



1978

## Texmelucan Zapotec suprasegmental phonology

Charles H. Speck  
*SIL-UND*

[How does access to this work benefit you? Let us know!](#)

Follow this and additional works at: <https://commons.und.edu/sil-work-papers>



Part of the [Linguistics Commons](#)

---

### Recommended Citation

Speck, Charles H. (1978) "Texmelucan Zapotec suprasegmental phonology," *Work Papers of the Summer Institute of Linguistics, University of North Dakota Session*: Vol. 22, Article 9.

DOI: 10.31356/silwp.vol22.09

Available at: <https://commons.und.edu/sil-work-papers/vol22/iss1/9>

This Article is brought to you for free and open access by UND Scholarly Commons. It has been accepted for inclusion in Work Papers of the Summer Institute of Linguistics, University of North Dakota Session by an authorized editor of UND Scholarly Commons. For more information, please contact [und.common@library.und.edu](mailto:und.common@library.und.edu).

# TEXMELUCAN ZAPOTEC SUPRASEGMENTAL PHONOLOGY<sup>1</sup>

Charles H. Speck

0. Introduction
1. Phonological Perturbation
  - 1.1 Tone Rules
  - 1.2 Tone Processes
2. Grammatical Perturbation
3. Laryngealization
4. The Effect of Grammatical Perturbation and Laryngealization on the Tone Lowering Process
5. Stress Placement

0. Speaking of general characteristics of tone languages, William S-Y-Wang (1967) points out some basic differences between the types of tone found in 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 Texmelucan Zapotec, hereafter referred to as TZ.<sup>2</sup> 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.

1. 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].

táz	<i>cup</i>	gá'l	<i>shadow</i>
lêz	<i>opossum</i>	gʸà'n	<i>dish</i>
bēz	<i>fox</i>	biTz	<i>corner post</i>
bèz	<i>bee</i>	brìz	<i>squirrel</i>

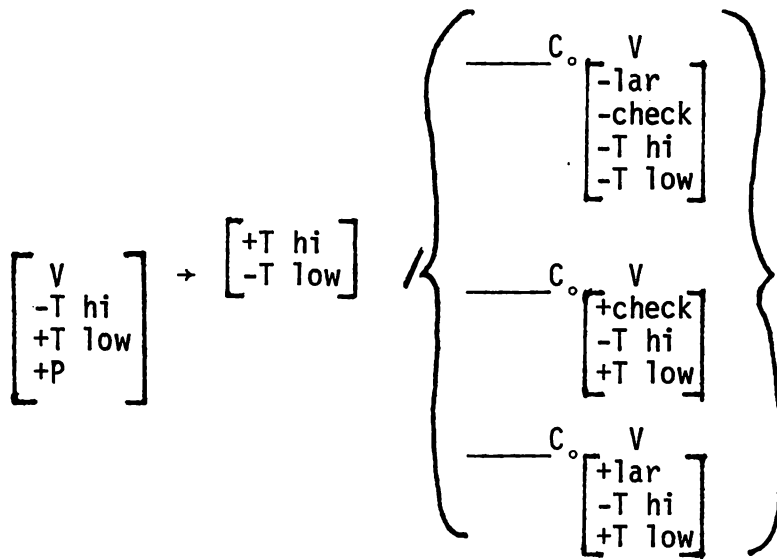
All four tones involve phonetic contours which can be described with reference to three heights. High tone rises from mid to high, the extent



in linear sequence with one another. The class of perturbers is characterized by their failure to be progressively 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.<sup>5</sup>

#### R46: REGRESSIVE PERTURBATION 1



The following illustrate the operation of this principle.

tàp bíly	<i>four snakes</i>
kYúp bíly	<i>two snakes</i>
psúy gYì nù nîs̃	<i>quenched-he fire with water</i>
psúy gYì nú yuù	<i>quenched-he fire with cargo</i>
kì cé' yà	<i>will-strike dog me</i>
kí bīly yà	<i>will-strike snake me</i>



gʸìdàg yù	<i>ear his</i>
gʸìdāg nʸì	<i>ear hers</i>
gʸìdāg nà	<i>ear ours</i>
bìgʸ yù	<i>thirsted he</i>
bṽgʸ nʸì	<i>thirsted she</i>
bṽgʸ nà	<i>thirsted we</i>
blèz yù	<i>waited he</i>
blèz nʸìTʹ	<i>waited she</i>
blèz naā	<i>waited we</i>
šèy	<i>uncle his</i>
šēnʸ	<i>uncle hers</i>
šēn	<i>uncle ours</i>

The first six examples show the operation of the rule on a noun and then on 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 3 below). The last three examples show that the rule is not blocked by MR43: 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 {≠nyì} '3p fem', {≠yù} '3p mas', or by {≠nà} '1p pl inc'.

R41: REGRESSIVE PERTURBATION 3

$$\left[ \begin{array}{c} V \\ -T \text{ hi} \\ +T \text{ low} \\ +P \end{array} \right] \rightarrow \left[ \begin{array}{c} V \\ +T \text{ hi} \\ -T \text{ low} \end{array} \right] / \left. \begin{array}{l} \{ \neq ny\grave{i} \} \\ \{ \neq y\grave{u} \} \\ \{ \neq n\grave{a} \} \end{array} \right\}$$

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

kìm	<i>will-hit-her (resp)</i>
	[+P]
kíy	<i>will-hit-he</i>
	[+P]
kínʸ	<i>will-hit-she</i>
	[+P]

kín	<i>will-hit-we</i> [+P]
gùtàm	<i>was-blessed-her (resp)</i> [+P]
gùtáy	<i>was-blessed-he</i> [+P]
gùtán <sup>Y</sup>	<i>was-blessed-her</i> [+P]
gùtán	<i>was-blessed-we</i> [+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.

1.2 Of the three tone processes operating above the natural phonemic level, a good part of the evidence for the first two has already been presented in the preceding section (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

$$[\alpha T \text{ hi}] \rightarrow \left[ \begin{array}{l} -T \text{ hi} \\ -\alpha T \text{ low} \end{array} \right] / \frac{V}{[+lar]}$$

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

$$[-T \text{ hi}] \rightarrow [+T \text{ low}] / \frac{V}{[+check]}$$

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.<sup>8</sup> First, in the beginning of section 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 P 3 provide a

functional explanation for these facts. The reason the language does not allow such contrasts is that 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 that 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

$$\begin{bmatrix} V \\ -T \text{ hi} \\ +T \text{ low} \\ -P \end{bmatrix} \rightarrow \begin{bmatrix} +T \text{ hi} \\ +P \end{bmatrix} / \begin{bmatrix} V \\ +P \end{bmatrix} C. \text{---}$$

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

$$\begin{bmatrix} V \\ -T \text{ hi} \\ +T \text{ low} \\ +P \end{bmatrix} \rightarrow \begin{bmatrix} +T \text{ hi} \\ -T \text{ low} \end{bmatrix} / \text{---} C. \begin{bmatrix} V \\ -T \text{ hi} \\ -T \text{ low} \end{bmatrix}$$

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 that they are never underlying low tone. Thus, the rule can be stated with greater generality.

R40: REGRESSIVE PERTURBATION 2.

$$\begin{bmatrix} V \\ -T \text{ hi} \\ +T \text{ low} \\ -P \end{bmatrix} \rightarrow [-T \text{ low}] / \text{---} C. \left\{ \begin{array}{l} \{=ny\} \\ \{=n\grave{a}\} \end{array} \right\}$$



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 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

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

The operation of this rule is seen on morphemes that have undergone R45: PROGRESSIVE PERTURBATION. The following partial derivation illustrates the operation of this rule.

UF	k+yíky <del>r</del> ú#rèspét	<i>will-do you respect</i>
		[+P]
R13	k yÍky rú rèspÉt	
	...	
R45	g <sup>Y</sup> Ík <sup>Y</sup> rú rêspÉt	
P4	g <sup>Y</sup> Ík <sup>Y</sup> rú réspÉt	

R13: STRESS PLACEMENT will be discussed in section 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. 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

$$V \rightarrow \left[ \begin{array}{l} +T \text{ hi} \\ -T \text{ low} \end{array} \right] / \left\{ \begin{array}{l} N \\ \text{Adj} \end{array} \right\} + \text{NP}$$

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

	<i>lame</i>	<i>skinny</i>	<i>hot</i>	<i>strong</i>
<i>he is ...</i>	tîs yù	rît yù	zTg yù	fért yù
<i>...person</i>	mbékY tîs	mbékY rît	mbékY zíg	mbékY fért
<i>...armadillo</i>	gòp tîs	gòp rît	gòp zíg	gòp fért
<i>...fox</i>	bēz tîs	bēz rît	bēz zíg	bēz fért
<i>...cat</i>	bîj tîs	bîj rît	bîj zíg	bîj fért

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.

	<i>small</i>	<i>thick</i>
<i>he is...</i>	pîs yù	mbàt yù
<i>...person</i>	mbékY pîs	mbékY mbàt
<i>...armadillo</i>	gòp pîs	gòp mbàt
<i>...fox</i>	bēz pîs	bēz mbàt
<i>...cat</i>	bîj pîs	bîj mbàt

Looking at verbs paradigmatically, eleven productive patterns of tone perturbation occur. In context all deviation from these patterns are accounted for by the rules of phonological perturbation.<sup>9</sup> Pattern I, illustrated by do, strike, and nurse, is characterized by no tone change.<sup>10</sup>

I.

	<u>do</u>	lp	<u>strike</u>	lp	<u>nurse</u>	lp
P	gYíkYá		dì		čîčá	
H	ríkYá		rdì		rčîčá	
C	bíkYá		bdì		pčîčá	
U	nYgYíkYá		ndì		nčîčá	

N	wàYíkYà	wàdì	wàčìčá
N+P	wàgYíkYá	wàgdì	wàkčìčá
N+U+P	wàngYíkYá	wàndì	wànčìčá
	2p	2p	2p
P	gYíkY rú	kYìr	čìč rú
H	ríkY rú	rgYìr	rčìč rú
C	bíkY rú	bdìr	pčìč rú
U	nYgYíkY rú	nYgYìr	nčìč rú
N	wàYíkY rú	wàYìr	wàčìč rú
N+P	wàgYíkY rú	wàkYìr	wàkčìč rú
N+U+P	wàngYíkY rú	wànkYìr	wànčìč rú

Pattern II, illustrated by dress is characterized by tone alternations conditioned by person only.<sup>11</sup>

II. dress

	1p	2p
P	zú	zùr
H	rzú	rzùr
C	bzú	bzùr
U	nzú	nzùr
N	wàzú	wàzùr
N+P	wàksú	wàksùr
N+U+P	wànsú	wànsùr

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

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

III.		IV.		V.
	<u>bend</u>		<u>slip</u>	<u>be angry</u>
	1p		1p	1p
P	ǰóŋá		ríIYá	gázî IāgYá
H	rǰòŋá		drTIIYá	rzì IāgYá
C	bǰòŋá		brTIIYá	gùzì IāgYá
U	nǰóŋá		nríIYá	nYgYázì IāgYá
N	wàǰóŋá		wàríIYá	wàzî IāgYá
N+P	wàkçòŋá		wàgrTIIYá	wàgàzì IāgYá
N+U+P	wànçòŋá		wànrTIIYá	wàngàzì IāgYá
	2p		2p	2p
P	ǰóŋ rú		ríIY rú	gàzî IāgY rú
H	rǰòŋ rú		drTIIY rú	rzì IāgY rú
C	bǰòŋ rú		brTIIY rú	gùzì IāgY rú
U	nǰóŋ rú		nríIY rú	nYgYázì IāgY rú
N	wàǰóŋ rú		wàríIY rú	wàzî IāgY rú
N+P	wàkçòŋ rú		wàgrTIIY rú	wàgàzì IāgY rú
N+U+P	wànçòŋ rú		wànrTIIY rú	wàngàzì IāgY rú

For verbs of pattern III, underlying low tone of the verb stem becomes high tone in P, U and N. For verbs of pattern IV, underlying mid tone becomes high tone in P, U and N. For verbs of pattern 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, cross and slice. Handle illustrates the most common pattern in the language.

VI.	<u>handle</u>	VII.	<u>cross</u>	VIII.	<u>slice</u>
	1p	1p	1p	1p	1p
P	dáná	dédá	dédá	sùgá	sùgá
H	rdáná	rdédá	rdédá	rsùgá	rsùgá
C	bdáná	bdédá	bdédá	psùgá	psùgá
U	ndáná	ndédá	ndédá	nsùgá	nsùgá
N	wàdáná	wàdédá	wàdédá	wàsùgá	wàsùgá
N+P	wàgdáná	wàgdédá	wàgdédá	wàksùgá	wàksùgá
N+U+P	wàndáná	wàndédá	wàndédá	wànsùgá	wànsùgá
	2p	2p	2p	2p	2p
P	gán rú	déd rú	déd rú	sùg rú	sùg rú
H	ràn rú	rdēd rú	rdēd rú	rsùg rú	rsùg rú
C	bdàn rú	bdēd rú	bdēd rú	psùg rú	psùg rú
U	nYgYaān rú	ndéd rú	ndéd rú	nsùg rú	nsùg rú
N	wán rú	wàdéd rú	wàdéd rú	wàsùg rú	wàsùg rú
N+P	wàgàn rú	wàgdēd rú	wàgdēd rú	wàksùg rú	wàksùg rú
N+U+P	wàngàn rú	wàndēd rú	wàndēd rú	wànsùg rú	wànsùg rú

For verbs of pattern VI, underlying low tone of the verb stem becomes high tone in 1p and P, U and N. For verbs of pattern VII, underlying mid tone becomes high tone in 1p and P, U and N. For verbs of pattern VIII, underlying low tone becomes falling tone in 1p and P, U and N.

There are several classes of verbs, all having /y/ initial stem, 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

	1p	2p
P	čéz <u>á</u>	čéz rú
H	rzéz <u>á</u>	rzéz rú
C	weèz <u>á</u>	weèz rú
U	nYgYéz <u>á</u>	nYgYéz rú
N	wàyé <u>z</u> á	wàyé <u>z</u> rpu
N+P	wàčeèz <u>á</u>	wàčeèz rú
N+U+P	wànčeèz <u>á</u>	wànčeèz rú

Since the verb stem nucleus of anchor is laryngealized, the underlying tone is mid tone. (See section 1.2.) Thus, underlying mid tone becomes high in P, H, U and N.

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

X.	<u>ascend</u>	XI.	<u>descend</u>
	1p		1p
P	gYét <u>á</u>		čúp <u>á</u>
H	yét <u>á</u>		rzúp <u>á</u>
C	bét <u>á</u>		gúp <u>á</u>
U	nYgYét <u>á</u>		nYgYúp <u>á</u>
N	wàyé <u>t</u> á		wàyúp <u>á</u>
N+P	wàgYét <u>á</u>		wàčúp <u>á</u>
N+U+P	wàngYét <u>á</u>		wànčúp <u>á</u>
	2p		2p
P	gYét rú		čúp rú
H	yét rú		rzúp rú

C	bèt rú	gūp rú
U	nʏgʏét rpu	nʏgʏúp rú
N	wàyé̄t rú	wàýúp rú
N+P	wàgʏè̄t rú	wàčūp rú
N+U+P	wàngʏè̄t rú	wànčūp rú

For verbs of pattern X, underlying low tone of the verb stem becomes high tone in 1p and P, H, U and N. For verbs of pattern XI, underlying mid tone becomes high tone in 1p and P, H, U and 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 {yà/}, 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 illustrates tone on the verbs with the motion auxiliary.

	<u>kill</u>	
	1p	1p mot aux
P	dútá	čá tútá
H	rdútá	rzá tútá
C	bdútá	g <sup>w</sup> á tútá
U	ndútá	nʏgʏá tútá
N	wàdútá	wàýá tútá
N+P	wàgdútá	wàčà tútá
N+U+P	wàndútá	wànčá tútá
	2p	2p mot aux
P	kút rú	čá tùt rú
H	rùt rú	rzà tùt rú
C	biìt rú	g <sup>w</sup> à tùt rú
U	nʏgʏút rú	nʏgʏá tùt rú
N	wút rú	wàýá tùt rú

N+P	wàkùt rú	wàčà tùt rú
N+U+P	wànkùt rú	wànčà tùt 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 is typical of verbs of this type.

	<u>lead</u>	
	1p	2p
P	gáy <sub>u</sub>	gáy <sub>ur</sub>
H	rgáy <sub>u</sub>	rgày <sub>ur</sub>
C	bgáy <sub>u</sub>	bgày <sub>ur</sub>
U	ngáy <sub>u</sub>	ngáy <sub>ur</sub>
N	wàgáy <sub>u</sub>	wàgáy <sub>ur</sub>
N+P	wàgáy <sub>u</sub>	wàgày <sub>ur</sub>
N+U+P	wàngáy <sub>u</sub>	wàngày <sub>ur</sub>

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

	<u>tumble</u>	
	1p	1p passive
P	tùb <sub>a</sub>	dúdùb <sub>a</sub>
H	rtùb <sub>a</sub>	rdùdùb <sub>a</sub>
C	ptùb <sub>a</sub>	bdùdùb <sub>a</sub>
U	ntùb <sub>a</sub>	ndúdùb <sub>a</sub>
	2p	2p passive
P	tùb rú	dúdùb rú
H	rtùb rú	rdùdùb rú



C	ptùb rú	bdùdùb rù
U	ntùb rú	ndùdùb rú

buy

	1p	2p	3p pass
P	z <u>í</u>	zír	dúziìnY
H	r <u>z</u> í	rziìr	rdùziìnY
C	w <u>í</u>	wiìr	bdùziìnY
U	nz <u>í</u>	nziír	ndùziìnY

The verb stem of tumble never perturbs. In passive constructions, however, tone of the passive morpheme does. The tone of buy perturbs except in passive constructions where only the tone of the passive morpheme perturbs. Furthermore, grammatical tone on buy 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 {à+} is conditioned by aspect only as be cold illustrates.

	<u>be cold</u>	
	1p	2p
P	gázTlY <u>á</u>	gázTlY rú
H	ràzTlY <u>á</u>	ràzTlY rú
C	gùzTlY <u>á</u>	gùzTlY rú
U	nYgYázTlY <u>á</u>	nYgYázTlY rú
N	wázTlY <u>á</u>	wázTlY rú
N+P	wàgàzTlY <u>á</u>	wàgàzTlY rú
N+U+P	wàngàzTlY <u>á</u>	wàngàzTlY 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.

	<u>be bored</u>	
	1p	2p
P	gàzédá	gàzéd rú
H	ràzeèdá	ràzeèd rú
C	gùzeèdá	gùzeèd rú
U	nʏgʏázeèdá	nʏgʏázeèd 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) grammatical environments, perturbation does not occur on the leftmost perturbable syllable. Be cold shows clearly that {à+} 'verbalizer' is perturbable. Tone is perturbed on the verbalizer in U and N of be bored. However, it perturbs on the stem of the main verb in P. The situation is even more complicated for be angry, where both wázì lāgʏá and wázì lāgʏa *I will not be angry* are acceptable. In the first case tone perturbs on {à+} 'verbalizer' and in the second case on {zì#lāgʏ} *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: 1p SUBJECT TONE ADJUSTMENT

$$\begin{bmatrix} -T & hi \\ -P & \end{bmatrix} \rightarrow \begin{bmatrix} +T & hi \\ -T & low \end{bmatrix} / +C_{LR} \text{ in 1p verb stem}$$

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

## R10: POTENTIAL TONE ADJUSTMENT

$$\begin{bmatrix} -T & hi \\ -P & \end{bmatrix} \rightarrow \begin{bmatrix} +T & hi \\ -T & low \end{bmatrix} / +C. \text{---}_{LR} \text{ in P, U, N verb stem}$$

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

## MR11: H TONE ADJUSTMENT

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

## MR12: TONE READJUSTMENT

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

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]. 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	R9	R9	R10	R9	R9
				MR12	R10	R10	R10	MR11	MR11	R10
							MR12			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 tone. 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 Isthmus Zapotec) 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 inter-relationship that presently exists in TZ does not represent the historical pattern.

3. 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

$$V \rightarrow [+lar] / \begin{array}{|c|} \hline +T \text{ hi} \\ \hline +T \text{ low} \\ \hline \end{array} C_0 V [+L]$$

I am aware of only four members of this class: {~~ny~~i} '3p fem', {~~na~~} '1p pl exc', {~~ga~~la} 'before', and {~~la~~} 'emphatically'. The following data illustrate the operation of this rule.

tîs yù	<i>lame he</i>
tiTs nʸì	<i>lame she</i>
gûl yù	<i>grandfather he</i>
guûl nʸì	<i>grandfather she</i>
gáyûy	<i>will-lead he</i>
gáyuûnʸ	<i>will-lead she</i>

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

	<i>she will slice</i>	<i>she sliced</i>	<i>you will slice</i>
UF	k+sùg <del>ny</del> ì	gb+sùg <del>ny</del> ì	k+sùg <del>rú</del>
R10	k súg nyì	---	k súg rú

MR12	k s̄ug nyì	---	k s̄ug rú
R47	k sūg nʸì	---	---
P2	sūg nʸì	---	---
SF	sūg nʸì	p s̄ug nʸì	s̄ug rú

The second rule states that the same class of morphemes, [+L], are laryngealized following a syllable with morpheme feature [+P].

R48: PROGRESSIVE LARYNGEALIZATION

$$\begin{array}{c} V \\ [+L] \end{array} \rightarrow [+lar] / \begin{array}{c} V \\ [+P] \end{array} C_0 \text{ \_\_\_\_\_\_}$$

The following illustrate the operation of this rule.

	3p mas	3p fem
<u>faint</u> [+P]	ʝò'w yú	ʝò'w nʸiT
<u>wait</u> [+P]	kʷèz yú	kʷèz nʸiT

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.

	<u>thirst</u>
	3p fem
P	kʷìgʸ nʸiT
H	rbìgʸ nʸì
C	bìgʸ nʸì
U	mbìgʸ nʸiT
N	wàbìgʸ nʸiT
N+P	wàkʷìgʸ nʸì
N+U+P	wànkʷìgʸ nʸì

The following rule expresses this principle.

## MR8: PERTURBER ADJUSTMENT

$$V \rightarrow [+P] / \text{in P, U, N}$$

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

$$V \rightarrow [-lar] / \begin{array}{|c|} \hline +T \text{ hi} \\ \hline -T \text{ low} \\ \hline \end{array}$$

This rule is fed by grammatical perturbation on adjectives.

gaà y byáh	<i>five trips</i>
byáh gáy	<i>trip fifth</i>
kaàs má	<i>it (animal) is black</i>
bTlY kás	<i>black snake</i>

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 illustrates this case.

	<u>anchor</u>	
	1p	2p
P	čéz <u>á</u>	čéz rú
H	rzéz <u>á</u>	rzéz rú
C	weèz <u>á</u>	weèz rú
U	nYgYéz <u>á</u>	nYgYéz rú
N	wàyé <u>á</u>	wàyé rú
N+P	wàkčèèz <u>á</u>	wàkčèèz rú
N+U+P	wànčèèz <u>á</u>	wànčèèz rú

The patterns of laryngealization, however, do not always follow from the patterns of grammatical perturbation. Note the following patterns.<sup>12</sup>

	<u>catch</u>		<u>relate</u>	
	1p	2p	1p	2p
P	dúbá	kúb rú	dó dú	gó nùr
H	rdúbá	rūb rú	rdó dú	rò nùr
C	bdúbá	bdūb rú	bdó dú	beè nùr
U	ndúbá	nʸgʸuūb rú	ndó dú	nʸgʸoō nùr
N	wàdúbá	wúb rú	wàdó dú	wó nùr
N+P	wàgdúbá	wàkūb rú	wàgdó dú	wàgò nùr
N+U+P	wàndúbá	wànkūb rú	wàndó dú	wàngò nùr
	<u>give</u>		<u>buy</u>	
	1p	2p	1p	2p
P	ríká	kʷík rú	zǐ	zír
H	dríká	rbìk rú	rzǐ	rziìr
C	bríká	brìk rú	wǐ	wiìr
U	nríká	mbík rú	nzǐ	nziTr
N	wàríká	wàbík rú	wàzǐ	wàzír
N+P	wàgríká	wàkʷík rú	wàksǐ	wàksiìr
N+U+P	wànríká	wànkʷík rú	wànsǐ	wànsiìr

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

MR16: U-LARYNGEALIZATION

V → [+lar] / in {2p, 3p}, U verb stem

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

MR17: C-LARYNGEALIZATION

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

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

	<u>buy</u>
	3p pas
P	dúziìnY
H	rdùziìnY
C	bdùziìnY
U	ndúziìnY
N	wàdúziìnY
B+P	wàkdùziìnY
N+U+P	wàndùziìnY

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 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 as is operating in anchor and in adjectives. The rule laryngealizing second and third person unreal is needed independently of the suggested analysis for buy in any case. The pattern illustrated by buy 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.

	<u>remove</u>	
	1p	2p
P	l <u>o</u> ō	kór
H	r <u>l</u> ōō	rboòr
C	b <u>l</u> ōō	bloòr
U	n <u>l</u> ōō	mboòr
N	wà <u>l</u> ōō	wàbór
N+P	wàg <u>l</u> ōō	wàkoòr
N+U+P	wà <u>n</u> l <u>o</u> ō	wàkoòr



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 is {lō}. 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 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 → [+lar] / in caus stem

	non-caus	caus
<i>thirst</i>	kʷìgʸ rú	kʷiTgʸ rú
<i>sleep</i>	gás rú	gaās rú
<i>bend</i>	ǰón rú	čoōn rú
<i>wait</i>	kʷèz rú	kʷeēz rú
<i>beat</i>	gàz rú	gaāz rú
<i>anchor</i>	čéz rú	šeēz rú
<i>scatter</i>	gYáč dér	čaāč rú
<i>scare</i>	ǰíb rú	čiṭb rú

4. 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 of MR18: lp-LARYNGEALIZATION. The partial derivations of *nʸgʸoōr you should have ground* and *nziṭr 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 *goòr you ground* illustrates this situation.

	<i>you will lie</i>	<i>you should have ground</i>	<i>you should have bought</i>	<i>you ground</i>
UF	k+guū <del>r</del> ú	ngy+dōr <del>r</del> ú	ngy+ziT <del>r</del> ú	gb+dōr <del>r</del> ú
R10	k guú rú	ngy ó rú	ngy zií rú	---
R15	---	---	ngy zí rú	---
MR16	---	ngy oó rú	ngy zií rú	---
MR17	---	---	---	gb oō rú
	...	...	...	...
P2	guūr	n <sup>Y</sup> g <sup>Y</sup> oōr	nziTr	goòr

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

5. In polysyllabic morphemes stress is always stem final.

R13: STRESS PLACEMENT

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

gayŪr	<i>you will lead</i>
grambEšt	<i>elephant</i> (lit. gran bestia)
rišt00	<i>story</i> (from riiĵword and too head)

FOOTNOTES

<sup>1</sup>This paper is section 2.3 of my 1978 University of North Dakota M.A. thesis entitled The Phonology of Texmelucan Zapotec Verb Irregularity. The theoretical framework within which the paper is written is that of Stampe's natural phonology. The phonemic transcription is self-explanatory with one exception. In Texmelucan Zapotec, there is contrast between an unmodified syllable nucleus, a glottalized syllable nucleus and a laryngealized syllable nucleus. The glottalized nucleus I indicate with vowel feature [+check] and I write V'. The laryngealized nucleus I indicate with the vowel feature [+lar] and I write VV. Note the contrast in the following words: zà lard, zà' corn on the cob, zaà beans, yù dirt, yù' house, yuù cargo.

<sup>2</sup>For a history of early work on Zapotec tone morphophonemics see Leal (1950).

<sup>3</sup>The first of the seven principles is numbered R45 conforming to the numbering of rules which have been discussed in earlier sections of the thesis even though the rules are not presented here. The same is true of the numbering of processes.

<sup>4</sup>Stress is always stem final (section 5.) and falling tone becomes high tone on an unstressed syllable (section 1.2).

<sup>5</sup>John 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 affects the rule, which suggests that at least historically, they were reflexes of the same principle. This principle looks something like the following:

$$\begin{array}{ccccccc}
 \left[ \begin{array}{l} +\text{syl} \\ +\text{T hi} \\ -\text{T low} \end{array} \right] & [+cons]_o & \left\{ \begin{array}{l} \left[ \begin{array}{l} +\text{syl} \\ +\text{T hi} \end{array} \right] \\ \left[ \begin{array}{l} +\text{syl} \\ +\text{T low} \end{array} \right] \end{array} \right\} & \Rightarrow & \left[ \begin{array}{l} +\text{syl} \\ +\text{T hi} \end{array} \right] & [+cons]_o & \left[ \begin{array}{l} +\text{syl} \\ +\text{T hi} \end{array} \right] \\
 1 & 2 & 3 & & 1 & 2 & 3
 \end{array}$$

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 (1.2) 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 UF. 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.

<sup>6</sup>This UF will be modified slightly in the next section.

<sup>7</sup>The laryngealization of {≠nyì} and {≠nà} will be discussed in section 3.

<sup>8</sup>Referring, of course, to the entire thesis.

<sup>9</sup>This 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.

<sup>10</sup>I have no examples of verbs of this class with mid tone. The abbreviations used in verb paradigms are P 'potential', H 'habitual', C 'completive', U 'unreal', N 'negative', 1p 'first person singular, 2p second person. There is a skewing between form and meaning in negative-aspect sequential limitations which is discussed in section 2.1.2 of my thesis.

<sup>11</sup>Underlying 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.

<sup>12</sup>Two words, go I and grind, 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.

## REFERENCES

- Daly, John P. (1973) "Tone Sandhi and Rule Ordering in Peñoles Mixtec." Work Papers of the Summer Institute of Linguistics, University of North Dakota 17:80-105.
- Leal, Mary. (1950) "Patterns of Tone Substitution in Zapotec Morphology." International Journal of American Linguistics 16:132-136.
- Wang, William S-Y. (1967) "Phonological Features of Tone." International Journal of American Linguistics 37:93-105.