+a 'I will go to kill'

The next rule voices /k/ when prefixed to a vowel.

R35: velar voicing 3

$$k \longrightarrow g / \frac{\quad}{\text{prefix}} + V$$

The operation of this rule is seen in the potential aspect [k+] on [-cons] initial stems as fall asleep 2 and go 1 9 illustrate.

fall asleep 2go 1 9P gas^V pkaalag^VaN+P wagas^V pkaalawag^VaaN+U+P wangas^V pkaalawang^Vaa

R35 differs from R30: velar voicing 1 only in that R35 requires [k+] to be voiced everywhere it occurs in the verb paradigm, whereas R30 voices it word initial only. The application of the rule can be seen in derived verbs.

SF

UF

gazeda

k+a+zeed+a 'I will be bored'

The application of this rule is also seen in vowel-initial causative constructions.

SF

UF

rgoowa

r+k+dow+a 'I feed'

MR6: deletion 3 deleted the initial stem consonant in forming the causative stem feeding R35. R35 is fed by

MR2: deletion 1 and k-substitution as sing 31 illustrates.

'you will sing'

UF k+dul/ru

MR2 k ul ru

R35 gul ru

There are a few cases, however, of words which undergo MR2 but not R35. Note catch 30.

SF

UF

kub ru

k+dub/ru

'you will catch'

Words which are exceptional are marked [-ctxt R35] in the lexicon.

The stem initial consonant is often voiced in the passive.

	'I...'	'It has been...'
slice	suga	duzug n ^y i
cultivate	kuug ^y a	duguug ^y n ^y i
disassemble	til ^y a	dudil ^y n ^y i
shake	k ^w in ^y a	duk ^w in ^y n ^y i
pick	k ^y uga	duk ^y ug n ^y i
extract	sii	du ^y sii ma

The first three examples illustrate the operation of the rule. In the next two, the rule does not apply because it views palatalization and labialization as clusters. Thus, the rule is ordered before R27 which switches interpretation. In the final form, the rule does not appear to have applied because the voiced counterpart of /s/ is rare, occurring syllable final only. I consider the rule to have applied but the voicing to have been readjusted by a later rule that states the surface condition /z/ never occurs syllable initial. R20 expresses

this voicing.

R20: passive voicing

$C \longrightarrow [+vd] / \{du+\} ______ V$

For verbs with a voiceless stem initial consonant, completive aspect [gb+] is devoiced.

SF	UF	
pta'	gb+ta'+a	<u>dig</u> 20
pka	gb+ka+a	<u>love</u> 35
p ^V ci ^V a	gb+ ^V ci ^V +a	<u>nurse</u> 38
psuga	gb+sug+a	<u>slice</u> 41
p ^V sii	gb+ ^V sii+a	<u>extract</u> 46

R37 accounts for this devoicing.

R37: regressive devoicing

$[+obs] \longrightarrow [-vd] / ______ \begin{bmatrix} +obs \\ -vd \end{bmatrix}$

The final rule of this set accounts for the voicing of /k/ between {n, r} and V. This rule applies only to /k/'s derived by MR2: deletion 1 and k-substitution. Hence, it is a global rule.

R36: global voicing

$k \longrightarrow \{+vd\} / \begin{Bmatrix} n \\ r \end{Bmatrix} ______ V // \begin{Bmatrix} d \\ l \\ r \end{Bmatrix}$

/k/ is voiced between {n, r} and V when it is an underlying {d, l, r}. The following illustrate the operation of this rule.

	1p H	2p H	2p U
fill	rdu'	rgu'r	ngu'r
set	dri ^V a	rg ^V i ^V s ru	n ^V g ^V i ^V s ru
distribute	rleza	rg ^V eez ru	n ^V g ^V eez ru

2.2.2.4 Principles constraining geminates

Two rules present the different ways in which TZ prevents identical consonants from occurring in sequence. In the first rule, /r/ becomes /d/ when preceding another /r/.

R29: r-obstruentization

r ----- d / _____ r

Note the way in which the habitual aspect {r+} combines with /r/ initial verb stems.

SF	UF	
dru'n ^y a	r+ru'nya+a	<u>arrive II</u> 62
dri	r+ri+a	<u>arrive I</u> 55
drika	r+rik+a	<u>give</u> 58
dri ^v a	r+ri ^v s+a	<u>set</u> 59
druza	r+ruz+a	<u>beat</u> 61
dre ^v a	r+re ^v j+a	<u>call</u> 60

The second rule reduces identical consonants whenever they occur together in sequence in the underlying form.

R31: geminate reduction

$$\begin{array}{c} \text{C} \\ \boxed{\begin{array}{l} +\text{obs} \\ \alpha\text{pt} \end{array}} \end{array} \quad \text{-----} \quad \emptyset / \quad \text{-----} \quad \begin{array}{c} \text{C} \\ \boxed{\begin{array}{l} +\text{obs} \\ \alpha\text{pt} \end{array}} \end{array}$$

Note the operation of this rule in the following forms.

SF	UF	
ka	k+ka+a	'I will love'
bi ^y a	gb+bigy+a	'I thirsted'
ʒoonə	k+k+ʒon+a	'I will bend'
waguu	wa+k+guu+a	'I do not lie'

The initial consonant /g/ of a verb stem never devoices. This is accomplished by ordering R31 before R33: progressive devoicing as the following partial derivation shows.

UF wa+k+guu+a 'I do not lie'

R31 wa guu a

R33 1970 100 100 100

SF waguu

Nasal geminates are allowed as speak 47 illustrates.

SF

UF

wannee

wa+ngy+k+ni+a

2.2.2.5 Principles constraining vowel cluster

TZ does not permit vowel cluster. One way of achieving this goal is by breaking up the clusters with an epenthesized /y/.

R39: y-epenthesis

$$\emptyset \longrightarrow y / v \xrightarrow{v} [+f r t]$$

The operation of this rule is seen on verbs where MR2: deletion 1 and k-substitution deletes the stem initial consonant. Note the following.

	lp	2p	
P	<u>di</u>	k ^y ir	<u>strike</u> 22
N	wadi	wayir	
P	<u>leza</u>	k ^y ez ru	<u>distribute</u> 52
N	waleza	wayez ru	
P	<u>du</u> '	ku'r	<u>fill</u> 33
N	wadu'	wu'r	

From the first two examples it is not clear whether /y/ is a reflex of R39 or of some stem formation rule. I have argued, however, that the same thing is happening in fill 33 as is happening in strike 22 and distribute 52. The stem initial consonant has been deleted in each case in forming the second person stem by MR2. (Palatalization in the first two examples is a result of P5.) /y/ is then inserted by R39.

/y/ epenthesis never occurs before [-frt] vowels.
Rather, the first vowel of the cluster is deleted.

R44: vowel deletion 1

$$V \longrightarrow \emptyset / \underline{\quad} V$$

A vowel is never deleted before a front vowel because R39 bleeds R44. The operation of R44 is seen on vowel initial stems.

	SF	UF	
P	gas ^V pkaala	k+as ^V #pkaal+ <u>a</u>	<u>fall asleep</u> 2
N	was ^V pkaala	wa+as ^V #pkaal+ <u>a</u>	

The operation of R⁴⁴ is also seen on stems with the derivational morpheme {+a}.

	SF	UF	
P	gazed <u>a</u>	k+a+zeed+ <u>a</u>	<u>be</u> <u>bored</u> 55
N	wazeeda	wa+a+zeed+a	

R44 is also fed by MR2: deletion 1 and k-substitution as the following illustrate.

	lp	2p	
P	dasa	gas ru	<u>sleep</u> 27

N	wada <u>s</u> a	was ru	
P	dula	gul ru	<u>sing</u> 31
N	wadula	wul ru	

For sleep 27 and sing 31, the stem initial consonant is deleted in forming the second person stem. The /a/ of {wa+} 'negative' is then deleted as it precedes a vowel.

2.2.2.6 Principles governing contraction

There is a tendency in TZ to shorten words by dropping a final unstressed vowel. Consequently, one recent change that has come into the language is the loss of a final unstressed vowel on certain nouns. /nis/ 'water', for example, is pronounced /nisa/ by some old speakers when spoken in isolation. Most people now, however, do not consider /nisa/ to be "good" Zapotec. This tendency affects verb morphology in the pronominal endings. Pronouns contract on both verb and noun stems ending in a [+syl] segment. The following rules account for contraction.

R42: regressive nasalization

$$[-\text{cons}] \longrightarrow [+nas] / \text{---} \begin{bmatrix} -\text{cons} \\ +nas \end{bmatrix}_{RL}$$

MR43: contraction

$$V \longrightarrow \emptyset / V+C_0 \begin{bmatrix} -\text{stress} \end{bmatrix}_{LR}$$

Condition: word bounded

Before contraction can take place with the first

person pronoun, nasalization regresses from right to left, on all [-cons] segments as the following illustrate.

SF	UF	
<u>di</u>	k+di+a	'I will strike'
<u>diwa</u>	k+diw+a	'I will whistle'

R40 and MR41, therefore, have an antibleeding relationship.

Whistle 23 and smoke 44 both show that [-cons, -syl] segments do not condition contraction.

SF	UF	
k ^y iw yu	k+diw ^y yu	'he will whistle'
zaay yu	k+zaay ^y yu	'he will smoke'

Lie 37 and dig 20 show that contraction occurs on syllables with a glottalized or laryngealized nucleus.

SF	UF	
guuy	k+guu ^y yu	'he will lie'
ta'y	k+ta' ^y yu	'he will dig'

Hence, contraction does not view glottal as a [-syl] segment. This supports its treatment as a vowel feature.

Strike 22 illustrates an iterative application of the rule.

SF	UF	
<u>dim</u>	k+di+a ^y mi	'I will strike her'
dim	k+di ^y mi	'she will strike'

The following illustrates that iteration is from left to right.

SF	UF
RL *k ^y i yun ^y	k+di ^y yu ^y nyi

LR k^yiy n^yi k+di#yu#nyi

In a previous section (section 2.8.1) I showed that first person and second person object pronouns do not contract. First person subject pronoun [+a] differs from first person object pronoun [#ya] in that the second is a free form. Although the phonological shape of the second person subject pronoun [≠ru] and the second person object pronoun [#ru] are identical, I suggest that the reason the first contracts is because it is a clitic and the reason the second does not is because it is a free form. All other object pronouns are clitics. The rule, then is word bounded.

Arrive 55 shows that the rule applies when the vowel to be deleted is followed by ≠ or # but not by +.

SP	UF	
rim re	k+ri#mi#re	'She will arrive there'
ri mire	k+ri#mi+re	'That one will arrive'

One other pronoun [≠ma] '3p animal' does not contract, but probably for different reasons. Failure to contract may be a desire to preserve contrast since should contraction take place, contrast would be lost between [≠ma] '3p animal' and [≠mi] '3p fem resp'. There are two conflicting goals then: desire to contract and desire to preserve contrast. Bound adverbs (section 2.1.10) also never contract. MR43: contraction, is therefore a minor rule.

2.2.2.7 Nasal assimilation

/n/ assimilates to the point of articulation of a following consonant within the same syllable.

P5: nasal assimilation

$$n \longrightarrow [\alpha pt] / \# \text{---} \overset{C}{\underset{\begin{bmatrix} -nas \\ \alpha pt \end{bmatrix}}{\text{---}}}$$

Note the way in which the unreal aspect {ngy+} combines with verb initial consonants.

	SF	UF	
U	mbig ^y a	ngy+bigy+a	<u>thirst</u> 18
U	nguu	ngy+guu+a	<u>lie</u> 37
N+U+P	wanguu	wa+ngy+k+guu+a	
U	n ^y n ^y a	ngy+nyata	<u>guard</u> 49
N+U+P	wann ^y a	wa+ngy+k+nyata	
U	nduta	ngy+dut+a	<u>kill</u> 32

Assimilation never occurs in N+U+P because the rule views /n/ as part of the first syllable.

2.2.2.8 The allomorphy of go II

One infrequent set of aspect allomorphs is illustrated by go II 10.

go II 10 1p

P	ča	U	n ^y g ^y aa
cont	za	N	waya
H	rza	N+P	wakč ^y a
C	g ^w a	N+U+P	wanč ^y a

All verbs of this type have /y/ initial verb stems. MR26 produces this allomorphy.

MR26: sibilant formation

$$y \longrightarrow \left[\begin{smallmatrix} \text{y} \\ \text{c} \\ \text{z} \end{smallmatrix} \right] / \left[\begin{smallmatrix} \text{k} \\ \text{[\# , r]} \end{smallmatrix} \right] ______$$

The alternative to MR26 would be to call the allomorphy suppletive. However, there is a phonological generalization to be made: that this rule occurs only on verbs with /y/ initial stems. Furthermore, go II 10 overtly distinguishes habitual from continuative. Other verbs which make this distinction mark continuative with { \emptyset } and habitual with {r+}.

know lp

P $g^y u' lo$

U $n^y g^y u' lo$

cent $yu' lo$

N $wayu' lo$

H $ryu' lo$

N+P $wag^y u' lo$

C $byu' lo$

N+U+P $wang^y u' lo$

Then, were this a case of suppletion, \emptyset would alternate with /z/ for 'continuative' and /rz/ would alternate with /r/ for 'habitual.' Because these morpheme breaks for go II are clearly suspicious, I reject this solution. Anchor 8 and ascend 15 also require MR26.

2.2.2.9 Miscellaneous

In a previous section (section 2.1.4), I presented a suppletive set of causative prefixes: {k+, t+, $\overset{y}{c}$ +, s+, z+, $\overset{y}{s}$ +, l+}. The last five of this set occur on y-initial stems only, the /y/ being deleted by the following two rules.

R53: y-deletion 2

y \longrightarrow \emptyset / [+sib] _____

R54: y-deletion 3

y \longrightarrow \emptyset / {l+} _____

The following illustrate these rules.

SF	UF	
rsocw n ^y i	r+s+yoow+nyi	<u>close</u> 14
r ^y ca ^y c n ^y i	r+ ^y c+ ^y ya ^y c+nyi	<u>scatter</u> 11
rzaan ^y	r+z+yaa+nyi	<u>make</u> 13
r ^y set n ^y i	r+ ^y s+ ^y et+nyi	<u>descend</u> 6
rlet n ^y i	r+l+ ^y et+nyi	<u>descend</u> 6

R53 states that /y/ cannot occur after sibilants. I know of one exception to this: /rsyaan^y/ 'she studies.' Study is marked [-R53] in the lexicon. There are many occurrences of /l^y/, however. Thus, /y/ is deleted only after the causative prefix {l+}.

If the second member of a cluster is [+nasal], the first one must be [+nasal] or /s/. The affect of this principle is seen in nasal-initial verb stems in the completive aspect.

R50: b-nasalization

b \longrightarrow [+nas] / _____ C
[+nas]

SF	UF	
mniir	gb+nii r ru	'You spoke'
mn ^y ar	gb+nya r ru	'You guarded'

If the first member of a cluster is [-cons, -syl], the second member must not be. The operation of this

principle is seen in some /y/ initial stems in the completive aspect.

R51: y-deletion 1

$y \longrightarrow \emptyset / \begin{bmatrix} -\text{cons} \\ -\text{syl} \end{bmatrix} ______$

SF

UF

g^wa

gb+ya+a

'I went'

n^yg^yuba

ngy+yub+a

'I should have
ridden'

There remains a set of ad hoc minor rules which account for alternations for which I see no phonological explanation. The first one accounts for deletion of the velar of [gb+] 'completive' before /w/ in words like anchor 8.

SF

UF

weeza

gb+yeez+a

'I was stuck'

/b/ became /w/ by R22: b-lenition and then the /g/ was deleted. The following accounts for this deletion.

MR24: velar deletion 3

$g \longrightarrow \emptyset / ______ w$

Sometimes on /y/ initial stems, the /r/ in the habitual is deleted. Remember that 'continuative' and 'habitual' were merged at some point in history. The rule deleting velars syllable initial may have influenced this merger by causing a loss in contrast between 'potential' and 'continuative' word initial. /y/ initial stems, however, do not condition deletion. The language, wanting to regularize the morphology, combined 'habitual'

and 'continuative' in most verbs of this type. However, unlike verbs with consonant initial stems, verbs with /y/ initial stems were free to draw from the marking of either the continuative {Ø} or of the habitual {r+}. Such may have been the origin of MR52.

MR52: r-deletion

$$r \xrightarrow{\text{Extremalprinzip}} \emptyset / \dots y$$

Note the following from descend 6.

SF

UF

g^yeta

k+ye t+a

'I will descend'

ye ta

r+ye t+a

'I am descending/
I descend'

/y/ often deletes after /r/.

MR55: y-deletion 4

$$y \longrightarrow \phi / r$$

hunger 12

scatter 11

P g^yana

$g^y a^v n^y i$

H rana

ryac n^yi

C byana

byač^v n^yi

/y/ sometimes deletes after /b/ and before a front vowel.

MR56: y-deletion 5

$$y \longrightarrow \emptyset / b \quad \begin{array}{c} V \\ +fnt \end{array}$$
g^y e t_a

'I will descend'

beta

'I descended'

g'yen'ya

'I will remain'

byeen^ya.

'I remained'

The derivational morpheme {a+} is sometimes deleted after /r/.

MR34: a-deletion

$a \longrightarrow \emptyset / r + \frac{\quad}{\text{prefix}} +$

be cold 64

be angry 65

P gazi^ya

gazi lag^ya

H razi^ya

rzi lag^ya

In a few cases, the first consonant /z/ of the verb stem is deleted in the completive.

MR21: z-deletion

$z \longrightarrow \emptyset / b \underline{\quad}$

In buy 42 this deletion feeds R22: b-lenition.

zi

'I will buy'

wi

'I bought'

2.2.2.10 Switch in interpretation

Palatalized and labialized velar obstruent stops are interpreted as sequences in UF. One reason for this is that there are often morpheme breaks between the two segments in the UF. Note, for example, the following.

SF

UF

k^wig^ya

k+bigy+a

'I will thirst'

g^ya

k+ya+a

'I will go'

Another reason is that early rules refer to them as sequences. (See Appendix IV for a summary of the relationships between R27 which changes interpretation and the other rules.)

However, some late rules refer to these segments as units. Furthermore, surface evidence supports a unit interpretation. Given the unit interpretation no consonant clusters occur morpheme final, and no more than two consonants occur morpheme initial. Therefore, in the UF and early in the phonological component a sequence interpretation is followed. R27 changes this interpretation. From there on, a unit interpretation is followed.

R27: switch in interpretation

$$\begin{array}{ccc}
 \begin{array}{c} \{k \\ g \\ n \\ l\} \\ 1 \end{array} & \begin{array}{c} [-cons \\ -syl \\ +hi \\ \alpha frt \\ \emptyset rnd] \\ 2 \end{array} & \Rightarrow \begin{array}{c} \begin{array}{c} [+hi \\ \alpha frt \\ \emptyset rnd] \\ 1 \end{array} \quad \begin{array}{c} \emptyset \\ 2 \end{array}
 \end{array}$$

Condition: clitic bound

R27 is constrained to operate within clitic or word boundaries. Note the following.

SF	UF	
$k^w ik \text{ } yu$	$[k^w ik^h \text{ } yu]$	$k + bik / yu$
		'He will
<u>not</u> $*k^w ik^y u$	$*[k^w i^y k^y h u]$	

2.3 Suprasegmental Phonology

Speaking of general characteristics of tone languages, William S-Y-Wang (1967) points out some basic differences between the types of tone found in different language areas of the world. Among other things, he notes that for some languages tone functions primarily to make lexical distinctions with the Sino Tibetan family being cited as examples of this type. For other languages tone functions

primarily on the grammatical level. Otomanguean languages are cited as examples of this type. In light of this fact, it is not surprising that two types of tone perturbation need to be distinguished in TZ.¹ The first type I will call phonological perturbation. This type consists of rules and processes operating in a phonological environment. The second type I will call grammatical perturbation. This type consists of phonological rules applying in grammatical environments and will be ordered along with the other syntactico-phonological rules. I will discuss the two types of perturbation in their respective order. I will then move on to a discussion of laryngealization and stress.

2.3.1 Phonological Perturbation

The four phonemic tones of TZ are high, falling, mid and low. These are distinguished by the features [T hi] and [T low]. High tone is [+T hi, -T low], falling tone is [+T hi, +T low], mid tone is [-T hi, -T low] and low tone is [-T hi, +T low]. All four tones contrast on syllables which are [-lar, -check]. Only mid tone and low tone contrast on syllables which are [+lar]. Only high tone and low tone contrast on syllables which are [+check].

tāz	'cup'	gā'l	'shadow'
lēz	'opossum'	g ^y ā'n	'dish'
bēz	'fox'	bi'z	'corner post'

¹For a history of early work on Zapotec tone morphophonemics see Leal (1950).

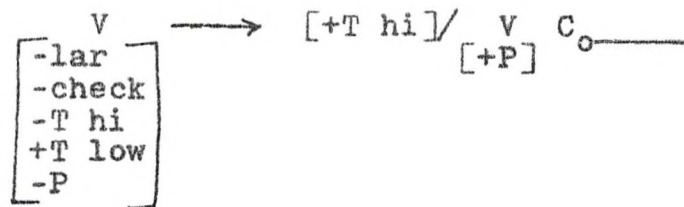
bēz 'bee' briŋz 'squirrel'

All four tones involve phonetic contours which can be described with reference to three heights. High tone rises from mid to high, the extent of the rise being determined by the length of the syllable. Low tone rises slightly from low, but does not reach mid. It has the least contour of any of the tones. Falling tone falls from high to mid. Mid tone falls from mid to low. In spite of the fact that the tones are phonetically characterized by pitch contours, however, phonological rules and processes refer to the tones according to their height.

2.3.1.1 Tone rules

Seven phonological principles account for all phonologically conditioned alternations in TZ. Four of the principles are rules and three are processes. All operate above the natural phonemic level. I will discuss rules first and then processes. The first rule I call progressive perturbation. This rule claims that there is a class of morphemes (marked with morpheme feature [+P]) which, for reasons other than the phonological shape of the morphemes, perturbs the low tone of a following syllable which is [-lar, -check] to a falling tone but itself is never progressively perturbed.

R45: progressive perturbation



Since morphemes of this class are never progressively perturbed, the rule is not directional.. Morphemes which condition perturbation are not limited to any particular grammatical category as the following illustrate.

táp gôp	'four armadillos'
k ^y ũp gôp	'two armadillos'
zũ táp gôp	'be four armadillos'
zũ k ^y ũp gôp	'be two armadillos'
bĩl ^y gôp	'sister armadillo'
bĩk ^y gôp	'brother armadillo'
psũg yũ beəl	'C-slice he meat'
k ^y ũ psũg beəl	'who C-slice meat'
g ^y ĩk ^y rú rêspêt ¹	'P-do you respect'
g ^y ĩk ^y yũ rêspêt	'P-do he respect'

The first two examples show the effect of two quantifiers on a following word with low tone. One is of the class of perturbers and the other is not. The two examples show what happens when two perturbers are in linear sequence with one another. The class of perturbers is characterized by their failure to be progressively

¹Stress is always stem final (section 2.3.5) and falling tone becomes high tone on an unstressed syllable (section 2.3.1.2).

perturbed. The third pair of examples show that some nouns are perturbers and some are not. The fourth pair of examples show that an interrogative pronoun is a perturber. And the final examples show that some subject pronouns are perturbers but not all. A relatively small percentage of the lexicon conditions perturbation. The classification of lexical items by morpheme feature [P], however, crosscuts distinction by grammatical category. No examples of the failure of syllables that are [+lar] or [+check] to undergo the change are given because the second rule shows what happens in these cases.

The second rule may be stated as follows. Low tone of a morpheme with the same morpheme feature [+P] becomes high tone in three environments. The first environment is when followed by a morpheme that is not checked or laryngealized but which has mid tone. The second environment is when followed by a checked syllable nucleus with low tone. The third environment is when followed by a laryngealized syllable nucleus with low tone.¹

¹John Daly has pointed out that there is a symmetry between R45 and R46, both in terms of the feature [+P] and in terms of the way in which laryngealization affect rule, which suggests that historically, they were reflexes of the same principle. This principle looks something like the following.

$$\begin{array}{ccccc}
 \begin{bmatrix} +\text{syl} \\ +\text{T hi} \\ -\text{T low} \end{bmatrix} & \begin{bmatrix} +\text{cons} \end{bmatrix}_0 & \begin{bmatrix} +\text{syl} \\ +\text{T hi} \\ +\text{syl} \\ +\text{T low} \end{bmatrix} & \Rightarrow & \begin{bmatrix} +\text{syl} \\ -\text{T hi} \end{bmatrix} \begin{bmatrix} +\text{cons} \end{bmatrix}_0 \begin{bmatrix} +\text{syl} \\ +\text{T hi} \end{bmatrix} \\
 1 & 2 & 3 & & 1 \quad 2 \quad 3
 \end{array}$$

The rule states that the feature [+T hi] moves over onto a following syllable (the exact conditions under which

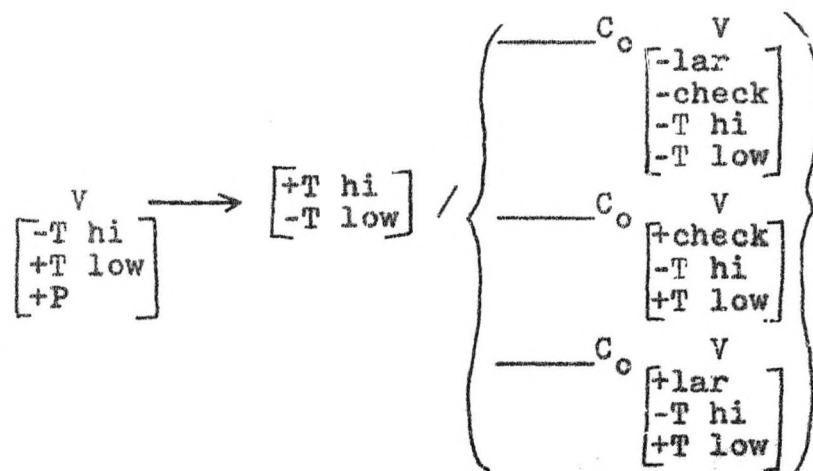
this happens are not clear) leaving [-T hi] in its place. R45: progressive perturbation is an expression of this principle for the situation where the second syllable has low tone, high tone, or falling tone. R46: regressive perturbation 1 is an expression of the principle for the situation where the second syllable is mid tone. Mid tone blocks the application of the rule. Thus, the feature [+T hi] occurs in a place in which it would never otherwise occur: on the syllable on which it occurs in the underlying form. For a similar rule in another Otomanguean language see Daly (1973: 82).

There are several facts about the language which may at least in part be a result of this principle. First, almost all morphemes which are [+P] are underlying low tone. Second, underlying high tone is relatively rare on native morphemes, but almost all single syllable Spanish loans are [+T hi]. Third, for two syllable morphemes, low tone always occurs on the first syllable. Fourth, grammatical perturbation is always from underlying [-T hi] to [+T hi].

The above principle does not work in the synchronic analysis of TZ for several reasons. First, there are a few morphemes which are [+P] with high tone. These morphemes condition progressive perturbation without losing the [+T hi] feature so that the above principle does not work. Second, I am unable to explain derived [+T hi] of the verb as coming from the above principle or as affecting adjacent morphemes in a way in which the principle would suggest. For some verbs an underlying mid tone is perturbed to high tone and for others to falling tone. In the next section, (section 2.3.2) I present the rules of grammatical perturbation. Third, single syllable Spanish loans are always [+T hi] on the surface. I take them to be [+T hi] in the UP. Yet they are all [-P]. I suspect that the fact that they are [+T hi] is a result of high pitch on the stressed syllable in Spanish. The fact that they are [-P] I take as an indication that the above principle was no longer productive in its historical form at the time when the loans came into the language. If it had been, this [+T hi] should move over onto an appropriate following syllable. Fourth, there are morphemes with high tone that are [-P]. As I have already stated, these morphemes are rare in native words.

The difference between the above rule and the analysis presented in this section is that in the case of the latter, I do not ascribe underlying [+T hi] to the perturber and claim that this is the source of progressive perturbation. Rather, I claim that the classification of lexical items by [P] is purely ad hoc.

R46: regressive perturbation 1



The following illustrate the operation of this principle.

tàp bīl ^y	'four snakes'
k ^y úp bīl ^y	'two snakes'
psúy gǐ nǔ nís	[+P] 'C-quench-he fire with water'
psúy gǐ nǔ yuñ	[+P] 'C-quench-he fire with cargo'
kí cē ^v yǎ	[+P] 'P-strike dog me'
kí bīl ^y yǎ	[+P] 'P-strike snake me'
kír briñz	[+P] 'P-strike-you squirrel'
kír bē ⁿ	[+P] 'P-strike-you alligator'

The first three pairs of examples illustrate the operation of the rule on words from different grammatical categories.

The final two examples show the operation of the rule conditioned by [+lar] or [+check] syllable nucleus. They also illustrate the situation where the rules are fed by

R43: contraction as the following partial derivation shows.

UF k+dl#r0#briiz^l P-strike#you squirrel
 [+P]

¹This UF will be modified slightly in the next section.

...

R43 kɪ̃ r briɪz

R46 kɪ̃ r briɪz

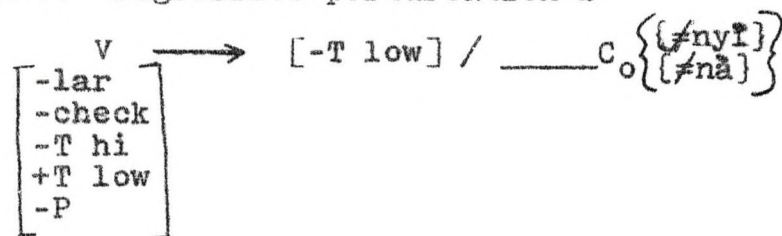
SF kɪr briɪz

had contraction not taken place, the structural description of the rule would not have been met since {ɹɪ̃} '2p sub' does not condition the change.

The final two rules deal with only three morphemes-- {yũ} '3p mas', {ɲyɪ̃} '3p fem', and {ɲã} '1p pl inc'-- and their affect on adjacent morphemes. However, because of the high frequency of occurrence of these morphemes in language materials and because application of the rules is widespread, it would be hard to miss the irregularity produced by the rules in even a casual examination of the data. These pronouns differ from the other five pronouns in several ways. Of the seven pronouns, only these three are not [+P]. Also only these three are low tone in the bound form. Furthermore, {ɲyɪ̃} and {ɲã} stand out in that they condition certain alternations involving laryngealization and tone.

The first of these rules is a type of regressive perturbation conditioned by two morphemes only. Low tone of a morpheme whose nucleus is [-lar, -check, -P] becomes mid tone when followed by {ɲyɪ̃} '3p fem' or {ɲã} '1p pl inc.'

R40: regressive perturbation 2



The following data illustrate the operation of this rule.

$g^y \text{Id}\bar{a}g \text{y}\bar{u}$	'ear his'
$g^y \text{Id}\bar{a}g \text{n}^y \text{i}$	'ear hers'
$g^y \text{Id}\bar{a}g \text{n}\bar{a}$	'ear ours'
$b\bar{i}g^y \text{y}\bar{u}$	'C-thirst he'
$b\bar{i}g^y \text{n}^y \text{i}$	'C-thirst she'
$b\bar{i}g^y \text{n}\bar{a}$	'C-thirst we'
$bl\bar{e}z \text{y}\bar{u}$	'C-wait he'
$bl\bar{e}z \text{n}^y \text{i}^1$	[+P] 'C-wait she'
$bl\bar{e}z \text{n}\bar{a}\bar{a}$	[+P] 'C-wait we'
$s\bar{e}y$	[+P] 'uncle his'
$s\bar{e}n^y$	'uncle hers'
$s\bar{e}n$	'uncle ours'

The first six examples show the operation of the rule on a noun and then a verb. The next three show that the rule does not affect morphemes that are [+P]. Rather, these morphemes perturb the tones of the pronouns by R45: progressive perturbation. The tones are then adjusted according to the influence of stress and of laryngealization (discussed in section 2.3.1.2 below). The last three examples show that the rule is not blocked by MR43:

¹The laryngealization of $\{\neq \text{ny}^i\}$ and $\{\neq \text{n}\bar{a}\}$ will be discussed in section 2.3.3.

contraction. It is ordered to precede MR43, however, this is merely a consequence of the form of the rule.

The final rule states that the low tone of an open syllable in a morpheme which is [+P] becomes high tone when followed by {/nyĩ} '3p fem', {/yũ} '3p mas', or by {/nã} '1p pl inc'.

R41: regressive perturbation 3

$$\begin{bmatrix} V \\ -T \text{ hi} \\ +T \text{ low} \\ +P \end{bmatrix} \longrightarrow \begin{bmatrix} V \\ +T \text{ hi} \\ -T \text{ low} \end{bmatrix} / \text{---} \left\{ \begin{array}{l} \{ /nyĩ \} \\ \{ /yũ \} \\ \{ /nã \} \end{array} \right\}$$

Note that these morphemes always undergo R43: contraction since the syllable is open. The following data illustrate the operation of this rule.

kĩm	'P-hit-her (resp)'
	[+P]
kĩy	'P-hit-he'
	[+P]
kĩn ^y	'P-hit-she'
	[+P]
kĩn	'P-hit-we'
	[+P]
gũtãm	'C-be blessed-her (resp)'
	[+P]
gũtã ^y	'C-be blessed-he'
	[+P]
gũtãn ^y	'C-be blessed-her'
	[+P]
gũtãn	'C-be blessed-we'
	[+P]

The first example in each set of four shows the unperturbed tone of the stem. In the following examples of each set, tone has been perturbed by R41.

2.3.1.2 Tone processes

Of the three tone processes operating below the natural phonemic level, a good part of the evidence for

the first two has already been presented in the preceding section (section 2.3.1.1). I first present these two processes followed by a discussion of the evidence for them. I then discuss the third process.

The first process states that laryngealization lowers tone. High tone and falling tone become mid tone, and mid tone becomes low tone on a laryngealized syllable.

P2: tone lowering on laryngealized vowels

$$[\alpha T \text{ hi}] \longrightarrow \begin{bmatrix} -T \text{ hi} \\ -\alpha T \text{ low} \end{bmatrix} / \begin{array}{c} V \\ [+lar] \end{array}$$

Application of this rule is without exception, thus requiring an abstract underlying form to be posited on many syllables. When surface tone is mid tone, the rule requires that underlying tone be high tone on laryngealized syllables. When surface tone is low tone, I posit an underlying mid tone on laryngealized syllables. P2 then produces correct surface tone.

The second process is also tone lowering. Mid tone becomes low tone in a checked syllable.

P3: tone lowering on checked vowels

$$[-T \text{ hi}] \longrightarrow [+T \text{ low}] / \begin{array}{c} V \\ [+check] \end{array}$$

Again, whenever surface tone is low on a checked syllable, I posit an underlying mid tone. Since P3 is not restricted in its application, correct surface tone will automatically result.

Evidence for P2 and P3 and the accompanying analysis for underlying tone occur in six parts of the paper. First

in the beginning of section 2.3.1, I stated that there was no contrast between high tone or falling tone and mid tone on laryngealized syllables. I also stated that there was no contrast between mid tone and low tone on checked syllables. P2 and P3 provide a functional explanation for these facts. The reason the language does not allow such contrasts is because any such underlying tone would be automatically lowered.

Second, evidence is provided by R45: progressive perturbation. I suggest that the reason [+lar] or [+check] syllables never undergo perturbation is because they never have an underlying low tone. Thus, given P2 and P3 and the accompanying analysis for underlying tone, R45 can be stated with greater generality.

R45: progressive perturbation

$$\begin{array}{c} V \\ \left[\begin{array}{cc} -T & hi \\ +T & low \\ -P & \end{array} \right] \end{array} \longrightarrow \begin{array}{c} [+T \ hi] / \\ [+P] \end{array} \begin{array}{c} V \\ C_o \end{array} \text{---}$$

The segment undergoing the change need not be specified [-lar, -check] since such segments will never have underlying low tone.

Third, evidence is provided by R46: regressive perturbation 1. Recall that syllables that are [-lar, -check, -T hi, -T low] or that are [+lar, -T hi, +T low] or that are [+check, -T hi, +T low] condition regressive perturbation. I suggest that the reason laryngealized or checked syllables with a low tone condition regressive perturbation is that they are underlying mid tone, correct

surface tone being a result of the tone lowering processes. Thus, given the tone lowering processes and the accompanying analysis for underlying tone, R46 can be stated with greater generality.

R46: regressive perturbation 1

$$\begin{bmatrix} V \\ -T \text{ hi} \\ +T \text{ low} \\ +P \end{bmatrix} \longrightarrow \begin{bmatrix} +T \text{ hi} \\ -T \text{ low} \end{bmatrix} / \text{---} C_o \begin{bmatrix} V \\ -T \text{ hi} \\ -T \text{ low} \end{bmatrix}$$

The conditioning syllable nucleus can be checked, laryngealized or neither.

Fourth, evidence is provided by R40: regressive perturbation 2. Recall that syllables with a nucleus that is [+check] or [+lar] do not undergo the rule when they would otherwise meet the structural description. Again, I suggest that the reason they do not undergo the operation of the rule is because they are never underlying low tone. Thus, the rule can be stated with greater generality.

R40: regressive perturbation 2

$$\begin{bmatrix} V \\ -T \text{ hi} \\ +T \text{ low} \\ -P \end{bmatrix} \longrightarrow [-T \text{ low}] / \text{---} C_o \left\{ \begin{array}{l} \{ \neq \text{nyl} \} \\ \{ \neq \text{nā} \} \end{array} \right\}$$

Rules 40, 45, 46 therefore, require the abstract underlying tone in order to operate correctly. Thus, they are ordered before P2 and P3 having an antibleeding relationship with them.

Fifth, the rules of grammatical perturbation provide evidence for the tone lowering processes and the accompanying underlying analysis. In the next section, I show that

grammatical perturbation provides the context on which
 P2: tone lowering on laryngealized vowels operates.

Sixth, rules involving alternations in laryngealization provide evidence. In section 2.3.4, I show that these rules in conjunction with the rules of grammatical perturbation provide the context in which the tone lowering processes operate.

In summary, therefore, the two tone lowering processes and the accompanying analysis for underlying tone are defended on the basis of three types of evidence. The first type is surface contrast. The second type is the requirements of three rules. And, the third type is the operation of the processes under situations created by the rules of grammatical perturbation and laryngealization.

The final process I present accounts for the neutralization of high tone and falling tone in unstressed syllables.

P4: tone adjustment on unstressed vowels

$$[+T \text{ hi}] \longrightarrow [-T \text{ low}] / \frac{V}{[-\text{stress}]}$$

The operation of this rule is seen on morphemes that have undergone P45: progressive perturbation. The following partial derivation illustrates the operation of this rule.

UF	k+yíky/rú#rèspét	P-do-you respect
		[+P]

R13 k yíky rú rèspét

...

R45 g^yík^y rú rèspét

P4 g^yík^y rú rèspét

R13: stress placement will be discussed in section 2.3.5.

R45: progressive perturbation causes low tone of the syllable following a morpheme which is [+P] to become falling tone. P4 then causes this falling tone to become high tone.

2.3.2 Grammatical Perturbation

Grammatical perturbation occurs only on adjectives and verbs. The principle operating among adjectives is a simple one. Whatever the underlying tone of an adjective is, the tone of an adjective in the noun phrase is high tone.

R7: adjectival tone

$$V \longrightarrow \begin{bmatrix} +T & \text{hi} \\ -T & \text{low} \end{bmatrix} / \left\{ \begin{matrix} N \\ \text{Adj} \end{matrix} \right\} + \underline{\hspace{1cm}} \Bigg]_{NP}$$

The following examples illustrate the operation of this rule. Underlying tone is that in the stative construction.

	lame	skinny	hot	strong
he is ...	tīs yũ	rīt yũ	zīg yũ	fērt yũ
...person	mbék ^y tīs	mbék ^y rīt	mbék ^y zīg	mbék ^y fērt
...armadillo	gõp tīs	gõp rīt	gõp zīg	gõp fērt
...fox	bēz tīs	bēz rīt	bēz zīg	bēz fērt
...cat	bī ^y tīs	bī ^y rīt	bī ^y zīg	bī ^y fērt

This rule will be treated as a major rule since its application is widespread. I have noticed some exceptions, however, and these will be marked as such in the lexicon. The following are exceptions to the rule.

	small	thick
he is...	pīs yũ	mbāt yũ
...person	mbék ^y pīs	mbék ^y mbāt
...armadillo	gõp pīs	gõp mbāt
...fox	bēz pīs	bēz mbāt
...cat	bī ^y pīs	bī ^y mbāt

Looking at verbs paradigmatically, eleven productive patterns of tone perturbation occur. In context all deviations from these patterns are accounted for by the rules of phonological perturbation.¹ Pattern I, illustrated by do 3, strike 22, and nurse 38, is characterized by no tone change.²

I.	<u>do</u> 3 lp	<u>strike</u> 22 lp	<u>nurse</u> 38 lp
P	g ^y ik ^y ā	dī	čicā
H	rīk ^y ā	rdī	rcicā
C	bīk ^y ā	bdī	pcicā
U	n ^y g ^y ik ^y ā	ndī	ncicā
N	wāyik ^y ā	wādī	wācicā
N+P	wāg ^y ik ^y ā	wāgdī	wākcicā
N+U+P	wāng ^y ik ^y ā	wāndī	wāncicā

¹This fact was pointed out to me by John Alsop for Isthmus Zapotec before I ever started working on tone. His analysis of Isthmus Zapotec tone perturbation (unpublished) was an important breakthrough in understanding Zapotec tone alternations and was of considerable help to me in working with TZ.

²I have no examples of verbs of this class with mid tone.

	2p	2p	2p
P	g ^y ík ^y rú	k ^y ir	čič ^y rú
H	rík ^y rú	rg ^y ir	rčič ^y rú
C	bík ^y rú	bdir	pčič ^y rú
U	n ^y g ^y ík ^y rú	n ^y g ^y ir	nčič ^y rú
N	wâyík ^y rú	wâyir	wáčič ^y rú
N+P	wăg ^y ík ^y rú	wăk ^y ir	wăkčič ^y rú
N+U+P	wăng ^y ík ^y rú	wănk ^y ir	wănčič ^y rú

Pattern II, illustrated by dress 45 is characterized by tone alternations conditioned by person only.¹

II. dress 45

	1p	2p
P	zú	zûr
H	rzú	rzûr
C	bzú	bzûr
U	nzú	nzûr
N	wăzú	wăzûr
N+P	wăksú	wăksûr
N+U+P	wănsú	wănsûr

An underlying low tone of a verb stem becomes high tone in the first person.

Patterns III, IV, V illustrated by bend 39, slip 57 and be angry 65 are characterized by tone alternations conditioned by aspect only.

¹Underlying tone is that of the second person completive. Again, I have no examples of verbs of this class with underlying mid tone. There are also no examples of underlying [-T hi] becoming falling tone conditioned by person only.

III. bend 39

1p

P Yónā

H rYónā

C bYónā

U nYónā

N wāYónā

N+P wācYónā

N+U+P wāncYónā

2p

P Yón rū

H rYón rū

C bYón rū

U nYón rū

N wāYón rū

N+P wācYón rū

N+U+P wāncYón rū

IV. slip 57

1p

ríl^Yádríl^Yábríl^Yánríl^Yáwāríl^Yáwāgríl^Yáwānríl^Yá

2p

ríl^Y rūdríl^Y rūbríl^Y rūnríl^Y rūwāríl^Y rūwāgríl^Y rūwānríl^Y rūV. be angry 65

1p

gāzī lāg^Yárzī lāg^Yágūzī lāg^Yán^Yg^Yázī lāg^Yáwāzī lāg^Yáwāgāzī lāg^Yáwāngāzī lāg^Yá

2p

gāzī lāg^Y rūrzī lāg^Y rūgūzī lāg^Y rūn^Yg^Yázī lāg^Y rūwāzī lāg^Y rūwāgāzī lāg^Y rūwāngāzī lāg^Y rū

For verbs of class III, underlying low tone of the verb stem becomes high tone in P, U, and N. For verbs of class IV, underlying mid tone becomes high tone in P, U, and N. For verbs of class V, underlying low tone becomes falling tone in P, U and N.

Patterns VI, VII and VIII are characterized by tone alternations conditioned by both aspect and person. These are illustrated by handle 25, cross 24 and slice 41. Handle 25 illustrates the most common pattern in the language.

VI. <u>handle</u> 25	VII. <u>cross</u> 24	VIII. <u>slice</u> 41
lp	lp	lp
P <u>dáná</u>	dédá	sûgá
H <u>rdáná</u>	rdédá	rsûgá
C <u>bdáná</u>	bdédá	psûgá
U <u>ndáná</u>	ndédá	nsûgá
N <u>wádáná</u>	wádédá	wăsûgá
N+P <u>wăgdáná</u>	wăgdédá	wăksûgá
N+U+P <u>wândáná</u>	wândédá	wânsûgá
2p	2p	2p
P <u>gân rú</u>	déd rú	sûg rú
H <u>rân rú</u>	rdéd rú	rsûg rú
C <u>bdân rú</u>	bdéd rú	psûg rú
U <u>n^yg^yaân rú</u>	ndéd rú	nsûg rú
N <u>wân rú</u>	wádéd rú	wăsûg rú
N+P <u>wăgân rú</u>	wăgdéd rú	wăksûg rú
N+U+P <u>wângân rú</u>	wândéd rú	wânsûg rú

For verbs of class VI, underlying low tone of the verb stem becomes high tone in lp and in P, U, N. For verbs of class VII, underlying mid tone becomes high tone in lp and in P, U, N. For verbs of class VIII, underlying low tone becomes falling tone in lp and in P, U, N.

There are several classes of verbs, all having /y/ initial stems, which differ from the eight patterns thus far discussed only by undergoing a tone change in the habitual form also. Pattern IX is characterized by tone alternations conditioned by aspect only, and differs from

IV only in the habitual form.

IX. anchor 8

	1p	2p
P	^V cézá	^V céz rú
H	rzézá	rzéz rú
C	weèzá	weéz rú
U	n ^y g ^y ézá	n ^y g ^y éz rú
N	wáyézá	wáyéz rú
N+P	wá ^V ceèzá	wá ^V ceèz rú
N+U+P	wān ^V ceèzá	wān ^V ceèz rú

Since the verb stem nucleus of anchor 8 is laryngealized the underlying tone is mid tone. (See section 2.3.1.2.) Thus, underlying mid tone becomes high tone in P, H, U, N.

The last patterns, X and XI, are characterized by tone changes conditioned by aspect and person. They differ from verbs of class VI and VII only in the habitual form. Ascend 15 and descend 6 illustrate these patterns.

X. descend 6

	1p
P	g ^y étá
H	yétá
C	bétá
U	n ^y g ^y étá
N	wáyétá
N+P	wāg ^y étá
N+U+P	wāng ^y étá

XI. ascend 15

	1p
P	cúpá
H	rzúpá
C	gúpá
U	n ^y g ^y úpá
N	wáyúpá
N+P	wācúpá
N+U+P	wāncúpá

IV only in the habitual form.

IX. anchor 8

	1p	2p
P	^V čézá	^V čéz rú
H	rzézá	rzéz rú
C	weèzá	weèz rú
U	n ^Y g ^Y ézá	n ^Y g ^Y éz rú
N	wáyézá	wáyéz rú
N+P	wá ^V ceèzá	wá ^V ceèz rú
N+U+P	wā ^V nceèzá	wā ^V nceèz rú

Since the verb stem nucleus of anchor 8 is laryngealized the underlying tone is mid tone. (See section 2.3.1.2.) Thus, underlying mid tone becomes high tone in P, H, U, N.

The last patterns, X and XI, are characterized by tone changes conditioned by aspect and person. They differ from verbs of class VI and VII only in the habitual form. Ascend 15 and descend 6 illustrate these patterns.

	X. <u>descend 6</u>	XI. <u>ascend 15</u>
	1p	1p
P	g ^Y étá	^V cúpá
H	yétá	rzúpá
C	bétá	gúpá
U	n ^Y g ^Y étá	n ^Y g ^Y úpá
N	wáyétá	wáyúpá
N+P	wāg ^Y étá	wā ^V cúpá
N+U+P	wāng ^Y étá	wā ^V ncúpá

	2p	2p
P	g ^y ét rú	čúp rú
H	yét rú	rzúp rú
C	bét rú	gúp rú
U	n ^y g ^y ét rú	n ^y g ^y úp rú
N	wâyét rú	wâyúp rú
N+P	wăg ^y ét rú	wăčúp rú
N+U+P	wăng ^y ét rú	wăncúp rú

For verbs of class X, underlying low tone of the verb stem becomes high tone in lp and P, H, U, N. For verbs of class XI, underlying mid tone becomes high tone in lp and in P, H, U, N.

Before formulating the rules, I will discuss tone on verbs with the motion auxiliary, on verbs with two syllable stems, on derived verbs, and on passive constructions. On verbs with the motion auxiliary {yă/}, tone perturbs on the verb stem conditioned by person only. On the auxiliary prefix, tone perturbs according to person and aspect. There is no tone change on the verb stem conditioned by aspect. Kill 32 illustrates tone on the verbs with the motion auxiliary.

kill 32

	lp	lp mot aux
P	dútă	čă tútă

H	rdútá	rzā tūtá
C	bdútá	g ^w á tūtá
U	ndútá	n ^y g ^y á tūtá
N	wādútá	wáyá tūtá
N+P	wāgdútá	wācá tūtá
N+U+P	wāndútá	wāncá tūtá
	2p	2p
P	kút rú	Yá tūt rú
H	rūt rú	rzā tūt rú
C	bílt rú	g ^w á tūt rú
U	n ^y g ^y út rú	n ^y g ^y á tūt rú
N	wút rú	wáyá tūt rú
N+P	wākút rú	wācá tūt rú
N+U+P	wānkút rú	wāncá tūt rú

Thus, the rules are clitic bound: i.e., change in aspect on the motion auxiliary will not affect the tone of the stem of the main verb since a clitic boundary intervenes between the motion auxiliary and the stem.

The significant thing about verbs with two syllable stems is that only the first syllable may undergo a grammatical tone change. Lead 36 is typical of verbs of this type.

lead 36

	1p	2p
P	gáyú	gáyúr
H	rgáyú	rgáyúr
C	bgáyú	bgáyúr

U	ngáyŭ	ngáyŭr
N	wágáyŭ	wágáyŭr
N+P	wágáyŭ	wágáyŭr
N+U+P	wángáyŭ	wángáyŭr

Similarly with passives, only the passive morpheme {dũ+} may undergo grammatical perturbation. The verb stem will always have underlying tone. Tumble 20 and buy 42 illustrate tone on passive constructions.

tumble 20

	lp	lp pass
P	tũbǎ	dũdũbǎ
H	rtũbǎ	rdũdũbǎ
C	ptũbǎ	bdũdũbǎ
U	ntũbǎ	ndũdũbǎ
	2p	2p pass
P	tũb rú	dũdũb rú
H	rtũb rú	rdũdũb rú
C	ptũb rú	bdũdũb rú
U	ntũb rú	ndũdũb rú

buy 42

	lp	2p	3p pass
P	zĩ	zĩr	dũziĩn ^y
H	rziĩ	rziĩr	rdũziĩn ^y
C	wĩ	wiĩr	bdũziĩn ^y
U	nziĩ	nziĩr	ndũziĩn ^y

The verb stem of tumble 20 never perturbs. In passive constructions, however, tone of the passive morpheme does.

The tone of buy 42 perturbs except in passive constructions where only the tone of the passive morpheme perturbs. Furthermore, grammatical tone on buy 42 is conditioned by person and aspect. However, grammatical tone on the passive is always conditioned by aspect only. The analysis, therefore, must reflect the following two generalizations. First, within clitic bounds, tone can perturb on only one syllable. If it perturbs on the passive morpheme, it cannot perturb on the stem of the main verb. Second, tone will always perturb on the leftmost perturbable syllable. In the final analysis, it will be seen that all verb stems which are [-T hi, -P] in UF are perturbable. The passive morpheme is perturbable. The motion auxiliary is perturbable. The verbalizer is sometimes perturbable. The negative is not perturbable.

Grammatical tone of the verbalizer [ã+] is conditioned by aspect only as be cold 64 illustrates.

be cold 64

	1p	2p
P	gázíl ^y á	gázíl ^y rú
H	rázíl ^y á	rázíl ^y rú
C	gázíl ^y á	gázíl ^y rú
U	n ^y gázíl ^y á	n ^y gázíl ^y rú
N	wázíl ^y á	wázíl ^y rú
N+P	wágázíl ^y á	wágázíl ^y rú
N+U+P	wāngázíl ^y á	wāngázíl ^y rú

Only the tone of the leftmost perturbable syllable changes

in this example; however, there are exceptions to this principle as are illustrated by be bored 63.

be bored 63

	1p	2p
P	gàzédá	gàzéd rú
H	ràzeèdá	ràzeèd rú
C	gūzeèdá	gūzeèd rú
U	n ^y g ^y ázeèdá	n ^y g ^y ázeèd rú
N	wázeèdá	wázeèd rú
N+P	wàgàzeèdá	wàgàzeèd rú
N+U+P	wàngàzeèdá	wàngàzeèd rú

Grammatical perturbation occurs on only the forms one would expect: however, in one, or sometimes two (see be angry 65) grammatical environments, perturbation does not occur on the leftmost perturbable syllable. Be cold 64 shows clearly that {à+} 'verbalizer' is perturbable. Tone is perturbed on the verbalizer in U and N of be bored 64. However, it perturbs on the stem of the main verb in P. The situation is even more complicated for be angry 65 where both wází lāg^yá and wází lāg^yá 'I will not be angry' are acceptable. In the first case tone perturbs on {à+} 'verbalizer' and in the second case on {zǐ#lāg^y} 'be angry.' Thus, while tone may perturb on only one syllable within clitic bounds, there are exceptions to the claim that it will always perturb on the leftmost perturbable syllable. One possible solution to the problem would be to break up the rule and treat the exceptions in each subpart where

they occur. I have, however, noticed no exceptions to the rule on passive constructions or on verbs with two syllable stems. For these forms, tone perturbs only on the leftmost perturbable syllable within the clitic bounds. Since the exceptions are rare in the data I have thus far observed and since I have studied the speech of only one individual, I leave the problem for further investigation.

The following four rules generate grammatical tone.

R9: lp subject tone adjustment

$$\begin{bmatrix} -T & hi \\ -P & \end{bmatrix} \longrightarrow \begin{bmatrix} +T & hi \\ -T & low \end{bmatrix} / +C_o \text{---} \text{LR} \text{ in lp verb stem}$$

Condition: (1) clitic bound
(2) can apply only once within clitic boundary

R10: potential tone adjustment

$$\begin{bmatrix} -T & hi \\ -P & \end{bmatrix} \longrightarrow \begin{bmatrix} +T & hi \\ -T & low \end{bmatrix} / +C_o \text{---} \text{LR} \text{ in P, U, N verb stem}$$

Condition: (1) clitic bound
(2) can apply only once within clitic boundary

MR11: H tone adjustment

$$[-T \ hi] \longrightarrow \begin{bmatrix} +T & hi \\ -T & low \end{bmatrix} / +y \text{---} \text{ in H verb stem}$$

MR12: tone readjustment

$$[+T \ hi] \longrightarrow [+T \ low] / + \text{---}$$

R9 accounts for alternations conditioned by lp. R10 accounts for alternations conditioned by semantic potential and unreal. R9 and R10 are major rules. Thus they capture the generalization that grammatical perturbation is regular. Tone always and only perturbs on verb stems in which the nucleus of the first syllable is $[-T \ hi, -P]$. Furthermore,

they reflect the fact that the majority of the verbs in the language require both R9 and R10. Those verbs in which perturbation is conditioned by aspect only are marked [-R9] in the lexicon. Those verbs in which perturbation is conditioned by person only are marked [-R10]. Of the eighty-four UF's listed in the appendix, only fourteen are [-R9] and only one is [-R10]. MR11 accounts for alternations conditioned by habitual aspect. MR12 accounts for alternations in which the perturbed tone is falling tone not high tone. They are minor: i.e., the alternations they account for are not predictable except by reference to ad hoc word class. The following table shows which rules are required to produce the tone patterns for each of the eleven classes.

I	II	III	IV	V	VI	VII	VIII	IX	X	XI
	R9	R10	R10	R10	R9 MR12	R9 R10	R9 R10	R10 MR11	R9 MR11	R9 R10 MR11

Wherever the same rules are required to produce alternations in different classes, the classes differ only in underlying tone.

The characteristics of grammatical perturbation in several ways resemble those of progressive perturbation. Tone always perturbs from [-T hi] to [+T hi]. Furthermore, only syllables that are [-P] undergo grammatical perturbation. With progressive perturbation, however, only low tone perturbs. With grammatical perturbation, low tone and mid tone perturb. With progressive perturbation, low tone

becomes falling. With grammatical perturbation, tone is perturbed to either high tone or falling tone. Historically, what is now analyzed as grammatical perturbation may have once been the automatic result of a principle like R45: progressive perturbation conditioned by a full syllable aspect prefix. In TZ (but not in the Isthmus) the aspect prefix has reduced to a consonant. What remains is the effect of this historical morpheme on the verb stem. At the present time, however, the differences between grammatical perturbation and progressive perturbation are great enough to require the analysis to treat them as different principles.

It is interesting to note that grammatical perturbation does not follow the morphology in TZ. Tone does not perturb on each construction in which the potential prefix {k+} occurs: P, N+P, N+U+P. It does perturb, however, on each construction in which the semantic idea 'potential' is present and in which the potential morpheme occurs in other Zapotec dialects: P, N. In light of what has already been said about the historical source of grammatical perturbation, it would appear that the negative-aspect interrelationship that presently exists in TZ does not represent the historical pattern.

2.3.3 Laryngealization

In discussing alternations involving laryngealization, I first present those rules which directly involve tone. I then proceed to rules which seem to be grammatically

conditioned. In the first rule, a small class of morphemes, marked [+L], condition laryngealization in a preceding syllable with falling tone.

R47: regressive laryngealization

$$V \longrightarrow [+lar] / \left[\begin{array}{c} +T \text{ hi} \\ +T \text{ low} \end{array} \right] C^0 \begin{array}{c} V \\ [+L] \end{array}$$

I am aware of only four members of this class: {/nyi} '3p fem', {/na} '1p pl inc', {/gala} 'before', and {/la} 'emphatically'. The following data illustrate the operation of this rule.

tis yù	'lame ne'
tiis n ^y i	'lame she'
gùl yù	'grandfather he'
guùl n ^y i	'grandfather she'
gâyûy	'P-lead-he'
gâyûn ^y	'P-lead-she'

Since {/nyi} is [+L], it conditions regressive laryngealization. {/yu} does not. The rules of grammatical perturbation feed R47 as the following partial derivations show.

	'she will slice'	'she sliced'	'you will slice'
UF	k+sùg/nyi	gb+sùg/nyi	k+sùg/rù
R10	k sùg nyi	---	k sùg rù
MR12	k sùg nyi	---	k sùg rù
R47	k suùg n ^y i	---	---
P2	suùg n ^y i	---	---
SF	suùg n ^y i	psùg n ^y i	sùg rù

The second rule states that the same class of

morphemes, [+L], are laryngealized following a syllable with morpheme feature [+P].

R48: progressive laryngealization

$$\begin{array}{c} V \longrightarrow [+lar] / \\ [+L] \end{array} \quad \begin{array}{c} V \\ [+P] \end{array} C_o \text{---}$$

The following illustrate the operation of this rule.

	3p mas	3p fem
<u>faint</u> 40 [+P]	ʃɔ'w yú	ʃɔ'w n ^y iɪ
<u>wait</u> 51	k ^w əz yú	k ^w əz n ^y iɪ

Most verbs which condition progressive perturbation and progressive laryngealization are marked [+P] in the lexicon. However, there is a small class of verbs in which tone does not perturb grammatically, but in which in exactly those environments where one expects grammatical perturbation, the feature [+P] is acquired. Note thirst 18.

thirst 18

	3p fem
P	k ^w ig ^y n ^y iɪ
H	rbig ^y n ^y i
C	blig ^y n ^y i
U	mbig ^y n ^y iɪ
N	wāblig ^y n ^y iɪ
N+P	wāk ^w ig ^y n ^y i
N+U+P	wānk ^w ig ^y n ^y i

The following rule expresses this principle.

MR8: Perturber adjustment

V \longrightarrow [+P] / in P, U, N

The fourth rule performs the same function as tone lowering. TZ does not allow high tone on laryngealized syllables. One way that this comes about as shown earlier is through tone lowering. Another way is by vowels losing their laryngealization on syllables with high tone.

R15: laryngeal reduction

V \longrightarrow [-lar] / $\begin{bmatrix} +T & \text{hi} \\ -T & \text{low} \end{bmatrix}$

This rule is fed by grammatical perturbation on adjectives.

gaây byáh	'five trips'
byáh gáy	'trip fifth'
kaàs má	'it (animal) is black'
bíl ^V kás	'black snake'

The adjective of the second member of each pair of examples loses its laryngealization due to its tone having been perturbed by R7: adjectival tone.

In some cases R15 is fed by grammatical perturbation on verbs. Anchor 8 illustrates this case.

anchor 8

	lp	2p
P	Vézá	Véz rú
H	rzézá	rzéz rú
C	weèzâ	weèz rú
U	n ^V gVézâ	n ^V gVéz rú
N	wâyézâ	wâyéz rú

N+P wāk^Vceēzā wāk^Vceēz rū

N+U+P wāncēēzā wāncēēz rū

The patterns of laryngealization, however, do not always follow from the patterns of grammatical perturbation. Note the following patterns.¹

	<u>catch 30</u>		<u>relate 29</u>	
	1p	2p	1p	2p
P	dūbā	kūb rū	dō dū	gō nūr
H	rdūbā	rūb rū	rdō dū	rō nūr
C	bdūbā	bdūb rū	bdō dū	beē nūr
U	ndūbā	n ^V g ^V uūb rū	ndō dū	n ^V g ^V oō nūr
N	wādūbā	wūb rū	wādō dū	wō nūr
N+P	wāgdūbā	wākūb rū	wāgdō dū	wāgō nūr
N+U+P	wāndūbā	wānkūb rū	wāndō dū	wāngō nūr
	<u>give 58</u>		<u>buy 42</u>	
	1p	2p	1p	2p
P	rikā	k ^W ik rū	zī	zīr
H	drīkā	rbīk rū	rzi	rziir
C	brikā	briik rū	wī	wiir
U	nrīkā	mbīk rū	nzi	nziir
N	wārikā	wābīk rū	wāzī	wāzīr
N+P	wāgrīkā	wāk ^W ik rū	wāksi	wāksiir
N+U+P	wānrīkā	wānk ^W ik rū	wānsī	wānsiir

¹Go I 9 and grind 28 each have laryngealization in forms other than those represented in the examples. However, their irregularity is unique, occurring in only single words. I have therefore excluded them from this study.

Catch 30 suggests a need for a rule laryngealizing second and third person unreal.

MR16: U-laryngealization

V \longrightarrow [+lar] / in {2p, 3p}, U verb stem

Give 58 suggests a need for a rule laryngealizing second and third person completive.

MR17: C-laryngealization

V \longrightarrow [+lar] / in {2p, 3p}, C verb stem

Relate 29 requires application of both rules. The analysis I suggest for buy 42 is to call the base form of the stem {ziĩ}. This is supported by the passive.

buy 42

3p pass

P	dūziĩ ^y	N	wādūziĩ ^y
H	rdūziĩ ^y	N+P	wākdūziĩ ^y
C	bdūziĩ ^y	N+U+P	wāndūziĩ ^y
U	ndūziĩ ^y		

The tone of the base form is grammatically perturbed by R9 and R10. Laryngealization is then lost on the perturbed forms by R15. Then the second and third person unreal is laryngealized by MR16. Tone lowering, P2, follows. Thus, all the forms in the active paradigm of buy 42 are accounted for. My reason for choosing this analysis is that the analysis claims that the parallel between grammatical perturbation and laryngealization is not just coincidental but the same principle is operating in buy 42 as is operating in anchor 8 and in adjectives. The rule

laryngealizing second and third person unreal is needed independently of the suggested analysis for buy 42 in any case. The pattern illustrated by buy 42 seems to be the most common one among verbs with alternations involving laryngealization.

One final pattern of this type needs to be considered. It is illustrated by remove 54.

remove 54

	lp	2p
P	loō	kór
H	rlōō	rboōr
C	bloō	bloōr
U	nloō	mboōr
N	wāloō	wābōr
N+P	wāgloō	wākoōr
N+U+P	wānloō	wānkōr

This pattern suggests the need for a rule laryngealizing lp stem.

MR18: lp-laryngealization

V → [+lar] / in lp stem

The underlying form for the stem of remove 54 is {loō}. Tone of the base form is grammatically perturbed by R9 and R10. Laryngealization is then lost on the perturbed forms by R15. The stem is then laryngealized in the lp and in the U by MR16 and MR18. Tone lowering, P2, follows. Thus, all the forms of remove 54 are accounted for. Like the rules of grammatical perturbation, therefore,

grammatical rules of laryngealization are seen to be conditioned by person and aspect.

The final rule of this section accounts for the fact that the verb stem often becomes laryngealized in the causative.

MR19: causative laryngealization

V \longrightarrow [+lar] / in caus stem

	non-caus	caus
thirst	k ^w iŋ ^v rú	k ^w iĩŋ ^v rú
sleep	gās rú	gaās rú
bend	ʎón rú	ʎoón rú
wait	k ^w əz rú	k ^w eēz rú
beat	gāz rú	gaāz rú
anchor	ʎéz rú	ʎeēz rú
scatter	g ^v āc ^v dér	ʎaāc ^v rú
scare	ʎīb rú	ʎiīb rú

2.3.4 The Effect of Grammatical Perturbation and Laryngealization on the Tone Lowering Processes

The rules presented in the last two sections have been seen to feed and bleed P2: tone lowering on laryngealized vowels. Before continuing, I make explicit the relationship of these rules to P2. R15: laryngeal reduction bleeds P2. However, the situation in which P2 applies is created by grammatical rules in three ways. First, it is created by tone adjustment rules (R9-R12) operating on underlying stems with laryngealized nuclei which are exceptional with respect to R15. The partial

derivation of *guūr* 'you will lie' illustrates this situation. Second, it is created by tone adjustment rules in conjunction with MR16: U-laryngealization or MR18: lp-laryngealization. The partial derivations of *n^yg^yoōr* 'you should have ground' and *nziīr* 'you should have bought' illustrate this situation. Third, it is created by MR17: C-laryngealization acting on forms on which the tone is not grammatically perturbed. The partial derivation of *goōr* 'you ground' illustrates this situation.

	'you will lie'	'you should have ground'	'you should have bought'	'you ground'
UF	k+guū/rú	ngy+dōr/rú	ngy+ziī/rú	gb+dōr/rú
R10	k guū rú	ngy ō rú	ngy ziī rú	---
R15	---	---	ngy zī rú	---
MR16	---	ngy oō rú	ngy ziī rú	---
MR17	---	---	---	gb oō rú

P2	guūr	n ^y g ^y oōr	nziīr	goōr

Thus, rules of grammatical perturbation and laryngealization provide evidence for the tone lowering processes by creating the situation in which they apply.

2.3.5 Stress Placement

In polysyllabic morphemes stress is always stem final.

R13: stress placement

V → [+stress] / $\frac{\text{stem}}{\text{stem}}$ +

gayUr	'you will lead'
grambE ^Y st	'elephant' (gran bestia)
ri ^Y st00	'story' (from rii ^Y 'word' and toe 'head')

3.0 MORPHEME STRUCTURE

Surface structure constraints (SC) are expressed at the natural phonemic level. Many of these have already been seen as the primary motivation for phonological rules operating above the natural phonemic level. For example, the fact that velar obstruents can't initiate a syllable initial cluster is primary motivation for R38: velar deletion 1 and R22: b-lenition. In terms of morpheme structure, unacceptable patterns often occur in UF. Phonological rules adjust these patterns so that they conform to acceptable patterns defined by SC. In the discussion that follows, I will be concerned only with constraints on sequences. I further limit discussion to single morphemes of native origin except where a principle has a broader application. A more thorough study would include constraints on segments, on non-native morphemes and on inter-morphemic constructions.

3.1 Syllable Structure

A syllable may be initiated by a vowel, a consonant or a two-consonant cluster. It may be terminated by a vowel or a single consonant. Although there are many two syllable words in TZ, the majority are composed of two

single syllable morphemes or are loan words.¹ Thus a morpheme will usually be one, but maybe two syllables.

$$SC1: +(C_0^2 \vee C_0^1)_1^2 +$$

Any [-syl] segment may terminate a syllable except for /k^w/ or /g^w/.

$$SC2: \text{not } [+syl] \begin{bmatrix} -syl \\ -cor \\ +rnd \end{bmatrix}$$

Any single [-syl] segment may initiate a syllable except for /p, ʔ, ŋ/.

$$SC3: \text{not } + \begin{Bmatrix} p \\ ʔ \\ ŋ \end{Bmatrix} [+syl]$$

Some loan words have been adjusted to conform to this constraint but not all.

pat	'pato'
bed	'Pedro'
bal ^y	'Pablo'

3.2 Consonant Cluster

The following constraints apply to syllable initial clusters. In the case of medial clusters in the bisyllabic morpheme, the first consonant of the cluster should be thought of as belonging to the first syllable and the

¹This may not have been the case even in recent history. Some old speakers pronounce many single syllable nouns with a final unstressed [-hi, -rnd] vowel utterance final. Note for example the following: nis/nisa 'water', biŋ/biŋe 'rabbit'. I consider the second form to no longer be a part of present day speech. Based on very limited contact, however, my impression of Zaniza Zapotec, (the most closely related to TZ), is that this vowel does not appear to have been dropped. Thus in the recent past, stress may not have been predictable, and there may have been many more two syllable morphemes.

remaining to the second syllable.

Geminates are not permitted within a morpheme.

SC4: not $+C_i C_i$

The only geminase clusters that are allowed in inter-morphemic clusters are [+nas] as the following illustrate.

nnuuza UF: ngy+nuuz+a 'I should have
planted'

Any [-syl] segment may be the second member of a [-syl] cluster except for /p, k^w, c^y, m, n, h/.

SC5: not +[-syl] {p, k^w, ɕ, m, n, h}

If the second member of a consonant cluster is
[+obs, -cont, -vd], then the first member is /p/ or /s^v/.

SC6: If: +[-syl] [+obs]
 ↓ [-cont]
THEN: {P} [+vd]
 {Y}

pk ⁱ	'louse'
pk ^y us	'tomato'
sk ^y eg	'fly'
skuu	'Juquila'

Medial two consonant sequences need not necessarily conform to this condition since the first consonant is part of the first syllable and the second consonant is part of the second syllable: sik^ytoo 'All Saints Day.'

If the second member of a consonant cluster is [+obs, -cont, +vd, α pt], the first member is either [+ant, -cor, -cont] or [+nas, α pt].

SC7: IF: $\begin{bmatrix} +[-\text{syl}] \\ +\text{obs} \\ -\text{cont} \\ +\text{vd} \\ \alpha\text{pt} \end{bmatrix}$

THEN: $\begin{bmatrix} +\text{ant} \\ -\text{cor} \\ -\text{cont} \\ +\text{vd} \\ +\text{cons} \\ +\text{nas} \\ \alpha\text{pt} \end{bmatrix}$

bgu	'canote'
b ^y i	'flute'
mdoo	'baby'
mban ^y	'alive'
n ^y g ^y a	'unfriendly'
nguu	'egg'
ng ^w el	'rooster'
ndiil	'bow'
n ^y uh	'drop'

If the second member of a $[-\text{syl}]$ cluster is $[+\text{ant}, +\text{sib}, \alpha\text{vd}]$, then the first member is $[+\text{obs}, +\text{ant}, -\text{cor}, \alpha\text{vd}]$.

SC8: IF: $\begin{bmatrix} [-\text{syl}] \\ +\text{ant} \\ -\text{sib} \\ \alpha\text{vd} \end{bmatrix}$

THEN: $\begin{bmatrix} +\text{obs} \\ +\text{ant} \\ -\text{cor} \\ \alpha\text{vd} \end{bmatrix}$

psi	'eagle'
bzin ^y	'mouse'

rzi 'stingy' appears to be an exception to this constraint. I have not modified the constraint, however, because it has the appearance of being two morphemes, one being

{r+} 'habitual.'

[+obs] sequences always agree in voicing.

SC9: IF: +[+obs][+obs]
 ↓ ↓
 THEN: [αvd][αvd]

Consequently, SC6, SC7, SC8 may be stated with greater generality.

SC6: IF: +[-syl] [+obs
 -
 cont
 +vd]
 ↓
 THEN: { [+ant
 -
 cor
 -
 cont
 v
 s] }

SC7: IF: +[-syl] [+obs
 -
 cont
 -
 vd
 αpt]
 ↓
 THEN: { [+ant
 -
 cor
 -
 cont
 +
 cons
 +
 nas
 αpt] }

SC8: IF: [-syl] [+ant
 -
 sib]
 ↓
 THEN: { [+obs
 +
 ant
 -
 cor] }

If the second member of a [-syl] cluster is [+cons, +nas], the first member is /^vs/ or /m/.

SC10: IF: +[-syl] [+cons
 +
 nas]
 ↓
 THEN: { ^v
 s
 m }

^v ni	'sad'
mni	'cultivated, domesticated'
mn ^v aa	'wife'

If the second member of a [-syl] cluster is [+cons, -obs, -nas], the first member is /b/ or /p/.

SC11: IF: [-syl] $\begin{bmatrix} +cons \\ -obs \\ -nas \end{bmatrix}$
 \downarrow
 THEN: $\begin{bmatrix} +obs \\ +ant \\ -cor \end{bmatrix}$

briiz 'squirrel'

bl^yuu 'cave'

plek^y 'mosquito'

If the second member of a [-syl] cluster is [-cons], the first member is /p, b, s, s^y/.

SC12: IF: [-syl] $\begin{bmatrix} -cons \\ -syl \end{bmatrix}$
 \downarrow
 THEN: $\left\{ \begin{bmatrix} +obs \\ +ant \\ -cor \end{bmatrix} \right\}$
 $\left\{ \begin{bmatrix} +cor \\ -vd \\ +sib \end{bmatrix} \right\}$

syaa (UF: k+syaa+a) 'will study'

bya' 'maggot'

s^ywaan 'master'

pyaar 'lasso'

It follows from the above constraints that only /p, b, s, s^y, m, n, n^y, ŋ/ may initiate a consonant cluster.

3.3 Vowels

There are no [+syl] sequence in TZ.

SC13: not +C₀ [+syl]₂ C₀+

Only [-rnd] vowels occur following [+cons, +ant, -cor] in native words.

SC14: IF: $\begin{bmatrix} +\text{cons} \\ +\text{ant} \\ -\text{cor} \end{bmatrix} \begin{bmatrix} +\text{syl} \end{bmatrix}$
 THEN: $\begin{bmatrix} -\text{rnd} \end{bmatrix}$

ma '3p animal'
 mi '3p fem resp'
 mee 'corn smut'
 ba 'sky'
 bi 'wind'
 bey 'nail'

SC14 does not hold without exception. It probably did historically and for that reason I include it. Spanish loans do not conform and there are even a few exceptions in what seem to be words of native origin. For discussion see section 2.2.2.2.

In morphemes of two syllables, the first syllable always has low tone in the unperturbed form.

SC15: IF: $+C_o \begin{bmatrix} +\text{syl} \end{bmatrix} C_o \begin{bmatrix} +\text{syl} \end{bmatrix} C_o +$
 THEN: $\begin{bmatrix} -T \text{ hi} \\ +T \text{ low} \end{bmatrix}$

Of course, this tone may be perturbed by a preceding word which is [+P]. This condition is probably a reflex of the historical principle governing tone perturbation (section 2.3.1.1). Morphemes with the feature [+P] usually have an unperturbed low tone. (The only exceptions are among the pronouns.)

In two syllable morphemes, the first syllable is never laryngealized or checked. I attribute this to lack of stress.


```

SCL6:  IF:  [+syl
             -stress]
        THEN: [-lar
               -check]

```

Note ri^ystoo 'story' from ri^yj 'word' and too 'head'.

Since stress is always stem final, in forming the compound stem, stress was lost and consequently so was laryngealization on the first syllable.

Palatalized obstruent stops are velar.

```

SC17:  IF:  [+obs  

             -cont  

             +hi  

             +frt  

             -rnd  

             ↓  

THEN:  [-ant  

        -cor]

```

Note the following from Spanish.

k^yoo^ys 'dios'
ng^yoo^ys 'dios'
k^yoh 'Teofilo'

APPENDICES

APPENDIX I

WORD LIST

This part of the appendix consists of a list of single syllable single morpheme words. They are primarily nouns and adjectives. Nouns are presented in the citation form. Note that this form has underlying tone. Adjectives are presented in the form in which they would occur in the stative clause since this form has underlying tone and laryngealization. When a possible Spanish source has been identified, it is included in parenthesis. Words are marked which are [+P].

ĩ	salary	pĩl ^y	water well(pila)
ĩk	head	pkĩ	louse
ĩg	water gourd	psĩ	eagle
ĩg ^y	mammary gland	bĩ	wind
ĩŷ	back	bĩt	skunk
ĩs ^y	sweet	bĩt	epasote
ĩn ^y	Indian (indio)	bĩd	tar
ĩn	turtle	bĩdr	bottle (vidrio)
ĩl ^y	parrot	bĩk ^y	mountain, brother
pĩd	(Elpidio)	bĩk ^y	short
pĩk	pick (pico)	bĩg ^y	frog
pĩs	small (pececillos)	bĩg ^y	stale

bīc ^y	rabbit [+P]	k ^y it	pretty [+P]
bīj ^y	cat	k ^y ig ^y	hard
bfs	habit (vicio)	k ^w i	noon meal
bīs	ghost	g ^y i	fire
bīs ^v	anus	g ^y i	shallow
bīs ^v	termite	g ^y ib	tendon
bīz ^y	desirous	g ^y it	tortilla
bīn	(Valvina)	g ^y id	leather
bīn	multi-colored	g ^y id	chicken
bīn ^y	mud	g ^y ik ^y	paper
bīl ^y	snake	g ^y ic	hair
bīl ^y	woman's sister [+P]	g ^y i]	sickly
bīw	whistle	g ^y is	pet
bji	flute	g ^y is ^v	wzed
bji]	pineapple	g ^y is ^v	net
bjin ^y	foam	g ^y iz ^v	grass
bzin ^y	mouse	g ^y in ^y	wax, palm, trunk [+P]
briz	crayfish	g ^y il ^y	mamey [+P]
brin	small ant	vī	long time
brin	hook	vī	soft
tī	or	vīt	red-headed woodpecker
tīb	knee	vīk	(Chico)
tīt	(Tito)	vīk	(Chica)
tīk	(Eutiquio)	vīv	breast (chiche)
tīs	lame	vīv	(Francisco)
tīs ^v	(Narciso)	vīv	elbow
tīz	a bird	vīn ^y	good quality
īm	(Timoteo)	vīn	cane whiskey
tīn	(Cristina)	vī	day
tīl	(Jutilio)	vīv	chick
tīr	a bird	vīb	weaver's stick
tīr	bullet (tiro)	vīv	fearfull
tīn ^y	money (dinero)	vīn ^y	deer, syrup [+P]
dī	tune (melodía)	vīn	bed bug (chenche)
cīl ^y	intes ne gas	fīs	business (oficio)
k ^y i	sin	fīn	fine quality (fino)

ffn ^v	her	mīr	(Casimiro)
fil	(Filigonio)	mnī	cultivated domesticated
sī	(Lucia)	mbī	toad
sīk	(Francisco)	mbīg ^v	seed
sīst ^v	(Sixto)	mbīc ^v	blister
sīn	shoestring (cinta)	nīd	(Leonides)
sīn ^v	belt (cincho)	nīk ^v	tight
sīn ^y	smart	nīg ^v	milk, sap [+P]
strīb	stirrup (estribo)	nīc ^v	coffin
skīn ^v	corner (esquina)	nīc ^v	(Dionisio)
zī	hurt	nīs	water
zī	few, squash flower	nīs	aunt
zīg	hot	nīl	just because
zīg	fist	nīw	(nigua)
zīg ^v	many	ng ^w īk ^y	flower bud
zīn ^y	fatigue	ng ^w īs	braid
zīl ^y	big	n ^y ī	her
zīr	more	n ^y g ^y īg ^y	belly button
vī	Mr.	lī	straight
vīk	shoulder	lī	(Maria)
vīg	pine cone	lī	(Elías)
vīs	wet [+P]	līp	(Felipe)
vīs	woman's daughter-in-law	lībr	book (libro)
v ^y v	coast people	līg ^y	placenta
v ^y v	mineral taste	līm	file (lima)
vīn ^y	ugly, bad	līn	(Cirino)
vīl ^y	saddle (silla)	līn	(Marcelina)
vīl ^y	sheep	līl	(Cirila)
vīnī	sad	līl ^y	important [+P]
mīz ^v	mass (misa)	līw	runt
mīn	(Maximina)	līh	sandpaper (lija)
mīn ^y	mine (mina)	lwīs	(Luisa)
mīq	(Domingo)	rīt	bone, skinny
mīq	(Dominga)	rīt	(Margarito, a)
mīl	(Emilio)	rīg	(Rodrigo)
		rīc ^v	crack

rɪz slip knot
 rɪl^y comal
 rɪf stingy
 wɪ Zimatlan
 wɪk^y oil gland
 wɪc^y Sola de Vega
 bɪ' flea
 tɪ' smell
 dɪ'n^y ash
 g^yi' foot
 zɪ' strong smell
 zɪ'l only
 ʋɪ' gay
 ʋtɪ' short time
 mɪ' small
 nɪ' too
 lɪ' patio
 rɪ' salty
 rɪ'n^y sharp
 wɪ'n^y puppy
 iɪn^y bottom
 iɪl^y cotton
 bɪlg^y difficult
 bɪlj lion
 wɪlz corner post
 bzɪl withered
 brɪlz squirrel
 tɪl ten
 tɪln^y fifteen
 tɪll^y mysterious
 g^yiɪb metal
 g^yiɪn^y chile
 g^wiɪ black widow spider
 ʋiɪb goat (chivo)
 ʋciɪnt Jacinto
 ʋciɪn^y greasy

ʋjɪf mountain pass
 ʋjɪlj ring-tailed cat
 sɪll^y morning meal
 zɪf sour
 zɪlg^y a flavor
 zɪlw rotten smell
 ʋsɪl narrow
 ʋsɪlk a town name
 ʋswɪln^y a town name
 mɪll^y thousand (mil)
 mɪln (Benjamin)
 mbriɪ six centavos
 mbɪlɪz bluejay, dragonfly
 nɪl this
 nɪlk (Monica)
 ndɪll^y bowed
 lɪlɪ (Patricia)
 rɪl mint flavored
 rɪlj word
 rɪln^y work
 wɪlɪz (Luis)
 ɛw (Eocario)
 pɛc^y sternum (pecho)
 pɛz^y (peso)
 pkɛk^y mosquito
 prɛb test (prueba)
 prɛs prisoner (preso)
 pwɛnt bridge (puente)
 bɛ small crab
 bɛt (Roberto)
 bɛd (Pedro)
 bɛk necklace
 bɛg comb
 bɛg^y dove
 bɛc^y (Silvester)
 bɛs welt

bēz	fox	fēb	Thursday (jueves)
bēz	bee	fēn ^y	young (joven)
bēn ^y	regular	fēl	(Ofelia)
bēl	star, fish	fērt	strong (fuerte)
bēl	wake (velorio)	fréd	(Alfredo)
bēy	nail, cloud	frén	bridle (freno)
brēc ^y	breach (brecha)	sēp	block (sapo)
byē	raccoon	sēb	(Eusebio)
byēr	Friday (viernes)	sēl	(Marcelo)
tēd	crosswise	swērt	fate (suerte)
tēg	flat pan	zē	long-haired
tēg	dip	zēt	far
tēm	(Artemio)	zēt	squash plant
tēy	(Leoterio)	zēd	salt, tough [+P]
tēw	(Teodoro)	vē	stomach
tyēn	store (tienda)	vē	wide, uncle
k ^y ēz ^y	cheez (queso)	vēn ^y	many
k ^w ēk ^y	firecracker (cohetete)	vēl	spider web
k ^w ēl	corn husk	vēl ^y	corn silk
k ^w ērp	body (cuerpo)	sēy	seal (sello)
g ^y ēt	squash	vēkēg	house fly
g ^y ēg	gourd	vēlēk	sparrow hawk
g ^y ēc ^y	sticker, metate [+P]	mēg ^y	sock (media)
g ^y ēj ^y	town, fiber	mēc ^y	wick (mecha)
g ^y ē ^y	sore	mēs	(Nemesia)
g ^y ēz	mazorca	mēz	table (mesa)
g ^y ēz	powder	mēn	a name
g ^y ēl	pond	mēl	(Samuel)
g ^y ēl	milpa	mēy	(Baldomero)
g ^y ēy	rain	mēw	cat
g ^y ēy	ice	mbék ^y	person
čē	evening meal [+P]	myérk	Wednesday (miercoles)
čēl	(Flocelo)	mwēst ^y	sign (muestra)
čēnc ^y	(Crescencio)	nēg ^y	cloth
yē	slow	nēc ^y	(Onesimo)
yēc ^y	coarse [+P]	nēz	road, race, type

nèn	raw smell	lè'	proud
ng ^w êl	rooster	rè'	water jar
ng ^w èz	tracea	rè'n ^y	fat
n ^y èb	a name	beè	right
lèt	(Anacleto)	beēd	mang
lêtr	letter (letra)	beēn ^y	guitar
lêx	milk (leche)	beēl	meat
lêy	home	beēy	moon
lès	long time	byeē	witch
lêz	opossum	teēs	but
lêz ^y	awl (lezna)	teēz	nest
lên	(Elena)	deēt	unhappy
lêw	a name	g ^y ēē	hard
rè	there	g ^y ēē	flower
rég	left	g ^y ēēz	edible greens
rén ^y	other	g ^y ēēn ^y	abscess
rál	night	g ^y ēēg ^y	hole
réy	king (rey)	g ^y ēēy	male
rēj	grillwork (reja)	g ^w ēēy	three days ago
rwéd	wheel (rueda)	ceēē	(Moisés)
héf	boss (jefe)	jeēn ^y	smoke
hér	brand	feēz	judge (juez)
wéy	wolf	feēn ^y	wife, husband
wêr	white-skinned (güero)	feēl ^y	(Felix)
yè	corn crib, heavy	seē	(José)
yēn ^y	neck, bundle	seēt	(Zeta)
bē'n	alligator	zeē	loosely woven
bē'y	mushroom, gnat	zeēd	lazy
bē'w	parrot	zīl	middle
tē'y	dandruff	seēs	rain wear
cē'	dog	sk ^y ēēy	San Lorenzo
g ^y ē'y	lime	meē	corn smut
sē'	place	neēē	(Onesima)
zē'	there	n ^y g ^y ēē	husband
ndē'	that	n ^y g ^y ēēē	gizzard
lē'w	zapote [+P]	n ^y ēēl	(Daniel)

leēy	law (ley)	tāc ^V	(Anastacia)
leēw	free	tāz	taza
weē	(Manuel)	tānt	quantity (tanto)
weēc ^V	rough texture	tān ^V	mean [+P]
āz ^V	garlic (ajo)	tāl	(Natalia)
ārē	arch (arco)	tāw	(Taurino, Claudio)
ānk	angel (ángel)	tāy	(Natalia)
ān ^V	dead (anima)	dā	holy
āny	(Ángela)	dā	delicate
pā	(papá)	dāt	flat
pāp	potato (papa)	dāz	dance (danza)
pāt	duck (pato)	dām	(Damaso)
pās	(paso)	kā	where
pāz	swell (espasmo)	kā	toucan
bā	sun light	kād	(Arcado)
bāt	shirt yoke (bata)	kās	frog
bāg	dow (vaca)	kān	(Cándido)
bāf	dog	kāl	lime (cal)
bās	fathom	kāy	street (calle)
bās	cup (vaso)	kryād	servant (criado, a)
bās ^V	baby boy	kāh	box (caja)
bān	(Silvano)	k ^W āg	cocoon (capullo)
bān ^V	male mule [+P]	k ^W āc ^V	twin (cuate)
bāl	bullet (bala)	k ^W āl	baby girl
bāy	rebozo (pañó)	k ^W āh	rennet, curd (cuajo)
bāl ^V	(Pablo)	k ^W āy	horse (caballo)
bzā	Ejutla	gā	topil
brāw	(Braulio)	gāg ^V	seven [+P]
byāh	trip (viaje)	gās ^V	low
byāk	crow	gān	profit (ganar)
byā ^V	winged ant	gāl	few
byān	hare	gāl	twenty [+P]
tāp	four	grās	thanks (gracias)
tāb	(Octavia)	g ^W āz	archer's bow
tāt	dad (tata)	g ^W ān	mirror, glass
tāk	taco	g ^V ā	high

Văt	short (chato)	năp	good
Văg	cheek	năb	idol [+P]
Văy	(Cesario)	năt	empty
Yă	full [+P]	năk	group, unit [+P]
Yăc	fast, light weight	năc ^V	(Nacho)
făn	(Juana)	năs	day before yesterday
făm	(famosa)	nân	(Fernando)
flăb	(Flavio)	năn	soot, thick [+P]
să	earlier	năn ^V	inside, around
săb	Saturday (sábado)	năr	(Leonardo)
săn	(Susano)	nây	(Zenaido)
sărk	wall-eyed (zarco)	n ^V ă	mother
smăn	semana	n ^V ă	red
ză	cloud, lard	ngăc ^V	chachalaca
zăn	cross sex sibling	ngăc ^V	chachalaca
zăn ^V	many [+P]	n ^V g ^V ă	unfriendly
v ^V săb	clothing	ng ^W ăz	horn, handle
v ^V săk	wild turkey	lă	what
v ^V skăb	intelligence	lăp	pencil (lápiz)
v ^V săn	a bird	lăb	foot
mă	(mamă)	lăt	among
măk	(Macrina)	lăt	bucket (lata)
măc ^V	male mule (macho)	lăd	tree bark
măs	(Maximo)	lăk	scar
măz	mallet (mazo)	lăk ^V	flat
măz ^V	tame (manso)	lăg ^V	liver, squash seed
măn	(Amando)	lăs	bark of banana plant
măr	(mango)	lăz	tie (lazo)
măl	harm (mala)	lăz	section
măr	bottle	lăz ^V	orange (naranja)
mây	pretend (mayo)	lăz ^V	last
mărt	Tuesday (martes)	lăn	(Hermelando)
mărs	March (marzo)	lăl	(Eulalio)
mbăt	thick	lăw	(Lauro)
mbăn ^V	life [+P]	lây	(Hilario)
nă	today, now	lây	tooth

l ^y á	bitter	zá'	fresh corn
l ^y á	gall bladder	n ^y á'	mom
l ^y ag	leaf	n ^y á'n	year
l ^y ás ^v	buzzard	lá'	guaje
l ^y ás ^v	avocado leaf	l ^y á'	bean plant
ráb	radish (rábano)	yá'	liquid
rág	cold [+P]	paác ^v	stalky
rás	twitch	pyaār	lasso
rás ^v	throb	baā	sky, grave
ráy	(Raym ^o ndo)	byaā	cactus
ryāl	shiny (real)	byaāl	cockroach
wác ^v	dry	taān	(Cayentano)
wán	(Juan)	daā	(Natividad)
wān	(Juana)	daāb	palm belt
yā	hot house	daāl	thimble (dedal)
yā	I	kaā	trap
yāp	chayote	kaād	(Ricardo)
yák	(Ciriaco)	kaāk ^v	white, clean
yāg	tree, wood	kaāc ^v	yellow
yāg ^v	plum	kaās	black, dark
yāg ^v	naked	kaāz	swollen lymph gland
yās	Zenzontepc	k ^w āā	unfortunate
yās	ditch, ravine	k ^w āān	medicine
yās ^v	avocado	gaā	nine
yāy	soot	gaāb	close
pk ^y á'	louse	gaāy	five
byā'	maggot	faās	(Caifas)
byā'n	zenzontle	saā	seed of cuajinicuil
dā'	petate	zaā	beans
kā'	green	^v swaān	master, owner
kā'	blind	maāc ^v	(Tomas)
k ^y ā'	repeatedly	maān	(Germán)
gā'l	shadow	mn ^y āā	wife
g ^y ā'n	dish	naā	orchard
jā'	warm [+P]	naāg	yesterday
sā'	fiesta	naāl	open, clear

naân	step relation	ṽôn	three
n ^y aa	mother	ṽôn	bent
ng ^w aa	weasel	sóp	soup (sopa)
laa	loose	sót	(Sotero)
l ^y aa	(Nicolás)	sóg	hide tie (soga)
waa	(Juan)	zð	well (pozo)
waân	people of Zanisa	mō	cow
yaâ	hand, light	mōd	method (modo)
yaâg	shirt	móz	helper (mozo)
yaân	(Adrian)	nób	bride, groom (novio,a)
yaâl	copal	nór	(Honorio, Leonor)
ôs	bear (oso)	lð	face, before
pól	(Leopoldo)	lóp	(López)
bód	(Euodia)	lób	wolf (lobo)
tór	bull (toro)	lód	(Elodia)
tróm	top (trompo)	lók	(loco)
dð	tassel of corn plant	lók ^y	turkey (guajolote)
dóç	(Eudoxio)	lóm	Loma Bonita
kóp	(Procopio)	lól	(lola)
kób	(Jacob)	lór	parrot (loro)
kók	coconut (coco)	lôw	lizard
kóst	coast (costa)	rós	(Rosa)
kóz	thing (cosa)	ròñ	curly
kóc	car (coche)	róm	(Romeo)
kónç	sea shell (concha)	róy	roll (rollo)
kðl	male turkey	rðw	throb
kôw	overcast	yð	oven
kón	lame (cojo)	yôn	virgin
k ^v ôn	tree trunk	yów	stallion (garaanón)
k ^y ôh	(Teofilo)	gð'	deaf
gðp	armadillo	zð'w	scaly
góp	mute	lð'	fence
góm	plastic (goma)	rð'	door
gôy	(Gregorio)	yð'w	fern
ṽók	Indian	poól ^y	(Apolinar)
ṽóg	(Crisógono)	boð	hot coals

toð	top, head	tũn ^y	long
tcðp	garbage	dũb	maguey
doð	sun	dũg ^y	pine needle
doðb	feather	kũb	new
koðt	under arm	kũb	dorn dough
g ^y oðw	river	kũc ^v	pig (cuchi)
syoo	Mr.	kũn ^y	turkey
mdoð	baby	kũy	peg (cuña)
moo	(Simón)	k ^y ũp	two [+P]
moon	(Salomón)	k ^y ũj	smooth, clean
moor	tan (moro)	k ^y ũg	shell
n ^y g ^y ooz	God (dios)	gũ	camote
loon	Arón	gũp	dew
loðw	bird's crop	gũg ^y	easy going
l ^y oo	a name	gũc ^v	iguana
ryo	kidney (riñon)	gũj	marsh
yoók	a people	gũs	female
ũz	fine grained	gũs	spindle
ũr	fine	gũn	because
úl	rubber (hule)	gũn	alm
ũl ^y	(Paula)	gũl	mature
pũt	whore (puta)	gũl	when
pk ^y ũs	tomato	gũl ^y	slow
bũr	donkey (burro)	vũn	stub (chunto)
bgũ	knot	vũl	pretty (chulo,a)
b ^y ũc ^v	rattle of a snake	jũ	otherside
bzũn	rattle	vũb	short [+P]
brũy	tan	vũg	finger nail
byũ	road runner	vũs	brittle [+P]
byũb	leaf cutter ant	vũs	grandmother
byũd	widow (viuda,o)	vũn ^y	eight [+P]
byũs	rendered fat	vũrk	row, furrow (zurco)
byũn	deer fly	mũlt	penalty (multa)
byũy	cricket	mũn	(Eduardo)
tũt	hot	mũl ^y	mule (mula)
tũb	one	mbũrk	jacamar

nā	with, and	uūg ^y	lump
nūc ^y	(Panuncio)	byuūz	spider
nūmbr	number (número)	bl ^y uū	cave
ndūb	spherical [+P]	duū	banana, curse
njūh	drop	kuūk ^y	hornet's nest
n ^y g ^y ūp	expensive	kuūg	dove
ngūš ^y	bush	kuūg	alter
n ^y ūp	teache	kuūs	buzzard
lūp	(Guadalupe)	kruūz	cross (cruz)
lūk	(Lucas)	k ^y uū	forty
lūs	(Lucio, luz)	guūb	broom
l ^y ū	root	guūj ^y	rotten
l ^y ūp	dance	guūz	hunt
l ^y ūk ^y	vine	guūš ^y	old
l ^y ūc ^y	sharp [+P]	guūl	rust
l ^y ūj ^y	tongue	suū	adobe
l ^y ūs ^y	breast	skuūl	fragrant
rū	you [+P]	š ^y uūp	six
rūp	both [+P]	š ^y kuū	Juquila
rūb	tenate	nuūn	bed, splint
rūd	rue (ruda)	nguū	egg
hūn ^y	June (junio)	nguūl ^y	ripple
hūl ^y	July (julio)	n ^y uū	few
hūnt	meeting (junta)	l ^y uūl ^y	tadpole
yū	he, ground	yuū	cargo
yūb	round [+P]	ruūb	healthy, strong
yūg	yoke (yugo)	ruūn	epiphyte
yūk ^y	reed		
brū ^y	prickle, pear		
tū ^y	witch		
čū ^y	excriment		
zū ^y	cocoa		
rū ^y	mouth, edge		
yū ^y	house		
yū ^y	cartilage		
uūb	corn		

APPENDIX II

VERB PARADIGMS

This section of the appendix is organized into two parts. The first part consists of a list of verbs whose paradigms appear in the second part. Accompanying each entry is the underlying form of the verb stem and a list of minor rules, diacritics and restrictions required to produce the correct surface forms found in the paradigms. Two or three UF's occur for verbs that can be causativized, the second and third forms consisting of the verb stem with causative prefix and underlying tone. Sometimes there are several spellings given for UF's. These spellings do not necessarily represent suppletive stems. In most cases rules could be written to account for these forms. I have not done so here primarily because they represent alternations that are rare.

The second part of this appendix consists of the paradigms of sixty five verbs which were selected to represent every alternation in the language of which I am aware. The paradigm of every verb referred to in sections 2.2 and 2.3 occurs in this section. Verbs are ordered according to underlying stem initial segment, and every possible stem initial segment is represented.

The basic verb paradigm is discussed under verb

morphology (section 2.1). The second person paradigm is included only when it differs from first person paradigm. Likewise, the third person paradigm is included only when it differs from the second person paradigm. Since contraction of the subject pronoun suffix is regular, sufficient information is given to construct the full paradigm of each verb. In a few instances some characteristics of a form in a paradigm are not accounted for by the rules applying to the listed UF's. These forms are followed by *.

<u>fold</u> 1	{ā ^V #kyūp}	[+P]
	{t+ū ^V #kyūp}	MR23
<u>fall asleep</u> 2	{ā ^V #pkaāl}	MR23, [-R9]
<u>do</u> 3	{yīky}	
<u>understand</u> 4	{yēny}	[-R9]
<u>stand up</u> 5	{yēs#zū}	MR11, MR24, MR53
<u>descend</u> 6	{yēt}	MR11, [+M]
	{s+yēt}	MR54
	{l+yēt}	MR54
<u>remain</u> 7	{yeēny}	MR19
	{z+yeēny}	MR19
<u>anchor</u> 8	{yeēz}	MR26, [-R9]
	{s+yeēz}	MR54, [-R9]
<u>go I</u> 9	{yā, yaā}	[+M]
<u>go II</u> 10	{yā, yaā}	MR26, MR54
<u>scatter</u> 11	{yā ^V }	[+M]
	{c+yā ^V }	MR19, MR53

<u>hunger</u> 12	{yān}	[+M], [-R9]
<u>make</u> 13	{yaāny}	[+M], [-R9]
	{z+yaāny}	MR54
<u>close</u> 14	{yoōw}	[+M], [-R9]
	{s+yoōw}	MR19, MR53
<u>ascend</u> 15	{yūp}	MR11, MR26
<u>ride</u> 16	{yūb}	[+M]
<u>seek</u> 17	{yūb}	MR11, MR12, [+ctxt R38]
<u>thirst</u> 18	{bīgy}	MR8
	{k+bīgy}	MR19
<u>return</u> 19	{bi ^V s#kyā}	MR23
	{t+bi ^V s#kyā}	MR23
<u>dig</u> 20	{tā'}	
<u>tumble</u> 21	{tūb}	[+P]
<u>strike</u> 22	{dī}	MR2, MR5, [+P]
<u>whistle</u> 23	{diīw}	MR2
<u>cross</u> 24	{dēd}	
<u>handle</u> 25	{dān}	MR2, MR5
<u>eat</u> 26	{dāw, dōw}	MR2, MR16, [+ctxt MR43]
	{k+dōw}	MR6, MR19
<u>sleep</u> 27	{daās, taās}	MR2
	{k+daās}	MR6, MR19
<u>grind</u> 28	{dō}	MR2, MR3, MR16, MR17, MR23
<u>relate</u> 29	{dō#dū, nō}	MR2, MR3, MR23, [+M]
<u>catch</u> 30	{dūb}	MR2, MR3, MR16, [+M], [-ctxt R35]
<u>sing</u> 31	{dūl}	MR2, MR3, MR16, MR17, [+M]
<u>kill</u> 32	{dūt}	MR2, MR3, MR17, [+M], [-ctxt R35]

<u>fill</u> 33	{dū'}	MR2, [-ctxt R35]
<u>clear</u> 34	{dū'n}	MR1, MR2, MR3, MR23
<u>love</u> 35	{kâ}	MR12
<u>lead</u> 36	{gāyû}	
<u>lie</u> 37	{guū}	[-ctxt R15]
<u>nurse</u> 38	{ŷiŷ}	
<u>bend</u> 39	{ŷðŋ}	[-R9]
	{k+ŷðŋ}	MR19
<u>faint</u> 40	{ŷō'w}	[+P]
<u>slice</u> 41	{sûg}	MR12
<u>buy</u> 42	{ziŷ}	MR16, MR21
<u>see</u> 43	{zâk}	[-R9]
<u>smcke</u> 44	{zaäy}	[-ctxt R16]
<u>dress</u> 45	{zû}	[-R10]
	{zû}	MR19
<u>extract</u> 46	{ŷiŷ}	[-ctxt R15]
<u>speak</u> 47	{niŷ}	MR49, [-ctxt R15]
<u>lose</u> 48	{nē'}	
<u>guard</u> 49	{nyâ}	MR12
<u>divide</u> 50	{lêw}	
<u>wait</u> 51	{lêz}	MR4, [+P]
	{k+lêz}	MR4, MR19
<u>distribute</u> 52	{leēz}	MR2, MR5, MR16
<u>empty</u> 53	{laāt}	[-ctxt R15]
<u>remove</u> 54	{loō}	MR4, MR8, [-ctxt R15], [-R28]
<u>arrive</u> I 55	{rî}	MR12
<u>drill</u> 56	{riîd}	MR2, MR16

<u>slip</u> 57	{rily}	[-R9]
<u>give</u> 58	{rik}	MR4, MR17
<u>set</u> 59	{riš}	MR2, MR17
<u>call</u> 60	{reŷ}	MR4
<u>beat</u> 61	{rūz}	MR1, MR2
	{k+rūz}	MR1, MR6, MR19
<u>arrive II</u> 62	{rū'nyā}	
<u>be bored</u> 63	{ā+}{zeēd}	[-R9]
	{yiky#zeēd}	
<u>be cold</u> 64	{ā+}{zily}	
<u>be angry</u> 65	{ā+}{zi#lāgy}	MR12, [-R9]
<u>be holy</u>	{ā+}{tā}	
<u>verbalizer</u>	{ā+}	[-R9]
<u>passive</u>	{dū+}	[-R9]

fold 1

	3p itv	1p caus
P	gáč k ^y ŭp n ^y iī	túč k ^y ŭpā
H	ráč k ^y ŭp n ^y iī	rtúč k ^y ŭpā
C	gũč k ^y ŭp n ^y iī	ptúč k ^y ŭpā
U	n ^y gáč k ^y ŭp n ^y iī	ntúč k ^y ŭpā
N	wáč k ^y ŭp n ^y iī	wātúč k ^y ŭpā
N+P	wăgáč k ^y ŭp n ^y iī	wăktúč k ^y ŭpā
N+U+P	wăngáč k ^y ŭp n ^y iī	wăntúč k ^y ŭpā
	2p caus	3p caus
P	túč k ^y ŭp rū	túč k ^y ŭp n ^y iī
H	rtúč k ^y ŭp rū	rtúč k ^y ŭp n ^y iī
C	ptúč k ^y ŭp rū	ptúč k ^y ŭp n ^y iī
U	ntúč k ^y ŭp rū	ntúč k ^y ŭp n ^y iī

N wātūc^V k^Vūp rū wātūc^V k^Vūp n^Viī
 N+ wāktūc^V k^Vūp rū wāktūc^V k^Vūp n^Viī
 N+I -P wāntūc^V k^Vūp rū wāntūc^V k^Vūp n^Viī

fall asleep 2

	1p	2p	3p
P	gās ^V pkaālā	gās ^V pkaāl rū	gās ^V pkaāl n ^V i
H	rās ^V pkaālā	rās ^V pkaāl rū	rās ^V pkaāl n ^V i
C	gūs ^V pkaālā	gūs ^V pkaāl rū	gūs ^V pkaāl n ^V i
U	n ^V g ^V ās pkaālā	n ^V g ^V ās pkaāl rū	n ^V g ^V ās pkaāl n ^V i
N	wās ^V pkaālā	wās ^V pkaāl rū	wās ^V pkaāl n ^V i
N+P	āgās ^V pkaālā	wāgās ^V pkaāl rū	wāgās ^V pkaāl n ^V i
N+U+P	wāngās ^V pkaālā	wāngās ^V pkaāl rū	wāngās ^V pkaāl n ^V i

2 3

	1p	2p
P	g ^V ik ^V ā	g ^V ik ^V rū
H	r ^V k ^V ā	r ^V ik ^V rū
C	b ^V k ^V ā	b ^V ik ^V rū
U	n ^V g ^V ik ^V ā	n ^V g ^V ik ^V rū
N	w ^V ik ^V ā	wāyik ^V rū
N+P	w ^V g ^V ik ^V ā	wāg ^V ik ^V rū
N+U+P	wāng ^V ik ^V ā	wāng ^V ik ^V rū

understand 4

	1p	2p
P	g ^V ēn ^V ā	g ^V ēn ^V rū
H	r ^V n ^V ā	rēn ^V rū
C	g ^V ēn ^V ā	g ^V ēn ^V rū
U	n ^V g ^V ēn ^V ā	n ^V g ^V ēn ^V rū
N	wāyēn ^V ā	wāyēn ^V rū
N+P	wāg ^V ēn ^V ā	wāg ^V ēn ^V rū
N+U+P	wāng ^V ēn ^V ā	wāng ^V ēn ^V rū

stand up 5

	1p	2p	3p
P	g ^V ēs sū	g ^V ēs sūr	g ^V ēs sūn ^V
H	yēs sū	yēs sūr	yēs sūn ^V
C	wēs sū	wēs sūr	wēs sūn ^V

U	n ^y g ^y és sù	n ^y g ^y és sùr	n ^y g ^y és sùn ^y
N	wàyés sù	wàyés sùr	wàyés sùn ^y
N+P	wàg ^y és sù	wàg ^y és sùr	wàg ^y és sùn ^y
N+U+P	wàng ^y és sù	wàng ^y és sùr	wàng ^y és sùn ^y
	lp caus	2p caus	3p caus
P	śés sù	śés sùr	śés sùn ^y
H	rśés sù	rśés sùr	rśés sùn ^y
C	pśés sù	pśés sùr	pśés sùn ^y
U	nsés eù	nsés sùr	nsés sùn ^y
N	wāsés sù	wāsés sùr	wāsés sùn ^y
N+P	wàksés sù	wàksés sùr	wàksés sùn ^y
N+U+P	wānsés sù	wānsés sùr	wānsés sùn ^y
	<u>descend 6</u>		
	lp	2p	
P	g ^y étá	g ^y ét rú	
H	yétá	yét rú	
C	bétá	bét rú	
U	n ^y g ^y étá	n ^y g ^y ét rú	
N	wàyétá	wàyét rú	
N+P	wàg ^y étá	wàg ^y ét rú	
N+U+P	wàng ^y étá	wàng ^y ét rú	
	lp caus	2p caus	
P	śétá	śét rú	
H	rśétá	rśét rú	
C	pśétá	pśét rú	
U	nsétá	nsét rú	
N	wāsétá	wāsét rú	
N+P	wàksétá	wàksét rú	
N+U+P	wānsétá	wānsét rú	
	lp caus	2p caus	
P	létá	lét rú	
H	rlétá	rlét rú	
C	blétá	blét rú	
U	nlétá	nlét rú	

N	wālétā	wālét rū
N+P	wāglétā	wāglét rū
N+U+P	wānlétā	wānlét rū
	<u>remain 7</u>	
	lp	2p
P	g ^y én ^y ā	g ^y én ^y rū
H	ryeēn ^y ā	ryeēn ^y rū
C	byeēn ^y ā	byeēn ^y rū
U	n ^y g ^y én ^y ā	n ^y g ^y én ^y rū
N	wāyén ^y ā	wāyén ^y rū
N+P	wāg ^y eēn ^y ā	wāg ^y eēn ^y rū
N+U+P	wāng ^y eēn ^y ā	wāng ^y eēn ^y rū
	lp caus	2p caus
P	zeēn ^y ā	zeēn ^y rū
H	rzeēn ^y ā	rzeēn ^y rū
C	bzeēn ^y ā	rzeēn ^y rū
U	nzeēn ^y ā	nzeēn ^y rū
N	wāzeēn ^y ā	wāzeēn ^y rū
N+P	wākseēn ^y ā	wākseēn ^y rū
N+U+P	wānseēn ^y ā	wānseēn ^y rū
	<u>anchor 8</u>	
	lp	2p
P	čézā	čéz rū
H	rzézā	rzéz rū
C	weēzā	weēz rū
U	n ^y g ^y éžā	n ^y g ^y éž rū
N	wāyéžā	wāyéž rū
N+P	wāčēēžā	wāčēēž rū
N+U+P	wānčēēžā	wānčēēž rū
	lp caus	2p caus
P	šēēžā	šēēž rū
H	ršēēžā	ršēēž rū
C	pšēēžā	pšēēž rū
U	nšēēžā	nšēēž rū

N	wā ^V seēzā	wā ^V seēz rū	
N+P	wāk ^V seēzā	wāk ^V seēz rū	
N+U+P	wān ^V seēzā	wān ^V seēz rū	
	go I 9		
	lp	2p	3p
P	g ^V ā	g ^V ār* ¹	g ^V ān ^V
H	ryāā	ryār	ryān ^V
C	byāā	byār	byān ^V
U	n ^V g ^V āā	n ^V g ^V ār*	n ^V g ^V āān ^V
N	wāyā	wāyār*	wāyān ^V
N+P	wāg ^V āā	wāg ^V ār	wāg ^V ān ^V
N+U+P	wāng ^V āā	wāng ^V ār	wāng ^V ān ^V
	go II 10		
	lp	2p	3p
P	vā	vār*	vān ^V
H	rzā	rzār	rzān ^V
C	g ^w ā	g ^w ār	g ^w ān ^V
U	n ^V g ^V āā	n ^V g ^V ār*	n ^V g ^V āān ^V
N	wāyā	wāyār*	wāyān ^V
N+P	wācā	wācār	wācān ^V
N+U+P	wāncā	wāncār	wāncān ^V

¹The same thing is happening to the tone of go I 9 and go II 10 and eat 25. Go I and go II have acquired [+P] in P and N of the 2p, 3p stem. The tones of these forms are therefore not grammatically perturbed. {/nyl} '3p fem', however, causes regressive perturbation by R41. Tone is grammatically perturbed on 2p, 3p, U to falling tone. The tone patterns of these forms could be accounted for by breaking up R8: perturber adjustment so that only the 2p and 3p N and P are adjusted, and then write a rule adjusting tone on 2p and 3p U only to falling tone. I have not done so because only three words require these changes.

scatter 11

	3p itv
P	g ^y ác n ^y i
H	ryác n ^y i
C	byác n ^y i
U	n ^y g ^y ác n ^y i
N	wáyác n ^y i
N+P	wág ^y ác n ^y i
N+U+P	wàng ^y ác n ^y i

1p caus
caācā
rcaācā
pcaācā
ncaācā
wācaācā
wākcaācā
wāncācā

2p caus
caāc rū
rcaāc rū
pcaāc rū
ncaāc rū
wācaāc rū
wākcaāc rū
wāncāc rū

hunger 12

	1p		2p
P	g ^y ānā		g ^y ān rū
H	rānā		rān rū
C	byānā		byān rū
U	n ^y g ^y ānā		n ^y g ^y ān rū
N	wāyānā		wāyān rū
N+P	wāg ^y ānā		wāg ^y ān rū
N+U+P	wāng ^y ānā		wāng ^y ān rū

make 13

	3p itv	1p caus	2p caus
P	g ^y an ^y	zaā	zaār
H	ryaān ^y	rzaā	rzaār
C	byaān ^y	bzaā	bzaār
U	n ^y g ^y aān ^y	nzaā	nzaār
N	wāyān ^y	wāzaā	wāzaār
N+P	wāg ^y aān ^y	wāksaā	wāksaār
N+U+P	wāng ^y aān ^y	wānsaā	wānsaār

close 14

	3p itv	1p caus	2p caus
P	g ^y ōw n ^y i	soōwā	soōw rū
H	ryoōw n ^y i	rsoōwā	rsoōw rū
C	byoōw n ^y i	psoōwā	psoōw rū
U	n ^y g ^y ōw n ^y i	nsoōwā	nsoōw rū
N	wāyōw n ^y i	wāsoōwā	wāsoōw rū
N+P	wāg ^y ōw n ^y i	wāksōōwā	wāksōōw rū
N+U+P	wāng ^y ōw n ^y i	wānsōōwā	wānsōōw rū

ascend 15

	lp	2p
P	Yúpá	Yúp rú
H	rzúpá	rzúp rú
C	gúpá	gúp rú
U	n ^y g ^y úpá	n ^y g ^y úp rú
N	wáyúpá	wáyúp rú
N+P	wácúpá	wácúp rú
N+U+P	wāncúpá	wāncúp rú

	lp caus	2p caus
P	Súpá	Súp rú
H	rsúpá	rsúp rú
C	psúpá	psúp rú
U	nsúpá	nsúp rú
N	wásúpá	wásúp rú
N+P	wáksúpá	wáksúp rú
N+U+P	wānsúpá	wānsúp rú

ride 16

	lp	2p
P	g ^y úbá	g ^y úb rú
H	ryúbá	ryúb rú
C	byúbá	byúb rú
U	n ^y g ^y úbá	n ^y g ^y úb rú
N	wáyúbá	wáyúb rú
N+P	wág ^y úbá	wág ^y úb rú
N+U+P	wāng ^y úbá	wāng ^y úb rú

seek 17

	lp	2p	3p
P	yúbá	yúb rú	yuúb n ^y i
H	ryúbá	ryúb rú	ryúb n ^y i
C	byúbá	byúb rú	byúb n ^y i
U	nyúbá	nyúb rú	nyuúb n ^y i
N	wáyúbá	wáyúb rú	wāyuúb n ^y i
N+P	wág ^y úbá	wág ^y úb rú	wág ^y úb n ^y i
N+U+P	wānyúbá	wānyúb rú	wānyúb n ^y i

thirst 18

	lp	2p	3p
P	k ^w ig ^y á	k ^w ig ^y rú	k ^w ig ^y n ^y ií
H	rbig ^y á	rbig ^y rú	rbig ^y n ^y i
C	bíg ^y á	bíg ^y rú	bíg ^y n ^y i
U	mbíg ^y á	mbíg ^y rú	mbíg ^y n ^y ií
N	wábíg ^y á	wábíg ^y rú	wábíg ^y n ^y ií
N+P	wák ^w ig ^y á	wák ^w ig ^y rú	wák ^w ig ^y n ^y i
N+U+P	wánk ^w ig ^y á	wánk ^w ig ^y rú	wánk ^w ig ^y n ^y i

(dry)

	lp caus	2p caus
P	k ^w iíg ^y á	k ^w iíg ^y rú
H	rk ^w iíg ^y á	rk ^w iíg ^y rú
C	pk ^w iíg ^y á	pk ^w iíg ^y rú
U	ŋk ^w iíg ^y á	ŋk ^w iíg ^y rú
N	wák ^w iíg ^y á	wák ^w iíg ^y rú
N+P	wák ^w iíg ^y á	wák ^w iíg ^y rú
N+U+P	wánk ^w iíg ^y á	wánk ^w iíg ^y rú

return 19

	lp	2p
P	kú ^v k ^y á	kú ^v k ^y ár
H	rbí ^v k ^y á	rbí ^v k ^y ár
C	bí ^v k ^y á	bí ^v k ^y ár
U	mbí ^v k ^y á	mbí ^v k ^y ár
N	wábí ^v k ^y á	wábí ^v k ^y ár
N+P	wákú ^v k ^y á	wákú ^v k ^y ár
N+U+P	wánkú ^v k ^y á	wánkú ^v k ^y ár
	lp caus	2p caus
P	tú ^v k ^y á	tú ^v k ^y ár
H	rtú ^v k ^y á	rtú ^v k ^y ár
C	ptú ^v k ^y á	ptú ^v k ^y ár
U	ntú ^v k ^y á	ntú ^v k ^y ár
N	wátú ^v k ^y á	wátú ^v k ^y ár
N+P	wáktú ^v k ^y á	wáktú ^v k ^y ár
N+U+P	wántú ^v k ^y á	wántú ^v k ^y ár

dig 20

	lp	2p	3p
P	tā'	tā'r	tā'n ^y
H	rtā'	rtā'r	rtā'n ^y
C	ptā'	ptā'r	ptā'n ^y
U	ntā'	ntā'r	ntā'n ^y
N	wātā'	wātā'r	wātā'n ^y
N+P	wāktā'	wāktā'r	wāktā'n ^y
N+U+P	wāntā'	wāntā'r	wāntā'n ^y

tumble 21.

	lp	2p
P	tūbā	tūb rū
H	rtūbā	rtūb rū
C	ptūbā	ptūb rū
U	ntūbā	ntūb rū
N	wātūbā	wātūb rū
N+P	wāktūbā	wāktūb rū
N+U+P	wāntūbā	wāntūb rū
	3p	lp pass
P	tūb n ^y if	dūdūbā
H	rtūb n ^y if	rdūdūbā
C	ptūb n ^y if	bdūdūbā
U	ntūb n ^y if	ndūdūbā
N	wātūb n ^y if	wādūdūbā
N+P	wāktūb n ^y if	wāgdūdūbā
N+U+P	wāntūb n ^y if	wāndūdūbā

strike 22

	lp	2p	3p mas
P	dī	k ^y ir	k ^y iy
H	rdī	rg ^y ir	rg ^y iy
C	bdī	bdir	bdiy
U	ndī	n ^y g ^y ir	n ^y g ^y iy
N	wādī	wāyir	wāyiy
N+P	wāgdī	wāk ^y ir	wāk ^y iy
N+U+P	wāndī	wānk ^y ir	wānk ^y iy

	3p fem	lp pass	2p pass
P	k ^y in ^y	dúg ^y _i	dúg ^y ir
H	rg ^y in ^y	rdúg ^y _i	rdúg ^y ir
C	bdin ^y	bdúg ^y _i	bdúg ^y ir
U	n ^y g ^y in ^y	ndúg ^y _i	ndúg ^y ir
N	wáyin ^y	wádúg ^y _i	wádúg ^y ir
N+P	wák ^y in ^y	wágdúg ^y _i	wágdúg ^y ir
N+U+P	wánk ^y in ^y	wándúg ^y _i	wándúg ^y ir

whistle 23

	lp	2p
P	díwā	k ^y iw rú
H	rdíwā	rg ^y iīw rú
C	bdíwā	bdiīw rú
U	ndíwā	n ^y g ^y iw rú
N	wādíwā	wáyiw rú
N+P	wágdíwā	wák ^y iīw rú
N+U+P	wándíwā	wánk ^y iīw rú

cross 24

	lp	2p
P	dédā	déd rú
H	rdédā	rdéd rú
C	bdédā	bdéd rú
U	ndédā	ndéd rú
N	wādédā	wádéd rú
N+P	wágdédā	wágdéd rú
N+U+P	wándédā	wándéd rú

handle 25

	lp	2p	lp pass
P	dānā	gān rú	dúgānā
H	rdānā	rān rú	rdúgānā
C	bdānā	bdān rú	bdúgānā
U	ndānā	n ^y g ^y aān rú	ndúgānā
N	wādānā	wān rú	wádúgānā
N+P	wágdānā	wāgān rú	wágdúgānā
N+U+P	wāndānā	wāngān rú	wándúgānā

eat 26

	lp	2p	3p fem
P	<u>dāw</u>	gōr*	gōn ^y
H	<u>rdāw</u>	rōr	rōn ^y
C	<u>bdāw</u>	bdōr	bdōn ^y
U	<u>ndāw</u>	n ^y g ^y ōr*	n ^y g ^y ōn ^y *
N	<u>wādāw</u>	wōr	wōn ^y
N+P	<u>wāgdāw</u>	wāgōr	wāgōn ^y
N+U+P	<u>wāndāw</u>	wāngōr	wāngōn ^y

lp caus

	2p caus
P	<u>goōwā</u>
H	<u>rgoōwā</u>
C	<u>bgoōwā</u>
U	<u>ngoōwā</u>
N	<u>wāgoōwā</u>
N+P	<u>wāgoōwā</u>
N+U+P	<u>wāngoōwā</u>

sleep 27

	lp	2p
P	<u>dāsā</u>	gās rū
H	<u>rdāsā</u>	raās rū
C	<u>bdāsā</u>	ptaās rū
U	<u>ndāsā</u>	n ^y g ^y aās rū
N	<u>wādāsā</u>	wās rū
N+P	<u>wāgdāsā</u>	wāgaās rū
N+U+P	<u>wāndāsā</u>	wāngaās rū
	lp caus	2p caus
P	<u>gaāsā</u>	gaās rū
H	<u>rgaāsā</u>	rgaās rū
C	<u>bgaāsā</u>	bgaās rū
U	<u>ngaāsā</u>	ngaās rū
N	<u>wāgaāsā</u>	wāgaās rū
N+P	<u>wāgaāsā</u>	wāgaās rū
N+U+P	<u>wāngaāsā</u>	wāngaās rū

grind 28

	lp	2p
P	dố	gố
H	rdố	rờ
C	bdố	godr
U	ndố	n ^y g ^y oôr
N	wầdố	wờ
N+P	wầgdố	wầgodr*
N+U+P	wầndố	wầngờ

relate 29

	lp	2p
P	dố dụ	gố nừ
H	rdố dụ	rờ nừ
C	bdố dụ	beê nừ
U	ndố dụ	n ^y g ^y oô nừ
N	wầdố dụ	wồ nừ
N+P	wầgdố dụ	wầgồ nừ
N+U+P	wầndố dụ	wầngồ nừ

catch 30

	lp	2p
P	dủbá	kủb rú
H	rdủbá	rủb rú
C	bdủbá	bdủb rú
U	ndủbá	n ^y g ^y uủb rú
N	wầdủbá	wủb rú
N+P	wầgdủbá	wầkủb rú
N+U+P	wầndủbá	wầnkủb rú

sing 31

	lp	2p
P	dủlă	gủl rú
H	rdủlă	rủl rú
C	bdủlă	biỉl rú
U	ndủlă	n ^y g ^y uủl rú
N	wầdủlă	wủl rú
N+P	wầgdủlă	wầgủl rú
N+U+P	wầndủlă	wầngủl rú

kill 32

	lp	2p
P	dútá	kút rú
H	rdútá	rút rú
C	bdútá	biit rú
U	ndútá	n ^y g ^y út rú
N	wádútá	wút rú
N+P	wágdútá	wákút rú
N+U+P	wándútá	wánkút rú
	lp mot aux	2p mot aux
P	čá tútá	čá tūt rú
H	rzá tútá	rzà tūt rú
C	g ^w á tútá	g ^w à tūt rú
U	n ^y g ^y á tútá	n ^y g ^y á tūt rú
N	wáyá tútá	wáyá tūt rú
N+P	wáčá tútá	wáčá tūt rú
N+U+P	wāncá tútá	wāncá tūt rú

fill 33

	lp	2p
P	dǎ'	kú'r
H	rdǎ'	rgǎ'r
C	bdǎ'	bdǎ'r
U	ndǎ'	ngǎ'r
N	wǎdǎ'	wú'r
N+P	wǎgdǎ'	wákǎ'r
N+U+P	wǎndǎ'	wánkǎ'r

clear 34

	lp	2p
P	dú'ná	gá'n rú
H	rdú'ná	rǎ'n rú
C	bdú'ná	gǎ'n rú
U	ndú'ná	n ^y g ^y á'n rú
N	wǎdú'ná	wá'n rú
N+P	wǎgdú'ná	wǎgǎ'n rú
N+U+P	wǎndú'ná	wǎngǎ'n rú

love 35

	1p	2p	3p
P	kā	kār	kaān ^y
H	rkā	rkār	rkān ^y
C	pkā	pkār	pkān ^y
U	ṅkā	ṅkār	ṅkaān ^y
N	wākā	wākār	wākaān ^y
N+P	wākā	wākār	wākān ^y
N+U+P	wānkā	wānkār	wānkān ^y

lead 36

	1p	2p	3p
P	gāyū	gāyūr	gāyuūn ^y
H	rgāyū	rgāyūr	rgāyuūn ^y
C	bgāyū	bgāyūr	bgāyuūn ^y
U	ṅgāyū	ṅgāyūr	ṅgāyuūn ^y
N	wāgāyū	wāgāyūr	wāgāyuūn ^y
N+P	wāgāyū	wāgāyūr	wāgāyuūn ^y
N+U+P	wāngāyū	wāngāyūr	wāngāyuūn ^y

lie 37

	1p	2p
P	guū	guūr
H	rguū	rguūr
C	bguū	bguūr
U	ṅguū	ṅguūr
N	wāguū	wāguūr
N+P	wāguū	wāguūr
N+U+P	wānguū	wānguūr

nurse 38

	1p	2p	3p
P	čičā	čič rū	čičē n ^y i
H	rčičā	rčič rū	rčičē n ^y i
C	pčičā	pčič rū	pčičē n ^y i
U	ṅčičā	ṅčič rū	ṅčičē n ^y i
N	wāčičā	wāčič rū	wāčičē n ^y i
N+P	wākčičā	wākčič rū	wākčičē n ^y i
N+U+P	wānčičā	wānčič rū	wānčičē n ^y i

bend 39

	lp	2p	3p
P	Yónā	Yón rū	Yón n ^{yi}
H	rYónā	rYón rū	rYón n ^{yi}
C	bYónā	bYón rū	bYón n ^{yi}
U	nYónā	nYón rū	nYón n ^{yi}
N	wāYónā	wāYón rū	wāYón n ^{yi}
N+P	wākčónā	wākčón rū	wākčón n ^{yi}
N+U+P	wāncónā	wāncón rū	wāncón n ^{yi}

	lp caus	2p caus
P	Ycoōnā	Ycoōn rū
H	rYcoōnā	rYcoōn rū
C	pYcoōnā	pYcoōn rū
U	nYcoōnā	nYcoōn rū
N	wāYcoōnā	wāYcoōn rū
N+P	wākčcoōnā	wākčcoōn rū
N+U+P	wāncōōnā	wāncōōn rū

faint 40

	lp	2p	3p
P	Yđ'wā	Yđ'w rū	Yđ'w n ^{yii}
H	rYđ'wā	rYđ'w rū	rYđ'w n ^{yii}
C	bYđ'wā	bYđ'w rū	bYđ'w n ^{yii}
U	nYđ'wā	nYđ'w rū	nYđ'w n ^{yii}
N	wāYđ'wā	wāYđ'w rū	wāYđ'w n ^{yii}
N+P	wākčđ'wā	wākčđ'w rū	wākčđ'w n ^{yii}
N+U+P	wāncđ'wā	wāncđ'w rū	wāncđ'w n ^{yii}

slice 41

	lp	2p	3p
P	sūgā	sūg rū	suūg n ^{yi}
H	rsūgā	rsūg rū	rsūg n ^{yi}
C	psūgā	psūg rū	psūg n ^{yi}
U	nsūgā	nsūg rū	nsuūg n ^{yi}
N	wāsūgā	wāsūg rū	wasuūg n ^{yi}
N+P	wāksūgā	wāksūg rū	wāksūg n ^{yi}
N+U+P	wānsūgā	wānsūg rū	wānsūg n ^{yi}

buy 42

	lp	2p	3p pass
P	<u>zĩ</u>	zĩr	dũziĩn ^y
H	rzĩ	rzĩr	rdũziĩn ^y
C	wĩ	wĩr	bdũziĩn ^y
U	nzĩ	nziĩr	ndũziĩn ^y
N	wāzĩ	wāzĩr	wādũziĩn ^y
N+P	wāksĩ	wāksiĩr	wāgdũziĩr ^y
N+U+P	wānsĩ	wānsiĩr	wāndũziĩn ^y

see 43

	lp	2p
P	<u>zākā</u>	zāk rū
H	rzākā	rzāk rū
C	bzaākā	bzaāk rū
U	nzākā	nzāk rū
N	wāzākā	wāzāk rū
N+P	wāksākā	wāksāk rū
N+U+P	wānsākā	wānsāk rū

smoke 44

	lp	2p
P	<u>zaāyā</u>	zaāy rū
H	rzaāyā	rzaāy rū
C	bzaāyā	bzaāy rū
U	nzaāyā	nzaāy rū
N	wāzaāyā	wāzaāy rū
N+P	wāksaāyā	wāksaāy rū
N+U+P	wānsaāyā	wānsaāy rū

dress 45

	lp	2p
P	<u>zũ</u>	zũr
H	rzũ	rzũr
C	bzũ	rzũr
U	nzũ	nzũr
N	wāzũ	wāzũr
N+P	wāksũ	wāksũr
N+U+P	wānsũ	wānsũr

	1p caus	2p caus
P	<u>zuū</u>	zuūr
H	<u>rzuū</u>	rzuūr
C	<u>bzuū</u>	bzuūr
U	<u>nzuū</u>	nzuūr
N	<u>wāzuū</u>	wāzuūr
N+P	<u>wāksuū</u>	wāksuūr
N+U+P	<u>wānsuū</u>	wānsuūr

extract 46

	1p	2p	3p caus
P	<u>ṣii</u>	ṣiir	dūṣiir ^v
H	<u>rṣii</u>	rṣiir	rdūṣiir ^v
C	<u>psii</u>	psiiir	bdūṣiir ^v
U	<u>nṣii</u>	nṣiir	ndūṣiir ^v
N	<u>wāṣii</u>	wāṣiir	wādūṣiir ^v
N+P	<u>wāksii</u>	wāksiiir	wāgdūṣiir ^v
N+U+P	<u>wāṣii</u>	wāṣiiir	wāndūṣiir ^v

speak 47

	1p	2p
P	<u>nee</u>	niir
H	<u>rnee</u>	rniir
C	<u>mnee</u>	mniir
U	<u>nnee</u>	nniir
N	<u>wānee</u>	wāniir
N+P	<u>wāgneē</u>	wāgniir
N+U+P	<u>wānnēē</u>	wānniir

lose 48

	1p	2p
P	<u>ne'</u>	ne'r
H	<u>rne'</u>	rne'r
C	<u>mne'</u>	mne'r
U	<u>nne'</u>	nne'r
N	<u>wāne'</u>	wāne'r
N+P	<u>wāgnē'</u>	wāgnē'r
N+U+P	<u>wānnē'</u>	wānnē'r

	lp pass	2p pass
P	dūnē'	dūnē'r
H	rdūnē'	rdūnē'r
C	bdūnē'	bdūnē'r
U	ndūnē'	ndūnē'r
N	wādūnē'	wācūnē'r
N+P	wāgdūnē'	wāgdūnē'r
N+U+P	wāndūnē'	wāndūnē'r

guard 49

	lp	2p	3p
P	n ^y ā	n ^y ār	n ^y aān ^y
H	rn ^y ā	rn ^y ār	rn ^y ān ^y
C	mn ^y ā	mn ^y ār	mn ^y ān ^y
U	n ^y n ^y ā	n ^y n ^y ār	n ^y n ^y aān ^y
N	wān ^y ā	wān ^y ār	wān ^y aān ^y
N+P	wāgn ^y ā	wāgn ^y ār	wāgn ^y ān ^y
N+U+P	wānn ^y ā	wānn ^y ār	wānn ^y ān ^y

divide 50

	lp	2p
P	lēwā	lēw rū
H	rlēwā	rlēw rū
C	blēwā	blēw rū
U	nlēwā	nlēw rū
N	wālēwā	wālēw rū
N+P	wāglēwā	wāglēw rū
N+U+P	wānlēwā	wānlēw rū

wait 51

	lp	2p	3p
P	lèzā	k ^w èz rū	k ^w èz n ^y iī
H	rlèzā	rbèz rū	rbèz n ^y iī
C	blèzā	blèz rū	blèz n ^y iī
U	nlèzā	mbèz rū	mbèz n ^y iī
N	wālèzā	wābèz rū	wābèz n ^y iī
N+P	wāglèzā	wāk ^w èz rū	wāk ^w èz n ^y iī
N+U+P	wānlèzā	wānk ^w èz rū	wānk ^w èz n ^y iī

	lp caus	2p caus
P	k ^w eēzā	k ^w eēz rū
H	rk ^w eēzā	rk ^w eēz rū
C	pk ^w eēzā	pk ^w eēz rū
U	ṅk ^w eēzā	ṅk ^w eēz rū
N	wāk ^w eēzā	wāk ^w eēz rū
N+P	wāk ^w eēzā	wāk ^w eēz rū
N+U+P	wānk ^w eēzā	wānk ^w eēz rū

distribute 52

	lp	2p	3p pass
P	lēzā	k ^y ēz rū	dūg ^y eēz n ^y i
H	rlēzā	rg ^y eēz rū	rdūg ^y eēz n ^y i
C	blēzā	bleēz rū	bdūg ^y eēz n ^y i
U	nlēzā	n ^y g ^y eēz rū	ndūg ^y eēz n ^y i
N	wālēzā	wāyēz rū	wādūg ^y eēz n ^y i
N+P	wāglēzā	wāk ^y eēz rū	wāgdūg ^y eēz n ^y i
N+U+P	wānlēzā	wānk ^y eēz rū	wāndūg ^y eēz n ^y i

empty 53

	lp	2p
P	laātā	laāt rū
H	rlaātā	rlaāt rū
C	blaātā	blaāt rū
U	nlaātā	nlaāt rū
N	wālaātā	wālaāt rū
N+P	wāglaātā	wāglaāt rū
N+U+P	wānlaātā	wānlaāt rū

remove 54

	lp	2p
P	loō	kōr
H	rloō	rboōr
C	bloō	bloōr
U	nloō	mboōr
N	wāloō	wābōr
N+P	wāgloō	wākoōr
N+U+P	wānloō	wānkoōr

arrive I 55

	lp	2p	3p
P	rī	rīr	riīn ^y
H	drī	drīr	drīn ^y
C	brī	brīr	brīn ^y
U	nrī	nrīr	nriīn ^y
N	wārī	wārīr	wariīn ^y
N+P	wāgrī	wāgrīr	wāgrīn ^y
N+U+P	wānrī	wānrīr	wānrīn ^y

drill 56

	lp	2p
P	rīdā	k ^y īd rū
H	drīdā	rg ^y īd rū
C	brīdā	brīd rū
U	nrīdā	ng ^y īd rū
N	wārīdā	wāyīd rū
N+P	wāgrīdā	wāk ^y īd rū
N+U+P	wānrīdā	wānk ^y īd rū

slip 57

	lp	2p
P	rīl ^y ā	rīl ^y rū
H	drīl ^y ā	drīl ^y rū
C	brīl ^y ā	brīl ^y rū
U	nrīl ^y ā	nrīl ^y rū
N	wārīl ^y ā	wārīl ^y rū
N+P	wāgrīl ^y ā	wāgrīl ^y rū
N+U+P	wānrīl ^y ā	wānrīl ^y rū

give 58

	lp	2p
P	rīkā	k ^w īk rū
H	drīkā	rbīk rū
C	brīkā	brīk rū
U	nrīkā	mbīk rū
N	wārīkā	wābīk rū
N+P	wāgrīkā	wāk ^w īk rū
N+U+P	wānrīkā	wānk ^w īk rū

set 59

	lp		2p
P	rísá		k ^y ís rú
H	drísá		rg ^y ís rú
C	brísá		bríís rú
U	nrísá		n ^y g ^y ís rú
N	wàrísá		wàyís rú
N+P	wàgrísá		wàk ^y ís rú
N+U+P	wànrisá		wànk ^y ís rú

call 60

	lp		2p
P	réjá		rbéj rú
H	dréjá		rbéj rú
C	bréjá		bréj rú
U	nréjá		mbéj rú
N	wàréjá		wàbéj rú
N+P	wàgréjá		wàk ^w éj rú
N+U+P	wànrejá		wànk ^w éj rú

beat 61

	lp		2p
P	rúzá		gáz rú
H	drúzá		ráz rú
C	brúzá		gúz rú
U	nrúzá		n ^y g ^y áz rú
N	wàrúzá		wáz rú
N+P	wàgrúzá		wàgáz rú
N+U+P	wànruzá		wàngáz rú
	lp caus		2p caus
P	gaāzā		gaāz rú
H	rgaāzā		rgaāz rú
C	bgaāzā		bgaāz rú
U	ngaāzā		ngaāz rú
N	wāgaāzā		wāgaāz rú
N+P	wāgaāzā		wāgaāz rú
N+U+P	wāngaāzā		wāngaāz rú

arrive II 62

	1p	2p	3p
P	rú'n ^y ǎ	rú'n ^y ǎr	rú'n ^y ǎn ^y
H	drú'n ^y ǎ	drú'n ^y ǎr	drú'n ^y ǎn ^y
C	brú'n ^y ǎ	brú'n ^y ǎr	brú'n ^y ǎn ^y
U	nrú'n ^y ǎ	nrú'n ^y ǎr	nrú'n ^y ǎn ^y
N	wárú'n ^y ǎ	wárú'n ^y ǎr	wárú'n ^y ǎn ^y
N+P	wágrú'n ^y ǎ	wágrú'n ^y ǎr	wágrú'n ^y ǎn ^y
N+U+P	wánrú'n ^y ǎ	wánrú'n ^y ǎr	wánrú'n ^y ǎn ^y

be bored 63

	1p	2p
P	gázédǎ	gázéd rú
H	rǎzeèdǎ	rǎzeèd rú
C	gùzeèdǎ	gùzeèd rú
U	n ^y g ^y ázeèdǎ	n ^y g ^y ázeèd rú
N	wázeèdǎ	wázeèd rú
N+P	wágázeèdǎ	wágázeèd rú
N+U+P	wángázeèdǎ	wángázeèd rú

(do bore)

	1p	2p
P	g ^y ík ^y seèdǎ	g ^y ík ^y seèd rú
H	rík ^y seèdǎ	rík ^y seèd rú
C	bík ^y seèdǎ	bík ^y seèd rú
U	n ^y g ^y ík ^y seèdǎ	n ^y g ^y ík ^y seèd rú
N	wáyík ^y seèdǎ	wáyík ^y seèd rú
N+P	wág ^y ík ^y seèdǎ	wág ^y ík ^y seèd rú
N+U+P	wáng ^y ík ^y seèdǎ	wáng ^y ík ^y seèd rú

be cold 64

	1p	2p
P	gázíl ^y ǎ	gázíl ^y rú
H	rázíl ^y ǎ	rázíl ^y rú
C	gùzíl ^y ǎ	gùzíl ^y rú
U	n ^y g ^y ázíl ^y ǎ	n ^y g ^y ázíl ^y rú
N	wázíl ^y ǎ	wázíl ^y rú
N+P	wágázíl ^y ǎ	wágázíl ^y rú
N+U+P	wángázíl ^y ǎ	wángázíl ^y rú

be angry 65

	lp	2p
P	gàzi lāg ^y ǎ	gàzi lāg ^y rú
H	rzi lāg ^y ǎ	rzi lāg ^y rú
C	gūzi lāg ^y ǎ	gūzi lāg ^y rú
U	n ^y g ^y azi lāg ^y ǎ	n ^y g ^y azi lāg ^y rú
N	wāzi lāg ^y ǎ	wāzi lāg ^y rú
N+P	wāgāzi lāg ^y ǎ	wāgāzi lāg ^y rú
N+U+P	wāngāzi lāg ^y ǎ	wāngāzi lāg ^y rú

be holy 66

	lp	2p	3p
P	gātǎ	gātǎr	gātǎn ^y
H	rātǎ	rātǎr	rātǎn ^y
C	gūtǎ	gūtǎr	gūtǎn ^y
U	n ^y g ^y ātǎ	n ^y g ^y ātǎr	n ^y g ^y ātǎn ^y
N	wātǎ	wātǎr	wātǎn ^y
N+P	wāgātǎ	wāgātǎr	wāgātǎn ^y
N+U+P	wāngātǎ	wāngātǎr	wāngātǎn ^y

APPENDIX III

PAPABUCO EQUIVALENCES

In this section of the appendix I include TZ equivalences for the Elotepec (EZ) Zapotec forms cited in Rendón (1971). EZ words are cited in Rendón's orthography. S is \bar{S} . Z is \bar{Z} . ch is \bar{C} . ʔ is glottal stop. dx is \bar{J} . N is nasalization on the previous vowel. High tone is 1. Low tone is 2. Rising tone is 3. Falling tone is 4. Neutral tone is unmarked. All other symbols are self evident.

The gloss in the third column is for TZ. When the EZ gloss differs I include it in parentheses. Sometimes EZ words are morphologically complex and although I can recognize the parts, they do not form an acceptable expression in TZ. For those forms I cite the TZ equivalents on separate lines with a separate gloss for each morpheme.

	EZ	TZ	
1.	a ³ N	\bar{a}	I
2.	ru ³	rú	you
3.	bi ¹ ge ¹ na ³	dě úbnà	we
4.	ndxe ¹	ndè	that
5.	ire ¹	rè	there
6.	chu ¹ -ñi ¹	kʷà ní	whose

7.	la ³ -ña ¹ (quế)	lả ná	what kind
8.	wa ¹ hka ¹ (no)	wàk (ã)	can not
9.	de ¹ la	dé là	all
10.	bi-goroba (muchos)	rùp làa	both
11.	ti ¹ bi ¹	tùb	one
12.	cho ² ppa ²	k ^y ùp	two
13.	i ³ lyi	il ^y	big
14.	tu ¹ ñi	tùn ^y	long
15.	mi ⁷ iN	mi ^ñ n ^y	little
16.	e ¹ mya ¹	mn ^y aa	woman
17.	i ¹ ge ¹ ye	yũ g ^y eēy	man
18.	mbetcha	mbék ^y	people
19.	bala	bəl	fish
20.	i ¹ SSki ³ ñi	Yig ^y in ^y	bird
21.	tchitti	čē'	dog
22.	e ¹ pcha ⁷ a	pk ^y ā'	louse
23.	yaga	yàg	tree
24.	le ¹ dxe ¹ (semilla)	lāg ^y	squash seed
25.	lya ³ ga ¹	l ^y āg	leaf
26.	lyu ⁴	l ^y ū	root
27.	lede	lād	bark
28.	gidi	g ^y id	skin
29.	ba ³ la	beəl	meat

30.	reñe	rən ^y	blood
31.	ritti	rit	bone
32.	za ⁴	zā	grease
33.	ngo	nguā	egg
34.	ya ¹ g gi ¹ kki (cuerno)	yāg gīk ^y	wood, tree paper
35.	ñe ³ N	nē	my tail
36.	debe	doðb	feather
37.	gi ¹ ssi ¹ kki	g ^y ich	hair
38.	ikki	ik	head
39.	i ¹ da ¹ ga	g ^y idāg	ear
40.	u ¹ r lo ³	ōrlō	eye
41.	ti ¹ 7ñiN (nariz)	tī'n ^y	its smell
42.	ru ¹ 7u	rū'	mouth
43.	leye	lāy	teeth
44.	lyuZa ³ N	l ^y ūjā	my tongue
45.	chog-, sog-	sūg	finger nail
46.	gya7a ¹ N	g ^y ī'	my foot
47.	ikkchiba ¹ N	tībā	my knee
48.	ya	yaā	hand
49.	sa ¹ N	_____	barriga
50.	gye ³ ñā ¹ N	yēn ^y ā	my neck
51.	ñīdxi ¹ (teta)	nīg ^y īg ^y	breast milk mammary gland
52.	lEre (corazōn)	lārdōð	spirit

53.	iga ³ N (esp.)		higado
54.	erdu ¹ 7u ¹ N	rd̥d̥'	I drink
55.	erda ³ wa ¹ N	rd̥āw	I eat
56.	erzo ¹ b le ³ ya ¹ N	rzúb	sit
	(morder)	lâyā	my teeth
57.	e ¹ rgwa ¹ N	rg ^w īī	I see
58.	re ¹ ñā ³ N	rēn ^y ā	I hear, understand
59.	re ¹ t le ³ ra ¹ N	rāt lāg ^y ā	I know
60.	e ¹ red ¹ sa ³ N	rdāsā	I sleep
61.	getta ³ N	gātā	I will die
62.	dutta ¹ N	dūtā	I will kill
63.			nadar
64.	gya ¹ esse ¹ ba ¹ N	g ^y ēs	ascend
	(volver)	bā	sky
		N	I
65.	erza ³ N	rzā	I walk
66.	yappa ³ N	yāpā	I come
67.	erbissa ³ N	rābīśā	I lay
68.	ri ¹ ba ¹ N	riībā	we sit
69.	zu ³ N	zū	I stand
70.	du ³ N	dū	I bring
	(dar)		
71.	e ¹ rnīa ³ N	rneē	I say
72.	do	doð	sun
73.	beie	beēy	moon
74.	ba ¹ lSe ¹	bēl	star
75.	ñissi	nīs	water
76.	kye ¹ ye	g ^y ēy	rain

77.	ittatʔa	g ^y it̪a'	rock
78.	yu ¹ ʔu ¹ zi	yũ t̪ɣ̃	sand (lit. fine dirt)
79.	yu ⁴	yũ	dirt
80.	za ³	z̪a	cloud
81.	Ze ¹ ñe	ʔẽ.n ^y	smoke
82.	gi ³	g ^y i	fire
83.	di ¹ ʔni ¹	dĩ.n ^y	ash
84.	rikki	r̪ik	give
	(arder)	g ^y i	fire
85.	naza	n̪ez	road
86.	ruʔ besse	rũ'	mouth
	(cerro)	bik ^y	mountain top
87.	ni ⁴ ñā	nũ n ^y ā	red
88.	ñi-kkaʔa	nũ k̪ā'	green
89.	ñiñ-ke ¹ SSe ¹	nũ k̪ač ^y	yellow
90.	ñiñ-ke ¹ che ¹	nũ k̪ak ^y	white
91.	ñiñ-ka ¹ ssa ¹	nũ k̪ás	black
92.	ralla	r̪él	night
93.	zi ⁴ gi	z̪ig	hot
94.	ra ⁴ ga	r̪ag	cold
95.	uza ³	ʔa	full
96.	kubi	kũb	new
97.	na ¹ ppa	n̪ap	good
98.	yu ³ bi ¹	yũb	round
99.	wa ¹ SSa	w̪ač ^y	dry
100.	la ³	l̪a	name

APPENDIX IV

RULE SUMMARY

This part of the appendix consists of two parts. In the first part, all rules are listed in their final form. The different types of rules are distinguished: syntactico-phonological rules, phonological rules, and processes. And, the relationship of these rules to the natural phonemic level is indicated.

In the second part, all rules which are extrinsically ordered are listed. Under each rule is a summary of its relationship with other rules. These relationships determine its order.

I have not included relationships that exist between phonological principles operating above the natural phonemic level and those operating below the natural phonemic level. Since principles operating above the natural phonemic level affect morphemes that alternate, there are many such constraints. I have also excluded from the rule summary surface structure constraints. The constraints are often violated in the UF. They therefore apply at the natural phonemic level. Otherwise they are not extrinsically ordered.

SYNTACTICO-PHONOLOGICAL

- MR1: a-substitution
 $u \longrightarrow a / + ______ V$ in {2p, 3p, caus} stem
- MR2: deletion 1 and k-substitution

$$\left\{ \begin{array}{c} c \\ l \\ r \end{array} \right\} \longrightarrow \left[\begin{array}{c} k \\ \emptyset \\ \emptyset \end{array} \right] / \left[\begin{array}{l} + ______ \{i, e, u\} \text{ in } [\{2p, 3p\} \text{ not } \{C, N\} \text{ stem}] \\ \quad \quad \quad [-M] \quad \quad \quad [\{2p, 3p\} \text{ N stem}] \\ + ______ \{a, o, u\} \text{ in } [\{2p, 3p\} \text{ not C stem}] \\ \quad \quad \quad [+M] \end{array} \right]$$
- MR3: deletion 2
 $\{d, r\} \longrightarrow \emptyset / + ______ V$ in {2p, 3p} C stem
- MR4: b-substitution
 $\{r, l\} \longrightarrow b / + ______ V$ in {2p, 3p} not C stem
- MR5: g-substitution
 $\{d, l, r\} \longrightarrow g / + ______ V$ in pass stem
- MR6: deletion 3
 $d \longrightarrow \emptyset / + ______$ in caus stem
- R7: adjectival tone
 $V \longrightarrow \left[\begin{array}{c} +T \text{ hi} \\ -T \text{ low} \end{array} \right] / \left\{ \begin{array}{c} N \\ \text{Adj} \end{array} \right\} + ______]_{NP}$
- MR8: perturber adjustment
 $V \longrightarrow [+P] /$ in {P, U, N}
- R9: lp subject tone adjustment
 $\left[\begin{array}{c} -T \text{ hi} \\ -\rho \end{array} \right] \longrightarrow \left[\begin{array}{c} +T \text{ hi} \\ -T \text{ low} \end{array} \right] /$ in lp LR
 condition: (1) clitic bound
 (2) can apply only once within clitic boundary
- R10: potential tone adjustment
 $\left[\begin{array}{c} -T \text{ hi} \\ -\rho \end{array} \right] \longrightarrow \left[\begin{array}{c} +T \text{ hi} \\ -T \text{ low} \end{array} \right] /$ in {P, U, N} LR
 condition: (1) clitic bound
 (2) can apply only once within clitic boundary
- MR11: H tone adjustment
 $[-T \text{ hi}] \longrightarrow \left[\begin{array}{c} +T \text{ hi} \\ -T \text{ low} \end{array} \right] / y ______$ in H
 condition: clitic bound
- MR12: tone readjustment
 $[+T \text{ hi}] \longrightarrow [+T \text{ low}]$

- R13: stress placement
 $V \longrightarrow [+stress] / \frac{\quad}{stem} +$
- R14: velar deletion 2
 $k \longrightarrow \emptyset / + \frac{\quad}{\quad} +C \text{ in the N stem}$
- R15: laryngeal reduction
 $v \longrightarrow [-lar] / \begin{bmatrix} + T hi \\ - T low \end{bmatrix}$
- MR16: U-laryngealization
 $v \longrightarrow [+lar] / \text{in } \{2p, 3p\} \text{ U stem}$
- MR17: C-laryngealization
 $v \longrightarrow [+lar] / \text{in } \{2p, 3p\} \text{ C stem}$
- MR18: lp-laryngealization
 $v \longrightarrow [+lar] / \text{in lp stem}$
- MR19: causative laryngealization
 $v \longrightarrow [+lar] / \text{in caus stem}$

PHONOLOGICAL RULES

- R20: passive voicing
 $C \longrightarrow [+vd] / \{du+\} \frac{\quad}{\quad} V$
- MR21: z-deletion
 $z \longrightarrow \emptyset / b \frac{\quad}{\quad}$
- R22: b-lenition
 $b \longrightarrow w / [+obs] \frac{\quad}{\quad} \begin{matrix} -cons \\ -M \end{matrix}$
- MR23: vowel raising and rounding
 $V \longrightarrow u / Cw \frac{\quad}{\quad} [-rnd]$
- MR24: velar deletion 3
 $g \longrightarrow \emptyset / \frac{\quad}{\quad} w$
- R25: w-deletion
 $w \longrightarrow \emptyset / C \frac{\quad}{\quad} \begin{matrix} V \\ [+rnd] \end{matrix}$
- MR26: sibilant formation
 $y \longrightarrow \begin{bmatrix} \overset{v}{c} \\ z \end{bmatrix} / \begin{bmatrix} k \\ [\#, r] \end{bmatrix} \frac{\quad}{\quad}$

R27: switch in interpretation

$$\begin{array}{c} \left\{ \begin{array}{c} k \\ g \\ n \\ l \end{array} \right\} \begin{array}{c} \left\{ \begin{array}{c} -\text{cons} \\ -\text{syl} \\ +\text{hi} \\ \alpha\text{frt} \\ \beta\text{rnd} \end{array} \right\} \end{array} \Rightarrow \begin{array}{c} 1 \\ \left[\begin{array}{c} +\text{hi} \\ \alpha\text{frt} \\ \beta\text{rnd} \end{array} \right] \end{array} \quad \emptyset$$

1 2
condition: clitic bound

R28: vowel fronting

$$\begin{array}{c} v \\ \left[\begin{array}{c} +\text{rnd} \\ +\text{native} \end{array} \right] \end{array} \longrightarrow \begin{array}{c} \left[\begin{array}{c} +\text{frt} \\ -\text{rnd} \end{array} \right] / b ____ \end{array}$$

R29: r-obstruentization

$$r \longrightarrow d / ____ r$$

R30: velar voicing 1

$$k \longrightarrow g / \# ____ \left[\begin{array}{c} +\text{cbs} \\ +\text{vd} \end{array} \right]$$

R31: geminate reduction

$$\left[\begin{array}{c} +\text{obs} \\ \alpha\text{pt} \end{array} \right] \longrightarrow \emptyset / ____ \left[\begin{array}{c} +\text{obs} \\ \alpha\text{pt} \end{array} \right]$$

R32: velar voicing 2

$$k \longrightarrow g / \left\{ \begin{array}{c} v \\ c \end{array} \right\} ____$$

Condition: clitic-bounded
optional

R33: progressive devoicing

$$\left[+\text{obs} \right] \longrightarrow \left[-\text{vd} \right] / \left[\begin{array}{c} +\text{obs} \\ -\text{vd} \end{array} \right] ____$$

MR 34: a-deletion

$$a \longrightarrow \emptyset / r + ____ +$$

prefix

R35: velar voicing 3

$$k \longrightarrow g / ____ +v$$

prefix

R36: global voicing

$$k \longrightarrow g / \{n, r\} ____ v // \{d, l, r\}$$

R37: regressive devoicing

$$\left[+\text{obs} \right] \longrightarrow \left[-\text{vd} \right] / ____ \left[\begin{array}{c} +\text{obs} \\ -\text{vd} \end{array} \right]$$

R38: velar deletion 1

$$\left[\begin{array}{c} +\text{obs} \\ -\text{ant} \\ -\text{cor} \end{array} \right] \longrightarrow \emptyset / \left\{ \begin{array}{c} \neq \\ +\text{cons} \end{array} \right\} ____ \left[+\text{cons} \right]$$

MR50: b-nasalization
 $b \longrightarrow [+nas] / \text{---} \overset{C}{[+nas]}$

R51: y-deletion 1
 $y \longrightarrow \emptyset / \begin{bmatrix} -cons \\ -syl \end{bmatrix} \text{---}$

R52: r-deletion
 $r \longrightarrow \emptyset / \text{---}y$

MR53: y-deletion 2
 $y \longrightarrow \emptyset / [+sib] \text{---}$

MR54: y-deletion 3
 $y \longrightarrow \emptyset / l+ \text{---}$

MR55: y-deletion 4
 $y \longrightarrow \emptyset / r \text{---}$

MR56: y-deletion 5
 $y \longrightarrow \emptyset / b \text{---} \overset{V}{[+frt]}$

PROCESSES

P1: palatalization
 $\begin{bmatrix} +obs \\ -cor \\ -ant \end{bmatrix} \longrightarrow \begin{bmatrix} +hi \\ +frt \\ -rnd \end{bmatrix} / \text{---} \overset{V}{[+frt]}$

P2: tone lowering on laryngeal vowels
 $[\alpha T hi] \longrightarrow \begin{bmatrix} -T hi \\ -\alpha T low \end{bmatrix} / \overset{V}{[+lar]}$

P3: tone lowering on checked vowels
 $[-T hi] \longrightarrow [+T low] / \overset{V}{[-stress]}$

P4: tone adjustment on unstressed vowels
 $[+T hi] \longrightarrow [-T low] / \overset{V}{[-stress]}$

P5: nasal assimilation
 $n \longrightarrow [\alpha pt] / \# \text{---} \begin{bmatrix} +cons \\ -nas \\ \alpha pt \end{bmatrix}$

NATURAL PHONEMIC LEVEL

- P6: d-lenition
 $d \longrightarrow [+cont] / V ______$
 condition: morpheme bound
- P7: sibilant lengthening

$$\begin{array}{c} C \\ [+sib] \\ [-vd] \end{array} \longrightarrow [+long] / ______ \#$$
- P8: aspiration

$$\begin{array}{c} C \\ [-sib] \\ [-vd] \end{array} \longrightarrow [+asp] / ______ \#$$
- P9: vowel lengthening
 a. $V \longrightarrow [1 \text{ long}] / \begin{array}{c} [+stress] \\ [-check] \end{array} \begin{array}{c} [-syl] \\ [+vd] \end{array}$
 b. $V \longrightarrow [2 \text{ long}] / \begin{array}{c} [+stress] \\ [-check] \end{array} \neq$
- P10: obstruent devoicing

$$\begin{array}{c} C \\ [+obs] \\ [+vd] \end{array} \longrightarrow [-vd] / ______ \#$$
- P11: diphthongization
 $\emptyset \longrightarrow y / V ______ \begin{array}{c} C \\ [+hi] \\ [+frt] \end{array}$
- P12: r devoicing
 $r \longrightarrow [-vd] / \left\{ \begin{array}{c} \# ______ C \\ ______ \# \end{array} \right\}$
- P13: velar fronting

$$\begin{array}{c} [+obs] \\ [-sib] \\ [+hi] \\ [+frt] \\ [-rnd] \end{array} \longrightarrow \begin{array}{c} [+ant] \\ [+cor] \end{array} / ______ \begin{array}{c} V \\ [+rnd] \end{array}$$
- P14: initial glottal insertion
 $\emptyset \longrightarrow ' / \# ______ V$
- P15: glottalization
 $\{m, n, n^y, l, y, w\} \longrightarrow [+check] / \begin{array}{c} V \\ [+check] \end{array} ______ \#$
- P16: glottal deletion
 $[+check] \longrightarrow [-check] / ______ [+check]$

P17: echo

$$\emptyset \longrightarrow \left[\begin{array}{l} +\text{syl} \\ -\text{check} \\ -\text{stress} \\ \alpha F \end{array} \right] / \left[\begin{array}{l} +\text{syl} \\ +\text{check} \\ \alpha F \end{array} \right] \text{---} \#$$

condition: (1) optional
(2) utterance final

P18: d-epenthesis

$$\emptyset \longrightarrow \left[\begin{array}{l} +\text{cons} \\ +\text{ant} \\ +\text{cor} \\ -\text{sib} \\ -\text{nas} \\ \alpha \text{vd} \end{array} \right] / \left[\begin{array}{l} +\text{cons} \\ +\text{cor} \\ -\text{sib} \\ \alpha \text{vd} \end{array} \right] \neq \text{---} r$$

P19: palatal fronting

$$\begin{array}{l} C \\ \left[\begin{array}{l} +\text{obs} \\ -\text{sib} \\ +\text{hi} \\ +\text{frt} \\ -\text{rnd} \end{array} \right] \end{array} \longrightarrow \left[\begin{array}{l} +\text{ant} \\ +\text{cor} \end{array} \right] / \text{---} \begin{array}{c} v \\ \left[+\text{rnd} \right] \end{array}$$

CONSTRAINTS ON RULE ORDER

- MR1: a-substitution
feed: MR2
- MR2: deletion 1 and k-substitution
feed: MR1, R35, R36, R44
bleed: R38
- MR3: deletion 2
feed: R22, R28
bleed: R38
- MR4: b-substitution
feed: R22
- MR6: deletion 3
feed: R35
bleed: R38
- R7: adjectival tone
feed: R15
- MR8: perturber adjustment
bleed: MR9, MR10
feed: R48, R45
- MR9-11: tone adjustment rules
feed: R12, R15, R40, R41, R47
bleed: MR8, R45
- MR12: tone readjustment
feed: MR9-11
- R13: stress placement
bleed: P4
- R15: laryngeal reduction
feed: R7, MR9-11, bleed: P2
antifeed: R16, MR19

MR16: U-laryngealization
 feed: P2
 antifeed: R15
 MR17: C-laryngealization
 feed: P2
 MR18: lp-laryngealization
 feed: P2
 MR19: caus-laryngealization
 feed: P2
 antifeed: MR19
 R20: passive voicing
 antibleed: R27
 MR21: z-deletion
 feed: R22
 R22: b-lenition
 feed: MR3, MR4, R21, R23, R24, R25, R27
 bleed: R28, R33, R38
 antibleed: R38
 MR23: vowel raising and rounding
 feed: R22
 antibleed: MR24, R25
 R25: w-deletion
 feed: R22
 bleed: R27
 antibleed: R27
 R27: switch in interpretation
 feed: R22, R38, P1
 bleed: R25
 antibleed: R20, R24, R25
 R28: vowel fronting
 feed: MR3
 bleed: R22
 R30: velar voicing 1
 bleed: R38
 antifeed: R31
 antibleed: R38
 R31: geminate reduction
 bleed: R38
 antifeed: R30
 R32: velar voicing 2
 bleed: R33
 R33: progressive devoicing
 bleed: R22, R30, R32
 antibleed: R38
 R35: velar voicing 3
 feed: MR2, MR6
 R36: global voicing
 feed: MR2
 R38: velar deletion 1
 feed: R27
 bleed: MR2, MR3, MR6, R22, R31
 antibleed: R22, R30, R33

- R39: y-epenthesis
bleed: R44
- R40: regressive perturbation 2
bleed: MR9-11
antibleed: P2
- R41: regressive perturbation 3
bleed: MR9-11
antibleed: R42
- R42: regressive nasalization
antibleed: R41, R43
- R43: contraction
feed: R46
bleed: R44
antibleed: R42, R44
- R44: vowel deletion
feed: MR2
bleed: R39, R43
antibleed: R43
- R45: progressive perturbation
feed: R47, MR8, P4
bleed: MR9-11
antifeed: P2, P3
antibleed: P2, P3
- R46: regressive perturbation 1
feed: R43
antifeed: P2, P3
antibleed: P2, P3
- R47: regressive laryngealization
feed: MR9-11, R45, P2
- R48: progressive laryngealization
feed: MR8
- P1: Nasal assimilation
feed: R27
- P2: tone lowering on laryngeal vowels
feed: MR16-19, R47
bleed: R15
antifeed: R45, R46
antibleed: R40, R46
- P3: tone lowering on checked vowels
antifeed R45, R46
antibleed: R46
- P4: tone adjustment on unstressed vowels
feed: R45
bleed: R13
- P6: d-lenition
antibleed: P10
- P7: sibilant length
antifeed: P10
- P8: aspiration
antifeed: P10
- P9: vowel length
antibleed: P10

P10: obstruent devoicing
 an:ifeed: P7, P8
 antibleed: P6, P7, P8, P9
P15: glottalization
 feed: P16
P16: glottal deletion
 feed: P15

APPENDIX V

LIST OF SYMBOLS

anim	animal
C	completive aspect
caus	causative
cont	continuative aspect
fam	familiar
fem	feminine
H	habitual aspect
inc	inclusive
itv	intransitive verb
lit	literal translation
LR	left to right iteration
mas	masculine
MR	minor rule
N	negative
obj	direct object
P	potential aspect
pass	passive
pl	plural
resp	respect
RL	right to left iteration
SC	surface structure constraint

sub	subject
tv	transitive verb
U	unreal aspect
[]	Square brackets enclose distinctive features. They enclose phonetic transcriptions. They enclose an ordered set of elements in a rule to show correspondence with respective members of an ordered set of elements at another place in the rule. The first member of the ordered set in the first set of brackets corresponds to the first member of the set in the second set of brackets, etc.
()	Parenthesis enclose optional elements.
{ }	Curly braces enclose a disjoint set of elements. They also enclose the underlying form of morphemes.
//	// enclose the phonemic transcription.
/_____	/_____ is to be read "in the environment of."
//_____	//_____ is to be read "when the environment is underlying." It refers to a global environment.
C	C refers to any [-syl] segment.
C _i ^j	C _i ^j refers to at least i [-syl] segments and as j [-syl] segments.
V	V refers to any [+syl] segment.
V.	V. refers to a segment that is [+syl, 1 long]
V:	V: refers to a segment that is [+syl, 2 long]
[α F]	[α F] indicates that the segments containing the variable α agree in all feature specifications except when indicated otherwise.
[α pt]	[α pt] indicates that segments containing the variable α agree in all point-of-articulation features.
+	The plus sign marks a morpheme boundary.
≠	≠ marks a clitic boundary
#	# marks a word boundary

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