Santiago Laxopa Zapotec Phonology

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1 Introduction

- Santiago Laxopa Zapotec (SLZ) is a variety of Sierra Norte Zapotec, an Oto-Manguean language (Adler et al. 2018, Sichel & Toosarvandani 2020).
- SLZ is spoken by 800-1200 people in the municipality of Santiago Laxopa, Oaxaca, Mexico with a small number of speakers in Oaxaca City, Mexico and Santa Cruz, CA.
- Similar to other Oto-Manguean languages, SLZ has both tone and phonation (Campbell, Kaufman & Smith-Stark 1986, Stolz & Stolz 2001, E. Campbell 2017, E. W. Campbell 2017).
- Data is drawn from elicitations conducted 2020-2021 with two native speakers of SLZ that live in the Santa Cruz, CA area.

2 Phonemic Inventory

- This section lays out what is currently known about the vowel and tone inventories of Santiago Laxopa Zapotec based on fieldwork conducted by myself and other researchers at UCSC.

Consonant Inventory

- SLZ has approximately 27 consonants as shown in Table 1
- Like other Zapotecan languages consonants are divided between fortis and lenis (Nellis & Hollenbach 1980, Jaeger & Van Valin 1982, Uchihara & Pérez Báez 2016).
- Following Jaeger & Van Valin (1982) there are four reasons that we use fortis/lenis instead of voiceless/voiced in Zapotecan languages.
    1. Fortis obstruents are always voiceless, while lenis can be voiced, partially devoiced, or voiceless.
    2. Fortis stops and affricates aalways retain their stop closure, whereas lenis stops and affricates are often realized as fricatives.
    3. Fortis obstruents are usually of longer duration than lenis obstruents.
    4. Fortis and lenis sonorants are primarily distinguished by length, with fortis having a longer duration than lenis.
- The behavior that Jaeger & Van Valin (1982) described is illustrated in Table 2.
- This same behavior has been observed to some extent in SLZ and in other Sierra Norte varieties (Sonnenschein 2005)

Table 1: SLZ Consonants

		bilabial	alveolar	retroflex	alveo-palatal	palatal	velar	labio-velar	uvular
nasal	lenis		n						
	fortis	mː	nː						
stop	lenis	b	d				g	g^w	
	fortis	p	t				k	k^w	
fricative	lenis		z	ʐ~ɻ	ʒ	ç			ʁ~χ
	fortis		s	ʂ	ʃ				
affricate	lenis		d͡z						
	fortis		t͡s		t͡ʃ				
lateral	lenis		l~ɾ						
	fortis		lː						
trill			r						
approximate						j		w	

Table 2: Allophones of some fortis and lenis obstruents in Yateé Zapotec

			Fortis				Lenis
/t/	→	tˑ	initially	/d/	→	d, d̥, ð, ð̥	initially
		tː	medially			d, ð	medially
		t^h	finally			ð̥, θ	finally
/t͡ʃ/	→	t͡ʃˑ	initially	/d͡ʒ/	→	d͡ʒ, d̥͡ʒ, ʒ, ʒ̊	initially
		t͡ʃː	medially			d͡ʒ, ʒ	medially
		$\widehat{t\int^h}$	finally			d̥͡ʒ, ʒ̊, ʃ	finally

2.1 Vowels

- SLZ follows the majority of languages in exhibiting a basic five vowel inventory.

Table 3: SLZ Vowels

	front	central	back
high	i		u
mid	e		o
low		a	

- Like other Oto-Manguean langauages, SLZ can manipulate these five vowel categories by making them laryngeally-complex (Silverman 1997).

- This is accomplished through the addition of three different laryngeally-complex phonations, which are all contrastive as seen in the the near-minimal triple (1)
  - Breathy: [a̤] <*ah*>
  - Checked: [aˀ] <*a'*>
  - Laryngealized: [aˀa] <*a'a*>[1]

(1) Near-minimal triple
  a. *yah* [ja̤³] 'iron; rifle'
  b. *yu'* [çuˀ³] 'earth'
  c. *yu'u* [juˀu¹³] 'house'

- Each of these phonation types are associated with different configurations of the larynx (Esling et al. 2019).
- Breathy phonation is produced with an open supraglottic tube during the production of the vowel
- Checked phonation consists of modal phonation which is abruptly stopped which is associated with a glottal stop.[2]
- Laryngealized vowels in SLZ and other closely related varieties (Yalálag Zapotec) show a variable pronunciation ranging from a vowel that has a glottal stop interrupting the vowel to the use of creaky voice throughout or a portion of the vowel.
- Table 4 shows the variable pronunciation of laryngealized vowels in Yalálag Zapotec, taken from Avelino (2010).

Table 4: Layngealized Vowels in Yalálag Zapotec

/VˀV/	[V?V]
	[VV̰V]
	[VV̰:V̆]
	[VV̰V̰]

[1]Previous descriptions of the the vowel system of closely related languages have used various different terms for this vowel including broken, rearticulated, interrupted, and creaky (Long & Cruz 2005, Avelino 2010, Avelino Becerra 2004, Sonnenschein 2005, Adler & Morimoto 2016). In order to avoid confusion, I will use the term laryngealized following Avelino (2010).

[2]There are two ways in which this vowel can be analyzed. One is the traditional way where the glottal stop is considered inseparable from the vowel. The other is to treat this as a consonant which is restricted to only reside in codas (similar to how the sound /ŋ/ is restricted to codas in English). This second approach is the one taken by Avelino Becerra (2004). I will follow the traditional way of analyzing these vowels through this paper.

2.2 Tone

- SLZ exhibits five different surface tonal patterns as shown in Table 5
  - Three level tones: H, M, and L (represented using Pike's numbers with 1 being the highest tone)
  - Two contours: MH and HL
- The number of tones were discovered doing a tonal analysis following the methods laid out in Pike (1948) and Snider (2018) by Maya Wax Cavallaro, Jack Duff, and myself from 2020-2021.

Table 5: SLZ tones

High	a^{1}	*xha*	[ʐa^{1}]	'clothing.POSS'
Mid	a^{2}	*lhill*	[ɾiʒ^{2}]	'house.POSS'
Low	a^{3}	*yu'*	[ɕuˀ^{3}]	'earth'
Rising	a^{21}	*yu'u*	[juˀu^{21}]	'quicklime (sp. cal)'
Falling	a^{13}	*yu'u*	[juˀu^{13}]	'house'

- The exact nature of these tones will be one of the focuses of this paper.
- Additionally, I will be focusing on what the tone bearing unit is in SLZ.

3 Interaction of Tone and phonation

- The interaction of tone and phonation is a well-established fact and has been heavily studied in Asian tonal languages (see references in Yip 2002, Duanmu 2007, Michaud 2012, Brunelle & Kirby 2016).
- In these languages it is common for certain phonation types to co-occur with certain tones.
- The interaction between tone and phonation in the languages of the America's has been studied but to a lesser extant than Asian languages (Adler & Morimoto 2016, Chávez-Peón 2010, DiCanio 2012).
- Chávez-Peón (2010) showed that the similar restrictions in tone and phonation co-occurrence appear in Quiaviní Zapotec but are at the same time much more free, see Table 4.
- One of the unique aspects found here is the co-occurrance of creaky voice with a H-tone.
- Creaky voice is frequently a by-product of low pitch but according to Esling et al. (2019) can also sometimes co-occur with high pitch.

Table 6: SLQZ tone and phonation

	High	Low	Falling	Rising
Modal	✓	✓	✓	✓
Breathy	X	✓	✓	X
Creaky	✓	✓	✓	X
Interrupted	✓	✓	✓	X

SLZ	Gloss	SLZ	Gloss	SLZ	Gloss
damː	'owl'	kua	'masa'	nis	'water'
ʐ̨ileˀ	'sheep'	jaːg	'tree'	jetʰ	'tortilla'
juː	'earth'	yuˀuː	'house'	ʁiːd	'chicken'
jit͡ʃʰ	'paper'	t͡siːl	'morning'	wiːʒ	'sun'

4 Data-set

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