



# Contrast preservation and other segmental effects in the formation of Xochistlahuaca Amuzgo plurals

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In Amuzgo (Eastern Otomanguean), the formation of nominal plurals exhibits many realizations, ranging from the simple addition of a nasal prefix (/n-tɛ²/ ‘PL-priest’ → [ntɛ²]), to additional initial consonant fortition (/n-sa¹/ ‘PL-elote’ → [nts¹]; /n-tsɔi²³/ ‘PL-egg’ → [ntɔi²³]; /n-fo²ʃi²/ ‘PL-griddle’ → [ŋko²ʃi²]), initial consonant deletion (/n-ʃɔm²·/ ‘PL-paper’ → [ɲɔm²·]), and sometimes also the replacement of the prefixal nasal by a lateral (/n-tsjo³/ ‘PL-bottle’ → [ljɔ³]). In this paper, we argue that all of the changes above follow from two main principles: (1) The underlying contrast between the two pairs of phonemes characterized by a delayed release – the [+anterior] /s, ts/ and the [-anterior] /ʃ, ʃ/ – must be maintained; and (2) /s, ʃ/ cannot be faithfully realized after [n]. These principles, in interaction with other considerations, lead to an establishment of a push chain (/s/ → /ts/ → /t/) among [+anterior] consonants and to a case of saltation (/ʃ/ → /tʃ/; /ʃ/ → /k/) among [-anterior] consonants.

*Keywords:* Amuzgo; morphology; nasalization; push chain; saltation

## 1 Introduction

In Amuzgo (Eastern Otomanguean), the formation of nominal plurals exhibits a dazzling array of realizations. Some plurals are formed with the simple addition of a nasal prefix, which assimilates in place to the following consonant (1a). In other cases, the first consonant of the singular undergoes fortition into a stop (1b; assuming that the plural is indeed derived from the singular). In a third group, the initial consonant of singular stems with nasal vowels is absent from the plural (1c). A fourth group of singulars with oral vowels (1d) also involves the omission of the initial consonant; yet the prefix is not nasal, but lateral. For singulars with initial consonant clusters, the first consonant either remains stable (1e), or disappears (1f), again leaving behind either a nasal or a lateral.<sup>1</sup> Note that sometimes, a noun class marker, most commonly *ka-*, is found before noun roots. In most cases these markers occur on both singulars and plurals as in (1e) ‘nest’, but in some cases they are absent from the singular as in (1f) ‘candle’. As shown, the plural marker intervenes between the class prefix and the stem. The presence or absence of these class markers never affects the realization of the plural marker or its effects on the stem.

\* The authors would like to thank Anna Lubowicz for help in discussing analyses of chain shifts and contrast. Also helpful were the comments of two anonymous reviewers and of the editor assigned to this paper, Andrew Nevins. Remaining errors are our own.

<sup>1</sup> The [·] symbol stands for a syllable-wide feature referred to as “ballisticity” or devoicing that has been described as non-modal phonation (see Herrera Zendejas 2000 and Dobui in press) and as a length contrast (Apóstol Polanco forthcoming).

## (1) Pluralization patterns in Xochistlahuaca Amuzgo

	SG	PL		SG	PL		
a.	tɛ <sup>2</sup>	n-tɛ <sup>2</sup>	‘priest’	d. tɕjo <sup>3</sup>	l-jo <sup>3</sup>	‘bottle’	
	kio <sup>2</sup>	ŋ-kio <sup>2</sup>	‘animal’		l-we <sup>2</sup>	‘bedroll’	
	tʃe <sup>3</sup>	n-tʃe <sup>3</sup>	‘huípil (dress)’	e. tʃkjo <sup>3</sup>	n-tʃkjo <sup>3</sup>	‘cough’	
b.	ʃo <sup>2</sup> tʃi <sup>2</sup>	ŋ-ko <sup>2</sup> tʃi <sup>2</sup>	‘griddle’		ka <sup>2</sup> -n-tkja <sup>2</sup>	‘nest’	
	tɕai <sup>3</sup>	n-tɕai <sup>3</sup>	‘egg’		tʃmɔ̃i	n-tʃmɔ̃i	‘clothes line’
	sa <sup>1</sup>	n-tsa <sup>1</sup>	‘elote (corn)’	f. ska <sup>2</sup>	ka-l-ka <sup>2</sup>	‘candle’	
c.	tʃʔã <sup>2</sup>	n-ʔã <sup>1</sup>	‘person’		stʔɛi <sup>1</sup>	n-tʔɛi <sup>1</sup>	‘buzzard’
	tʃɔ̃m <sup>2</sup>	n-ɔ̃m <sup>2</sup>	‘paper’		tɕkɔ̃m <sup>2</sup>	l-kɔ̃m <sup>2</sup>	‘huarache (footware)’

The plural prefix, whether nasal or lateral, exhibits some phonetic length when found before obstruents, as in (1a, b, e and f). However, there is reason to think it is not phonologically syllabic. When the noun stem begins with a cluster, the first consonant reacts in a special way to the addition of the prefix, suggesting that there is something problematic about a sequence NCC (where N represents the plural prefix). We interpret this as a \*CCC effect; if N were a nucleus, this effect would have to be explained otherwise, and we do not see how. The effect is further detailed in section 3.3 below.

In this paper, we argue that all of the changes found in (1) follow from two main principles or inviolable constraints:

## (2) Principles

- i. The underlying contrast between the two pairs of phonemes characterized by a delayed release (DR), the [+anterior] /s, ts/ and the [-anterior] /ʃ, tʃ/, must be maintained; and
- ii. /s, ʃ/ cannot be faithfully realized after [n].

Principle (2.ii) is not surprising from a cross-linguistic perspective. In many languages, nasal-fricative sequences exhibit instability, often leading to the deletion of the nasal (Padgett 1991; Ohala & Busà 1995). Possibly as a reaction to this instability, some languages produce an intrusive consonant between the two when they share place of articulation, e.g. English *instance* [ɪntstənts]. In Amuzgo, resistance to this marked configuration yields the abovementioned fortition.

Other considerations that underlie the surface realizations, and may be understood as violable constraints, are the following (the term “sibilant” is henceforth used only for /s, ʃ/; DR is used for the entire set /s, ts, ʃ, tʃ/):

## (3) Other considerations

- i. Faithfulness to sibilants is more important than faithfulness to affricates.
- ii. Nasality preferably spans the entire word: nasal consonants seek to be adjacent to nasal vowels, and oral vowels may not follow nasal consonants.
- iii. The anteriority of a deleted consonant must be preserved in the output.

Finally, a seemingly unmotivated rule mutates /ʃ/ into [k] after [n]. While the velar realization of /ʃ/ is phonetically surprising, we show that it follows a logic that abides by the constraints in (2) and (3).

The structure of this short paper is as follows. In the next section, we provide the language background necessary to understand the transcriptions, data and phenomena that follow. Section 3 presents both the data from singular-plural pairs and the analysis. We show that the realization of the plural morph and its effect on the following consonant follow from the constraints in (2) and (3). We begin with [+ant(erior)] consonants before oral vowels and continue to [+ant] consonants before nasal vowels, and show that both involve what can be regarded as a chain shift of the push chain type. Then, [-ant] consonants are discussed in the same order, and it is shown that they involve not a push chain, but a case of saltation. Finally, we address cluster-initial stems, again making the necessary distinction between oral and nasal C<sub>2</sub>. Section 4 concludes.

## 2 Amuzgo segmental inventory and relevant phonological processes

Three varieties of the Amuzgo language group (ISO 639-3) have been described: San Pedro Amuzgos, Ipalapa, and Guerrero, though other varieties have been noted (Nazario et al. 2009 for Huixtepec; Lopez

de Jesús 2015 for Tlacoachistlahuaca; de Jesús García 2019 for Cochoapa). Guerrero Amuzgo is the variety with the most speakers at about 23,000. It is also known as Xochistlahuaca Amuzgo, for the city (population 4,000) where the data used in this study comes from.

We are unaware of any work discussing internal variation within the Amuzgo language group. However, a comparative reading of language descriptions shows a considerable level of divergence, notably in prosodic inventories. For the variety of San Pedro Amuzgos, Kim (2011) finds three level tones, one contour tone and no phonation contrasts. While for Xochistlahuaca Amuzgo, Bauernschmidt (1965) reports three level tones and three contour tones, in addition to a three-way phonation contrast between modal, creaky and breathy voices (Dobui in press).

This language group is classified as part of the eastern branch of Otomanguean, a large language family currently distributed across central and southern Mexico (Campbell et al. 1986). Amuzgo has traits that are typical of Otomanguean languages: all have some pitch contrast, many have phonemic vowel nasalization, and many lack labial consonants. Outside of these shared features, the various language groups within Otomanguean exhibit fewer globally shared features, attesting to a significant time depth of divergence. Among known Proto-Otomanguean peoples are those of the Tehuacán culture dating from 5000 BCE to 2300 BCE (Campbell 1997).

The data used here comes from first- and second-hand sources. First-hand sources were elicited from a female speaker, born in 1954 and a male speaker, born in the 1980s, both bilinguals in Amuzgo and Spanish. Second-hand data comes from the 2014 version of an unpublished dictionary of the same variety by Amy Bauernschmidt of the Summer Institute of Linguistics based on materials from 1970s missionary work.

The consonant inventory is given in Table 1. Consonants contrast across five places: labial, apico-dental, postalveolar, velar and glottal. Apico-dental consonants are lightly velarized. The post-alveolar series subsumes postalveolars and palatals. Labials are marginal, attested mainly in function words (/m, w/) and loan words (/p, β/), with the latter noted below in parentheses. Rhotics are the apical trill /r/ and tap /ɾ/, both of which are mostly restricted to expressive words, ideophones and loanwords.

Table 1: Consonant inventory

	[+anterior]		[-anterior]		
	Bilabial	Apico-dental	Postalveolar	Velar	Glottal
<b>Stop</b>	(p)	t, tʰ		k kʷ	ʔ
<b>Affricate</b>		ts	tʃ		
<b>Fricative</b>	(β)	s	ʃ		
<b>Nasal</b>	m	n [n̥, n̥ʰ, ŋ, nʰ]	ɲ [ɲʰ]		
<b>Trill</b>		r			
<b>Tap</b>		ɾ			
<b>Lateral</b>		l			
<b>Glide</b>	w [m]		j		

The language distinguishes between [+ant] /s, ts, t/ and [-ant] /ʃ, tʃ, k/. The distinction is found in allophonic alternations. In what seems like a dissimilatory process, the high [+ant] vowel /i/ breaks into diphthong [əj] after all [+ant] consonants (except palatalized /tʰ/) (4a-c), but never after [-ant] palatals and velars (4d-f) (Bauernschmidt 1965: 478). The effect brings to mind the ban on post coronal palatals in some dialects of American English, whereby *new* is realized not [njuw] but [nuw] (Davis & Hammond 1995).

## (4) Motivation for [±ant] division in consonants: [i]-[əj] allophony

C <sub>[+ant]_</sub>		C <sub>[-ant]_</sub>	
a. /si/ → [səj <sup>1</sup> ]		d. /ʃilu/ → [ʃi <sup>1</sup> lu <sup>1</sup> ]	
‘fresh corn’		‘a small variety of fish’	
b. /tsiʔ/ → [tsəjʔ <sup>3</sup> ]		e. /ʃiʔ/ → [ʃiʔ <sup>2</sup> ]	
‘bone’		‘moon, month’	
c. /nti/ → [ntəjʔ <sup>3</sup> ]		f. /ki/ → [ki <sup>1</sup> ]	
‘buds’		‘merely’	
d. /mĩ/ → [mĩ <sup>3</sup> ]			
‘nor’			

Outside the final coda position (on which see below), both glottals are always positioned to the left of a sonorant or a vowel. In previous literature /h/ and /ʔ/ are both given as full segments. However, given this distribution, in this paper /ʔ/ is considered a phoneme only when in coda position, and all other realizations of laryngeals are considered non-modal phonation (further arguments in Dobui in press). Silverman (1997) describes linear sequencing of multiple realizations of secondary articulation as *phasing*, where e.g. non-modal phonation may be timed before the production of the modal voice needed to produce tonal targets (in Amuzgo, nasalization may also add to this heavy articulatory load). Still, for visibility, we will continue to transcribe non-modal phonation as [h] and [ʔ], though these should not be considered as full segments – again, with the exception of syllable-final [ʔ].

In the analysis below, we will use the distinctive features in Table 2 to distinguish between consonants. In the table, we have marked with 0 cases in which there does not seem to be good reason in the language to assume that the feature is valued. Most importantly for the present purpose, this is the case for the difference between /n/ and /l/. In Table 2, these are distinguished only by their value of the feature [nasal], even though standard distinctive feature tables also identify other differences between them (notably the values for [continuant]). Finally, we used the feature [Delayed Release] to distinguish between affricates and sibilants.<sup>2</sup> Other distinctions conveyed by Table 2 are given here somewhat tentatively for completeness – they do not carry consequences for the analysis below.

Table 2: Distinctive features of Amuzgo consonants

	m	w	n	l	(r)	t	tʃ	s	ʂ	ʃ	ʧ	k	kʷ	ŋ	j	ʔ
Anterior	0	0	+	+	+	+	+	+	-	-	-	-	-	-	0	0
Continuant	0	0	0	0	0	-	-	+	-	+	-	-	-	0	0	0
Delayed Release	0	0	0	0	0	-	-	+	+	+	+	-	-	0	0	0
Nasal	+	-	+	-	-	-	-	-	-	-	-	-	-	+	-	0
Sonorant	+	+	+	+	+	-	-	-	-	-	-	-	-	+	+	0
Consonantal	+	-	+	+	+	+	+	+	+	+	+	+	+	+	-	-
Labial	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Palatal	-	-	-	-	-	-	+	-	-	+	+	-	-	+	+	-
velar	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-

There are seven oral vowels: /i, e, ε, u, o, ə, a/ and five nasal vowels: /ẽ, ê, õ, ô, ã/. No high nasal vowels are found. Besides these vowels, there are also falling diphthongs [wi, we, wa, ju, jo, ja]. The vowel inventory is given on the left-hand side of Table 3, and examples of falling diphthongs are given on the right-hand side.

<sup>2</sup> Another, more sophisticated distinction was suggested to us by a reviewer. An affricate would have a single root node with two ordered, conflicting specifications for [continuant]. Such a view carries consequences for the analysis below, but we preferred to refrain from adopting it since there is no clear language-internal evidence for a higher level of complexity in affricates.

Table 3: Vowel inventory

i	u	_high	_mid	_low
e ē	o õ	tʰwiʔ³	tʰweʔ³	tʰwa²
ε ẽ	ɔ õ̃	w_ ‘break’	‘tightly (woven)’	‘earth, soil’
a ã		j_ ka¹·fo³· tʰjuʔ¹	tʰjo³· fu¹	tʰjaʔ³
		‘cottage cheese’	‘shaft’	‘quarrel, war’

In falling diphthongs, the glide is analyzed as part of the nucleus (as opposed to the onset) because such diphthongs have the same distribution as monophthongs. These diphthongs are to be distinguished from cases of initial glide-vowel sequences such as [we³] ‘red’ or [ju³-sku³] ‘woman’. These must be analyzed as onset-nucleus, since the language generally disallows onsetless syllables. As for rising diphthongs, we are not certain at this point. We have found several cases of [əj], but as reported in (4) above such sequences are an allophonic realization of /i/ after [+ant] consonants.

Three basic tones (high V<sup>1</sup>, mid V<sup>2</sup>, low V<sup>3</sup>) and three contour tones (V<sup>13</sup>, V<sup>21</sup>, V<sup>32</sup>) exist. A near minimal sextuple is given in (5).

(5) Distinctive tones in Xochistlahuaca

- a. hnda<sup>1</sup> ‘river’
- b. hnda<sup>2·</sup> ‘son/daughter.3SG.POSS’
- c. ka<sup>3</sup>-hnda<sup>3·</sup> ‘expensive’
- d. hndaʔ<sup>13</sup> ‘ordered, organized’
- e. ka<sup>1</sup>-hnda<sup>21</sup> ‘anim-frog’
- f. hnda<sup>32</sup> ‘moment, time’

Roots are monosyllabic. Maximal initial clusters are CCC where C<sub>1</sub> is a nasal and mostly a prefix (see §3.3). Only glottal stops are found in coda position, though nasal closure is realized for /ð/: /tsõ·/ is [tsõ̃ᵐ¹·] ‘heart’ and /ẽ/: /fẽ̃/ [fẽ̃ᵐ¹] ‘fragile’. In addition, the distribution of consonants in the initial position is skewed: most nouns start with sibilants. It seems that historically, the proto-Amuzgo nominal system involved several class markers, which under the influence of the tendency for monosyllabicity have become inseparable from the root.

Nasal consonants are never found before oral vowels, unless they are shielded by secondary oral closure of the nasal (Dobui, 2021 on shielding in Amuzgo; and for shielding in other languages see Herbert 1986; Stanton 2018; Wetzels & Nevins 2018; Lapierre in press). Many surface onset sequences [N<sup>1</sup>V] or [N<sup>4</sup>V] (remembering that voicing is not contrastive) are underlyingly /NV/, and contrast with /ÑV/ [ÑV]. The first form /NV/ can also be distinguished from /NTV/ when a nasal autosegmental /N/ suffix attaches to the stem and nasalizes the oral vowel. In (6a), the stem-initial nasal precedes an oral vowel, and is realized as shielded. In (6b), when the nasal autosegment for 3SG.HUM.POSS attaches to the right of the same noun and nasalizes the oral nucleus, no shielding occurs since the vowel is nasal. Conversely in (6c, d), closure is maintained even after the nasal autosegment is attached, evidence of a full segmental stop or /NTV/ in the base.

## (6) Oral/nasal contrast preservation through nasal shielding

- |   |  |
|---|--|
| a. /ɲo/<br>[ɲ <sup>di</sup> o <sup>1</sup> ]<br>mouth.3SG.POSS<br>‘someone’s mouth’ | b. /ɲo-N/<br>[ɲ <sup>ẽ</sup> ɲ <sup>1</sup> ]<br>mouth.3SG.HUM.POSS<br>‘his/her mouth’                     |
| c. /ɲtʰɔ/<br>[ɲtʰɔ <sup>2</sup> ·]<br>‘to frolic’                                   | d. /ma-ɲtʰɔ-N/<br>[ma <sup>2</sup> -ɲtʰɔ <sup>2</sup> ·]<br>PROG.SG-frolic-3SG.HUM<br>‘s/he is frolicking’ |

The plural marker is most often a nasal prefix, and blocking of nasal assimilation is responsible for some of the alternations seen in pluralized nominals. We return to this at length below. In addition, the process of nasal shielding is motivated by the need to preserve the underlying contrast between oral and nasal vowels. As announced, we will claim that contrast preservation is also a guiding principle in the phonological effects attested in plural marking.

Finally, nouns can be morphologically simplex or complex. Complex nouns are of two types. In one type, they carry a synchronic nominal class marker – such as the *ka* mentioned in the introduction (1e) – and number marking occurs only on the root. In the second case they are compounds, with two stems that continue to agree for number, bear lexical tone and have full vocalic realizations (we have not included such examples in this paper).

### 3 Analysis

As we have just seen in the phenomenon of nasal shielding, contrast preservation plays an important role in Amuzgo phonology. We propose that this consideration is decisive in determining the changes attested in plural formation (along with other factors). In the following two subsections, we concentrate on consonant mutation in [+ant] consonants (subsection 3.1) in [-ant] consonants (subsection 3.2) before oral and nasal vowels. Subsection 3.3 examines the realization of the plural exponent before consonant clusters.

A disclaimer is in order before we present our proposal. The analysis below remains purposely somewhat underformalized, in the sense that it is not couched in a specific framework. Specifically, while the analysis features notions familiar from Optimality Theory (OT; Prince & Smolensky 1993), such as violable constraints, we refrain from formalizing the proposed account in this or any other framework. We made this choice for the following reason. As anticipated, the account involves chain shifts, saltation and contrast preservation, all of which are notions that raise specific technical problems within OT (Łubowicz 2011, 2012; Hayes & White 2015). Engaging in that discussion is somewhat beyond our expertise, and more importantly would draw attention away from our goal: to propose rationales for the intricate consonant mutation and deletion patterns in Amuzgo plural formation.

#### 3.1 Consonant mutations among [+ant] consonants

The most straightforward alternation in plural formation is the stopping of /s/ after [n], e.g. /N-su/ → [ɲtsu] ‘resins’. This phonetically-motivated change is a very common process universally: as mentioned, it occurs, for instance, in English *instance* [ɪntstənts].

- (7) /N-s/ → [nts]
- |    |                                    |                                      |         |
|----|------------------------------------|--------------------------------------|---------|
|    | <i>sg</i>                          | <i>pl</i>                            |         |
| a. | ka <sup>1</sup> -so <sup>2</sup>   | ka <sup>1</sup> -n-tso <sup>2</sup>  | ‘horse’ |
| b. | səj <sup>1</sup>                   | n-təj <sup>1</sup>                   | ‘corn’  |
| c. | ka <sup>1</sup> -sa <sup>2</sup>   | ka <sup>1</sup> -n-tsa <sup>2</sup>  | ‘bird’  |
| d. | ka <sup>1</sup> -sɛ <sup>3</sup> · | ka <sup>1</sup> -n-tɛ <sup>3</sup> · | ‘toad’  |

In a system like Amuzgo, however, this change threatens to neutralize the distinction between /s/ and /ts/. To preserve that contrast, /ts/ too, cannot be realized faithfully. How it is realized will depend on whether the vowel after it is nasal or oral. If an oral vowel follows the /ts/, it mutates into [t].


- (8) /N-ts/ → [nt]
- |    | <i>sg</i>                           | <i>pl</i>                            |             |
|----|-------------------------------------|--------------------------------------|-------------|
| a. | ka <sup>1</sup> -tse <sup>1</sup> · | ka <sup>1</sup> -n-te <sup>1</sup> · | ‘butterfly’ |
| b. | tio <sup>2</sup> -tso <sup>2</sup>  | tio <sup>2</sup> -n-to <sup>2</sup>  | ‘squirrel’  |
| c. | tsəj <sup>3</sup> ·                 | n-təj <sup>3</sup> ·                 | ‘egg’       |
| d. | ka <sup>1</sup> -tsu <sup>1</sup>   | ka <sup>1</sup> -n-tu <sup>1</sup>   | ‘snake’     |

The change from /ts/ to [t] also results in loss of contrast, this time between /ts/ and /t/. However, the sequence /N-t/ is faithfully realized.

- (9) /N-t/ → [nt]
- |    | <i>sg</i>                          | <i>pl</i>                            |          |
|----|------------------------------------|--------------------------------------|----------|
| a. | tɛ <sup>2</sup>                    | n-te <sup>2</sup>                    | ‘priest’ |
| b. | ka <sup>1</sup> -tu <sup>1</sup> ? | ka <sup>1</sup> -n-tu <sup>1</sup> ? | ‘dove’   |
| c. | ka <sup>1</sup> -to <sup>2</sup>   | ka <sup>1</sup> -n-to <sup>2</sup>   | ‘parrot’ |
| d. | ta <sup>3</sup> ·                  | n-ta <sup>3</sup> ·                  | ‘hill’   |

To summarize, in the context of an oral vowel, one might establish the “push chain” (Łubowicz 2011 and references therein) in (10), making the claim that /ts/ is realized as [t] *because* /s/ is realized as [ts]. The resistance of /t/ to change is not surprising in this context, as the last element in the chain is commonly unaltered.<sup>3</sup> To motivate this chain, one may assume that contrast is required between DR consonants, not between stops.

- (10) [+ant] push chain: first approximation

s → ts → t  / N\_\_V

A caveat must be made here for a very specific environment, namely /ts/ preceding glides. In these cases, instead of the [t] expected under (10), one finds the deletion of /ts/ and a concomitant denasalization of the prefix:

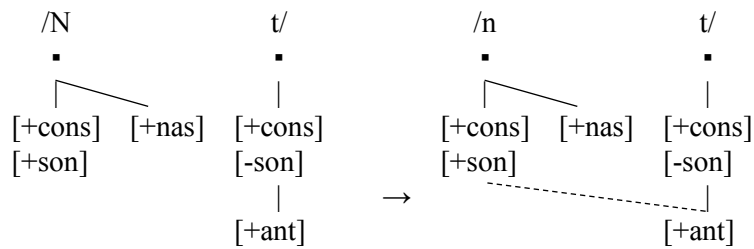
- (11) /n-tsG/ → [l-G] (G=glide)

- |    | <i>sg</i>                          | <i>pl</i>                          |                 |
|----|------------------------------------|------------------------------------|-----------------|
| a. | tswa <sup>3</sup> ·                | l-wa <sup>3</sup> ·                | ‘calabash’      |
| b. | tswe <sup>1</sup>                  | l-we <sup>1</sup>                  | ‘bedroll’       |
| c. | tsjo <sup>2</sup>                  | l-jo <sup>2</sup>                  | ‘bottle’        |
| d. | ka <sup>1</sup> -tsju <sup>3</sup> | ka <sup>1</sup> -l-ju <sup>3</sup> | ‘concave, deep’ |

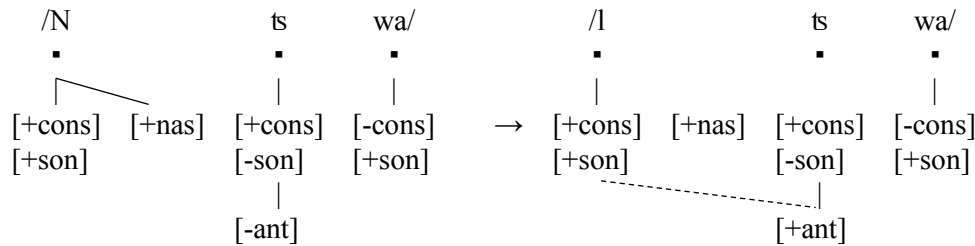
We relate this interesting mutation to the fact that /t/ is never found before such diphthongs: there appears to be a general ban on /t/ before glides. The mutation of /ts/ into [t] is therefore blocked, and instead /ts/ is deleted. This deletion places the prefixal /N/ before an oral nucleus. In order to preserve the orality of the nucleus, the prefix is denasalized.

To be explicit, we provide a short Feature Geometry formalization (e.g. Clements & Hume 1995) of the relevant processes examined so far. The diagram in (12) provides the general rule of nasal assimilation: the placeless /N/ prefix comes to acquire the value for anteriority of the following consonant:

<sup>3</sup> The circular arrow is used here to convey the fact that the final consonant remains unaltered, rather than claiming that there is another step in the chain.

(12) Nasal assimilation /N-ta<sup>3</sup>/ → [n-ta<sup>3</sup>] ‘hill’

The process of deletion and denasalization is presented in (13). While nasal assimilation still applies, providing the nasal with its [+ant] feature, the root node of /ts/ is delinked. Since nasals cannot precede oral vowels, the feature [+nasal] is delinked from the prefixal root node. As shown in Table 2 above, a sonorant with no nasal feature (or specified [-nasal]) can be either /r/ or /l/. Of these two, the former is exclusive to ideophones and loanwords, and thus clearly more marked; the result of denasalization is therefore /l/.

(13) Pre-diphthongal deletion and denasalization: /N-tswa<sup>ʔ3</sup>/ → [l-wa<sup>ʔ3</sup>] ‘calabash’

The delinking rule in (13) is of course motivated by the same generalization as nasal shielding: the language does not allow for nasal onsets with oral nuclei. This raises the question of why the process of nasal shielding does not occur in plurals. One possibility is that the rule in (13) is morpheme-specific, applying only to the plural exponent. Another possibility would be to represent the prefix with a floating nasal feature, which is linked to the sonorant unless this creates an illicit configuration. We prefer the second option; but we refrain from further argumentation in favor of it.

Now consider [+ant] consonants before nasal vowels. The first and third steps in the chain are the same: /s/ is realized as [ts], and /t/ remains unaltered (14a, c). But the second step is different: instead of mutating into [t], /ts/ is deleted (14b).

(14) Underlying [+ant] consonants in the environment /N-<sub>̃</sub>V/

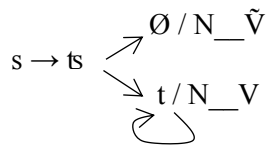
- |   |   |
|---|---|
| a. /s/ → [ts]   | b. /ts/ → ∅                               |
| <i>sg</i> <i>pl</i>                                       | <i>sg</i> <i>pl</i>                       |
| sã <sup>1</sup> ka <sup>1</sup> -n-tã <sup>1</sup> ‘scar’ | ʃhã <sup>1</sup> n-hã <sup>1</sup> ‘town’ |
| ʃjã <sup>13</sup> n-tʃjã <sup>13</sup> ‘humming-bird’     | ʃʔã <sup>2</sup> n-ʔã <sup>2</sup> ‘tail’ |
| c. /t/ → [t]  |   |
| <i>sg</i> <i>pl</i>                                       |   |
| tã <sup>3</sup> n-tã <sup>3</sup> ‘piece’                 |   |
| tã <sup>1</sup> n-tã <sup>1</sup> ‘knot’                  |   |

While different from the fortition strategy in (8) above, the treatment of underlying /ts/ in (14b) can be regarded as resulting from the same pressure as the one in (8). Because /s/ is realized as [ts], /ts/ must not be faithfully realized, and since the nasality of the vowel allows for it, it may be deleted.



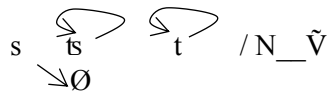
Nevertheless, why is there deletion and not fortition before nasal vowels? We have already seen the beginning of an answer in the phenomenon of nasal shielding. If /ts/ were deleted between /N/ and an oral vowel, the resulting sequence would leave the nasal before the oral vowel – and such a configuration is ungrammatical in Amuzgo. Thus, one might assume that deletion is the preferred solution, as it allows for two nasal segments to be uninterrupted by a non-nasal segment; but it is inapplicable before oral vowels. Incidentally, deletion of /ts/ also prevents the loss of contrast between /ts/ and /t/; though it is less clear whether this consideration plays a role in the choice.

(15) [+ant] push chain: final



This view of /ts/-deletion, however, raises another question: if deletion of an oral consonant between a nasal consonant and a nasal vowel is preferred, why does it not apply to /s/? As shown in (16), this would eliminate the chain effect completely, with /s/ being deleted and therefore not pushing /ts/.

(16) Unattested pattern in [+ant] consonants

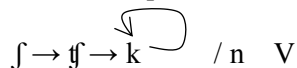


As announced, we assume that there is greater faithfulness to sibilants than to affricates. Thus, the chain in (16) is dispreferred when compared to the chain in (15).<sup>4</sup> We now move to [-ant] consonants.

### 3.2 Consonant mutations among [-ant] consonants

Consider the underlying sequence /N-ʃV/ (i.e., with /ʃ/ preceding an oral vowel). One expects [nʃV], assuming the same affrication process encountered in the [+ant] set. Following this parallel, /N-tʃV/ should become [ŋkV], since /k/ is the only [-ant] stop in the inventory. These changes would result in the unattested push chain in (17):

(17) Unattested push chain in [-ant] consonant



Instead of this perfect parallel of the [+ant] set, one finds /N-ʃV/ → [ŋkV] (18a), and /N-tʃV/ → [nʃV] (18b); whereas /N-kV/ remains unaltered (18c).

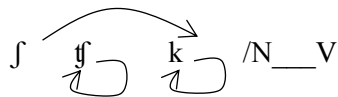
<sup>4</sup> Feature preservation is a recurrent motivation in studies of chain shifts (e.g. Tessier 2004). A possible motivation for this greater faithfulness to /s/ is the preservation of the value for the feature [continuant]: when /ts/ is deleted, the /n/ left behind preserves the [-continuant] feature of the affricate. But if /s/ were deleted, its [+continuant] feature would be completely lost. However, this formalization encounters a problem in the parallel situation among [-ant] consonants (see fn. 7).

## (18) [-ant] consonants in the environment /N\_ V/

- |  |                                      |                      |           |                                    |                                      |                 |                    |                      |                  |  |           |           |  |                    |                      |                      |                   |                     |                  |
|--|--------------------------------------|----------------------|-----------|------------------------------------|--------------------------------------|-----------------|--------------------|----------------------|------------------|--|-----------|-----------|--|--------------------|----------------------|----------------------|-------------------|---------------------|------------------|
| <p>a. /ʃ/ → [k]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>ʃo<sup>2</sup>·ʃi<sup>2</sup>·</td> <td>ŋ-ko<sup>2</sup>·ʃi<sup>2</sup>·</td> <td>‘griddle’</td> </tr> <tr> <td>ʃjo<sup>2</sup>·</td> <td>ŋ-kjo<sup>2</sup>·</td> <td>‘plate, tile’</td> </tr> </table> | <i>sg</i>                            | <i>pl</i>            |           | ʃo <sup>2</sup> ·ʃi <sup>2</sup> · | ŋ-ko <sup>2</sup> ·ʃi <sup>2</sup> · | ‘griddle’       | ʃjo <sup>2</sup> · | ŋ-kjo <sup>2</sup> · | ‘plate, tile’    | <p>b. /tʃ/ → [tʃ]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>tʃe<sup>3</sup>·</td> <td>n-tʃe<sup>3</sup>·</td> <td>‘underdress (nagua)’</td> </tr> <tr> <td>tʃwe<sup>2</sup></td> <td>n-tʃwe<sup>2</sup></td> <td>‘tunic (huipil)’</td> </tr> </table> | <i>sg</i> | <i>pl</i> |  | tʃe <sup>3</sup> · | n-tʃe <sup>3</sup> · | ‘underdress (nagua)’ | tʃwe <sup>2</sup> | n-tʃwe <sup>2</sup> | ‘tunic (huipil)’ |
| <i>sg</i>  | <i>pl</i>                            |                      |           |                                    |                                      |                 |                    |                      |                  |  |           |           |  |                    |                      |                      |                   |                     |                  |
| ʃo <sup>2</sup> ·ʃi <sup>2</sup> ·   | ŋ-ko <sup>2</sup> ·ʃi <sup>2</sup> · | ‘griddle’            |           |                                    |                                      |                 |                    |                      |                  |  |           |           |  |                    |                      |                      |                   |                     |                  |
| ʃjo <sup>2</sup> ·   | ŋ-kjo <sup>2</sup> ·                 | ‘plate, tile’        |           |                                    |                                      |                 |                    |                      |                  |  |           |           |  |                    |                      |                      |                   |                     |                  |
| <i>sg</i>  | <i>pl</i>                            |                      |           |                                    |                                      |                 |                    |                      |                  |  |           |           |  |                    |                      |                      |                   |                     |                  |
| tʃe <sup>3</sup> ·   | n-tʃe <sup>3</sup> ·                 | ‘underdress (nagua)’ |           |                                    |                                      |                 |                    |                      |                  |  |           |           |  |                    |                      |                      |                   |                     |                  |
| tʃwe <sup>2</sup>  | n-tʃwe <sup>2</sup>                  | ‘tunic (huipil)’     |           |                                    |                                      |                 |                    |                      |                  |  |           |           |  |                    |                      |                      |                   |                     |                  |
| <p>c. /k/ → [k]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>ki<sup>1</sup></td> <td>ŋ-ki<sup>1</sup></td> <td>‘hard, solid’</td> </tr> <tr> <td>kjo<sup>1</sup></td> <td>ŋ-kjo<sup>1</sup>·</td> <td>‘animal’</td> </tr> </table>                                   |                                      |                      | <i>sg</i> | <i>pl</i>                          |                                      | ki <sup>1</sup> | ŋ-ki <sup>1</sup>  | ‘hard, solid’        | kjo <sup>1</sup> | ŋ-kjo <sup>1</sup> ·   | ‘animal’  |           |  |                    |                      |                      |                   |                     |                  |
| <i>sg</i>  | <i>pl</i>                            |                      |           |                                    |                                      |                 |                    |                      |                  |  |           |           |  |                    |                      |                      |                   |                     |                  |
| ki <sup>1</sup>  | ŋ-ki <sup>1</sup>                    | ‘hard, solid’        |           |                                    |                                      |                 |                    |                      |                  |  |           |           |  |                    |                      |                      |                   |                     |                  |
| kjo <sup>1</sup>   | ŋ-kjo <sup>1</sup> ·                 | ‘animal’             |           |                                    |                                      |                 |                    |                      |                  |  |           |           |  |                    |                      |                      |                   |                     |                  |

These changes can be regarded as a case of saltation (19): for an expected chain 1→2→3, one finds 1→3, ignoring 2. Thus, the change cannot be described as a push chain:

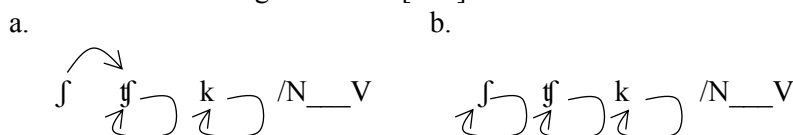
## (19) Saltation in [-ant] consonants before oral vowels



Why does the language not allow a chain similar to that of the [+ant] set, as in (17)? We propose that this is due to the asymmetry between the [+ant] and [-ant] inventories, combined with the requirement for a push chain to be uniform for place of articulation (POA). Elements on the [+ant] push chain in (10) all share the apico-dental POA. But in the unattested [-ant] chain in (17), POA is not shared by all three members because [-ant] groups two places of articulation in this language: [ʃ, tʃ] are palatal, but [k] is velar.<sup>5</sup>

Thus, a push chain may not be established among [-ant] consonants. A different question is raised with respect to the configuration in (19): why is there “saltation” at all? At least two other options are possible. The first is presented in (20a): it maintains the first, expected step in (17), but not the problematic second step, which would change the POA. This configuration, we propose, is ruled out by the need to maintain contrast between delayed release (DR) consonants. The second possible configuration (20b) does respect this contrast, by leaving /ʃ/ unaltered. We have already seen why this cannot be: /ʃ/ *must* change because of the phonotactic restriction against sequences of post nasal sibilants; /tʃ/ is not targeted by that restriction. In other words, [ŋV] cannot arise, and this gives /ʃ/ priority for mutation over /tʃ/. This is another example of a nasal-fricative sequences being avoided.

## (20) More unattested configurations in [-ant] consonants



Finally, note that like the [+ant] stop /t/, the [-ant] plosive /k/ does not change, even though contrast between /ʃ/ and /k/ is lost. Again, by assumption, the motivating force in these changes is the requirement for contrast among DR consonants, not among any pair of consonants. Crucially, the situation in (19) *does* comply with this requirement: *because* /ʃ/ saltates into [k], /tʃ/ may remain unaltered, and the /ʃ, tʃ/ contrast is not lost. While /ʃ/→[k] /n\_ V does not appear to be phonetically motivated, preservation of

<sup>5</sup> An anonymous reviewer remarks that the saltation described here is surprising because it occurs along two phonetic dimensions - manner and place. Storme (2018) proposes that such cases of saltation can benefit from a perceptual effect, whereby a change along one dimension seems smaller when accompanied by a change along another dimension, roughly because it is only *part* of the entire change, as opposed to all of it.

[-ant] in conjunction with the phoneme inventory of Amuzgo provides the necessary phonological motivation.

To summarize, the impossibility of maintaining a sibilant after a nasal, the requirement to maintain contrast among DR consonants and the phonemic inventory of the language – all three factors combined result in a push chain in [+ant] consonants, but in saltation and no push chain in [-ant] ones.

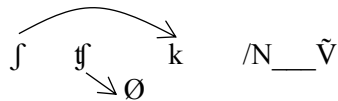
The increased faithfulness to sibilants is apparent in [-ant] consonants, too. Consider the behavior of these consonants in the inter-nasal environment /N\_  $\tilde{V}$ / in (21). Here, one finds that like the [+ant] affricate, the [-ant] affricate is deleted.<sup>6</sup>

(21) Underlying [-ant] consonants in the environment /n-  $\tilde{V}$ /

<p>a. /ʃ/ → [k]</p> <table style="border: none; width: 100%;"> <tr> <td style="width: 30%;"><i>sg</i></td> <td style="width: 30%;"><i>pl</i></td> <td></td> </tr> <tr> <td>ʃẽʔ<sup>3</sup></td> <td>ŋ-kẽʔ<sup>3</sup></td> <td>‘father-in-law’</td> </tr> <tr> <td>ʃjẽm̃<sup>21</sup></td> <td>ŋ-kjẽm̃<sup>21</sup></td> <td>‘crab’</td> </tr> </table>	<i>sg</i>	<i>pl</i>		ʃẽʔ <sup>3</sup>	ŋ-kẽʔ <sup>3</sup>	‘father-in-law’	ʃjẽm̃ <sup>21</sup>	ŋ-kjẽm̃ <sup>21</sup>	‘crab’	<p>b. /tʃ/ → Ø</p> <table style="border: none; width: 100%;"> <tr> <td style="width: 30%;"><i>sg</i></td> <td style="width: 30%;"><i>pl</i></td> <td></td> </tr> <tr> <td>tʃẽm̃<sup>2</sup></td> <td>ŋ-ẽm̃<sup>2</sup></td> <td>‘paper’</td> </tr> <tr> <td>ka<sup>1</sup>-tʃãʔ<sup>13</sup></td> <td>ka<sup>1</sup>-ŋ-ãʔ<sup>13</sup></td> <td>‘larva’</td> </tr> </table>	<i>sg</i>	<i>pl</i>		tʃẽm̃ <sup>2</sup>	ŋ-ẽm̃ <sup>2</sup>	‘paper’	ka <sup>1</sup> -tʃãʔ <sup>13</sup>	ka <sup>1</sup> -ŋ-ãʔ <sup>13</sup>	‘larva’
<i>sg</i>	<i>pl</i>																		
ʃẽʔ <sup>3</sup>	ŋ-kẽʔ <sup>3</sup>	‘father-in-law’																	
ʃjẽm̃ <sup>21</sup>	ŋ-kjẽm̃ <sup>21</sup>	‘crab’																	
<i>sg</i>	<i>pl</i>																		
tʃẽm̃ <sup>2</sup>	ŋ-ẽm̃ <sup>2</sup>	‘paper’																	
ka <sup>1</sup> -tʃãʔ <sup>13</sup>	ka <sup>1</sup> -ŋ-ãʔ <sup>13</sup>	‘larva’																	

This state-of-affairs is represented graphically in (22):

(22) Saltation and deletion in [-ant] consonants before nasal vowels



Importantly, while /tʃ/ itself is deleted, its palatal POA is not, in that the nasal prefix is now palatal [ɲ] (a phenomenon already formalized in (13) above). The preservation of POA will play a central role in the next section.

As with [+ant] consonants in the /N\_  $\tilde{V}$ / environment, the question raised is why /tʃ/ is deleted, rather than /ʃ/. Again, one may assume an increased faithfulness to sibilants, such that if either /ʃ/ or /tʃ/ must delete, it will be [tʃ], much like in the [+ant] set where [ts] is deleted.<sup>7</sup>

In the /N\_  $\tilde{V}$ / environment, one may wonder why, given the deletion of /tʃ/, /ʃ/ does not undergo affrication as in [+ant] consonants, to yield [nʃ]. We do not have an insightful answer to this question: it seems that the situation before nasal vowels is modeled on that before oral ones, such that the mutation of /ʃ/ into [k] is generalized, even though it is not motivated by contrast preservation in this environment.

To summarize, the need to maintain the underlying contrast between DR phonemes and the impossibility of faithfully realizing /s, ʃ/ after [n] end up accounting for the data. Other aspects of the proposal include the restriction of chain shifts to the same POA and greater faithfulness to sibilants, which never delete before vowels.

Having said that, there are cases where even sibilants are deleted in pluralization, as discussed in the next subsection.

### 3.3 Consonant deletion vs. retention in N\_C

Several basic nouns in Amuzgo begin with consonant clusters. In the plural, this places the initial consonants between the prefixal nasal and the following consonant. In this configuration, stem-initial consonants react somewhat differently from the prevocalic position. Below, we first examine [+ant] consonants in the /N-  $\tilde{C}$ / configuration, and then move on to [-ant] ones.

Let us begin with [+ant] consonants followed by oral consonants. An initial /s/ may be followed by oral [t, k] in  $C_2$ . The plural always involves the deletion of /s/. When /s/ is deleted before [t], only a [+ant] nasal surfaces; but before [k] (23b), the deletion seems to leave a curious trace: the prefixal nasal

<sup>6</sup> We were not able to find roots with nasal vowels beginning with [k].

<sup>7</sup> Here, formalizing the greater faithfulness to /ʃ/ as the need to preserve the value of the feature [continuant] is not a good option because this value is not preserved in the passage from /ʃ/ to [k].

denasalizes into [l] (recall that the first [ka] in ‘candle’ is a prefixed class marker). Clusters with an initial affricate /ts/ always involve C<sub>2</sub> [k] (23c), never [t]. In the plural, /ts/ also deletes, again leaving behind the curious denasalized realization of the prefix. Finally, clusters with initial plosive /t/ always involve C<sub>2</sub> [k] (23d). The /t/ is never omitted in the plural.

(23) [+ant] consonants in N\_C

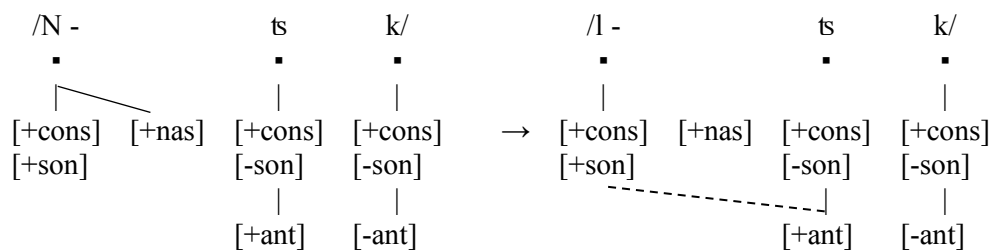
<p>a. /N-st/ → [nt]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>sto<sup>1</sup></td> <td>n-to<sup>1</sup></td> <td>‘elf’</td> </tr> <tr> <td>sta<sup>1</sup></td> <td>ka<sup>1</sup>-n-ta<sup>1</sup></td> <td>‘forehead’</td> </tr> </table>	<i>sg</i>	<i>pl</i>		sto <sup>1</sup>	n-to <sup>1</sup>	‘elf’	sta <sup>1</sup>	ka <sup>1</sup> -n-ta <sup>1</sup>	‘forehead’	<p>b. /N-sk/ → [lk]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>ska<sup>2</sup></td> <td>ka<sup>2</sup>-l-ka<sup>2</sup></td> <td>‘candle’</td> </tr> <tr> <td>ju<sup>3</sup>-sku<sup>3</sup></td> <td>jo<sup>3</sup>-l-ku<sup>3</sup></td> <td>‘woman’<sup>8</sup></td> </tr> </table>	<i>sg</i>	<i>pl</i>		ska <sup>2</sup>	ka <sup>2</sup> -l-ka <sup>2</sup>	‘candle’	ju <sup>3</sup> -sku <sup>3</sup>	jo <sup>3</sup> -l-ku <sup>3</sup>	‘woman’ <sup>8</sup>
<i>sg</i>	<i>pl</i>																		
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ju <sup>3</sup> -sku <sup>3</sup>	jo <sup>3</sup> -l-ku <sup>3</sup>	‘woman’ <sup>8</sup>																	
<p>c. /N-ʈsk/ → [lk]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>ʈska<sup>2</sup></td> <td>l-ka<sup>2</sup></td> <td>‘board’</td> </tr> <tr> <td>ka<sup>1</sup>-ʈsku<sup>2</sup></td> <td>ka<sup>1</sup>-l-ku<sup>2</sup></td> <td>‘pig’</td> </tr> </table>	<i>sg</i>	<i>pl</i>		ʈska <sup>2</sup>	l-ka <sup>2</sup>	‘board’	ka <sup>1</sup> -ʈsku <sup>2</sup>	ka <sup>1</sup> -l-ku <sup>2</sup>	‘pig’	<p>d. /N-tk/ → [ntk]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>ka<sup>2</sup>-tkja<sup>2</sup></td> <td>ka<sup>2</sup>-n-tkja<sup>2</sup></td> <td>‘nest’</td> </tr> <tr> <td>tk<sup>wi</sup>?<sup>2</sup></td> <td>n-tk<sup>wi</sup>?<sup>2</sup></td> <td>‘leg’</td> </tr> </table>	<i>sg</i>	<i>pl</i>		ka <sup>2</sup> -tkja <sup>2</sup>	ka <sup>2</sup> -n-tkja <sup>2</sup>	‘nest’	tk <sup>wi</sup> ? <sup>2</sup>	n-tk <sup>wi</sup> ? <sup>2</sup>	‘leg’
<i>sg</i>	<i>pl</i>																		
ʈska <sup>2</sup>	l-ka <sup>2</sup>	‘board’																	
ka <sup>1</sup> -ʈsku <sup>2</sup>	ka <sup>1</sup> -l-ku <sup>2</sup>	‘pig’																	
<i>sg</i>	<i>pl</i>																		
ka <sup>2</sup> -tkja <sup>2</sup>	ka <sup>2</sup> -n-tkja <sup>2</sup>	‘nest’																	
tk <sup>wi</sup> ? <sup>2</sup>	n-tk <sup>wi</sup> ? <sup>2</sup>	‘leg’																	

We assume that the deletion of the DR consonant before C is due to the illicit triconsonantal cluster. Since contrast between /s/ and /ʈs/ is lost in (23b, c) – and indeed, even faithfulness to /s/ is violated in (23a, b) – we must again posit a hierarchy among considerations: the ban on CCC clusters is more important than either contrast preservation or faithfulness to sibilants. As mentioned in the introduction, if this view is correct, it constitutes an argument against considering prefixal N as syllabic, because if N were syllabic, then N.CC would not pose a problem given that CC is a possible syllable-initial cluster.

Denasalization of /n/ → [l] before [k] can be attributed to a need to preserve the POA of the deleted consonant, alongside the requirement for /N/ to assimilate in POA to a following consonant. Once /s, ʈs/ are deleted, the nasal prefix is placed before the velar [k]. It is expected to be realized as [ŋ]. However, such a realization would obscure the [+ant] nature of the underlying /s, ʈs/ from the surface representation. By denasalizing /n/ into [l], which does not require assimilation, the [+ant] feature of /s, ʈs/ can be realized even after their deletion (which is therefore only partial, as their POA is preserved).

A feature geometric representation is provided in (24). Again, as in (13) above, when the consonant following the prefix is delinked from its root node, its value for anteriority is preserved in the prefix. But since nasals generally share the value for anteriority with the following root node, leaving the prefix linked to its nasal node creates a conflict with the following [-ant] specification. To repair the illicit sequence [nk] while still preserving the POA of the deleted consonant, denasalization applies: the prefix is dissociated from its nasal node.

(24) Preconsonantal deletion and denasalization: /N-ʈska<sup>2</sup>/ → [l-ka<sup>2</sup>] ‘board’



As for C<sub>2</sub> nasals, we found clusters with initial /s/ followed by either nasal (25a), but clusters with initial /ʈs/ or /t/ only before /m/ (25b, c). Again, /s/ and /ʈs/ are deleted due to the ban on triconsonantal clusters. It is noteworthy that with initial /sn/, there seems to be no plural prefix at all; we assume the surviving nasal corresponds to both the stem and the prefix nasals: /N-snV/ → /N-nV/ → [n<sup>d</sup>V]. The

<sup>8</sup> The word for person /ju<sup>3</sup>/ has an irregular plural /jo<sup>3</sup>/.

sequence /n-tm/ is again unaltered, reflecting the higher faithfulness to non-DR plosives we have seen elsewhere. Note that the [+ant] feature of the deleted consonants is preserved in the apical POA of the prefixal [n].

## (25) [+ant] consonants in N\_CN

- |  |  |           |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |
|--|--|-----------|-----------|--------------------------------|----------------------------------|--------------------------------|--------------------------------|----------------------------------|--------------------------------|--|--|----------|--|-----------|-----------|--|--|--|--------|--|--|----------|
| <p>a. /N-sN/ → [n-t]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>sn<sup>d</sup>a<sup>1</sup></td> <td>ka-n<sup>d</sup>a<sup>1</sup></td> <td>‘plow’</td> </tr> <tr> <td>sn<sup>ñ</sup>m<sup>1</sup></td> <td>ka-n<sup>ñ</sup>m<sup>1</sup></td> <td>‘donkey’</td> </tr> <tr> <td>ka<sup>1</sup>sm<sup>ã</sup><sup>1</sup></td> <td>ka<sup>1</sup>-n-m<sup>ã</sup><sup>1</sup></td> <td>‘purple’</td> </tr> </table> | <i>sg</i>                                      | <i>pl</i> |           | sn <sup>d</sup> a <sup>1</sup> | ka-n <sup>d</sup> a <sup>1</sup> | ‘plow’                         | sn <sup>ñ</sup> m <sup>1</sup> | ka-n <sup>ñ</sup> m <sup>1</sup> | ‘donkey’                       | ka <sup>1</sup> sm <sup>ã</sup> <sup>1</sup> | ka <sup>1</sup> -n-m <sup>ã</sup> <sup>1</sup> | ‘purple’ | <p>b. /N-tsm/ → [n-m]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>tɛ<sup>3</sup>-tsm<sup>ã</sup><sup>3</sup></td> <td>tɛ<sup>3</sup>-n-m<sup>ã</sup><sup>3</sup></td> <td>‘plow’</td> </tr> <tr> <td>ka<sup>1</sup>-tsm<sup>ã</sup><sup>2</sup></td> <td>ka<sup>1</sup>-n-m<sup>ã</sup><sup>2</sup></td> <td>‘donkey’</td> </tr> </table> | <i>sg</i> | <i>pl</i> |  | tɛ <sup>3</sup> -tsm <sup>ã</sup> <sup>3</sup> | tɛ <sup>3</sup> -n-m <sup>ã</sup> <sup>3</sup> | ‘plow’ | ka <sup>1</sup> -tsm <sup>ã</sup> <sup>2</sup> | ka <sup>1</sup> -n-m <sup>ã</sup> <sup>2</sup> | ‘donkey’ |
| <i>sg</i>  | <i>pl</i>                                      |           |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |
| sn <sup>d</sup> a <sup>1</sup>   | ka-n <sup>d</sup> a <sup>1</sup>               | ‘plow’    |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |
| sn <sup>ñ</sup> m <sup>1</sup>   | ka-n <sup>ñ</sup> m <sup>1</sup>               | ‘donkey’  |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |
| ka <sup>1</sup> sm <sup>ã</sup> <sup>1</sup>   | ka <sup>1</sup> -n-m <sup>ã</sup> <sup>1</sup> | ‘purple’  |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |
| <i>sg</i>  | <i>pl</i>                                      |           |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |
| tɛ <sup>3</sup> -tsm <sup>ã</sup> <sup>3</sup>   | tɛ <sup>3</sup> -n-m <sup>ã</sup> <sup>3</sup> | ‘plow’    |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |
| ka <sup>1</sup> -tsm <sup>ã</sup> <sup>2</sup>   | ka <sup>1</sup> -n-m <sup>ã</sup> <sup>2</sup> | ‘donkey’  |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |
| <p>c. /N-tm/ → [n-tm]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>tm<sup>ã</sup>ʔ<sup>2</sup></td> <td>n-tm<sup>ã</sup>ʔ</td> <td>‘pile’</td> </tr> <tr> <td>tm<sup>ẽ</sup>ʔ<sup>3</sup></td> <td>n-tm<sup>ẽ</sup>ʔ<sup>3</sup></td> <td>‘fever’</td> </tr> </table>  |  |           | <i>sg</i> | <i>pl</i>                      |                                  | tm <sup>ã</sup> ʔ <sup>2</sup> | n-tm <sup>ã</sup> ʔ            | ‘pile’                           | tm <sup>ẽ</sup> ʔ <sup>3</sup> | n-tm <sup>ẽ</sup> ʔ <sup>3</sup>             | ‘fever’  |          |  |           |           |  |  |  |        |  |  |          |
| <i>sg</i>  | <i>pl</i>                                      |           |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |
| tm <sup>ã</sup> ʔ <sup>2</sup>   | n-tm <sup>ã</sup> ʔ                            | ‘pile’    |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |
| tm <sup>ẽ</sup> ʔ <sup>3</sup>   | n-tm <sup>ẽ</sup> ʔ <sup>3</sup>               | ‘fever’   |           |                                |                                  |                                |                                |                                  |                                |  |  |          |  |           |           |  |  |  |        |  |  |          |

Among [-ant] consonants, examples are fewer. In C<sub>1</sub>, we found only /ʃ/ and /tʃ/. /ʃ/ can precede either [tʃ] or [k] (26a; a single example was found for each). It is deleted in both environments, leaving behind an assimilated nasal. In contrast, there are several examples of /tʃk/-initial nouns; and unlike its [+ant] equivalent /ts/ in the same environment, /tʃ/ is never deleted (26b).

## (26) [-ant] consonants in N\_C

- |  |   |            |  |                                 |   |        |                              |                               |        |  |           |           |  |                    |                      |            |                    |                      |         |                                     |                                       |          |
|--|---|------------|--|---------------------------------|---|--------|------------------------------|-------------------------------|--------|--|-----------|-----------|--|--------------------|----------------------|------------|--------------------|----------------------|---------|-------------------------------------|---------------------------------------|----------|
| <p>a. /n-ʃC/</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>ʃt<sup>l</sup>oʔ<sup>2</sup></td> <td>ka<sup>2</sup>-n-t<sup>l</sup>oʔ<sup>2</sup></td> <td>‘neck’</td> </tr> <tr> <td>ʃk<sup>ẽ</sup><sup>3</sup></td> <td>ŋ-k<sup>ẽ</sup><sup>3</sup></td> <td>‘head’</td> </tr> </table> | <i>sg</i>   | <i>pl</i>  |  | ʃt <sup>l</sup> oʔ <sup>2</sup> | ka <sup>2</sup> -n-t <sup>l</sup> oʔ <sup>2</sup> | ‘neck’ | ʃk <sup>ẽ</sup> <sup>3</sup> | ŋ-k <sup>ẽ</sup> <sup>3</sup> | ‘head’ | <p>b. /n-tʃk/ → [n-tʃk]</p> <table border="0"> <tr> <td><i>sg</i></td> <td><i>pl</i></td> <td></td> </tr> <tr> <td>tʃkja<sup>2</sup></td> <td>n-tʃkja<sup>2</sup></td> <td>‘tortilla’</td> </tr> <tr> <td>tʃkjo<sup>3</sup></td> <td>n-tʃkjo<sup>3</sup></td> <td>‘cough’</td> </tr> <tr> <td>ka<sup>2</sup>-tʃkwe<sup>3</sup></td> <td>ka<sup>2</sup>-n-tʃkwe<sup>3</sup></td> <td>‘spider’</td> </tr> </table> | <i>sg</i> | <i>pl</i> |  | tʃkja <sup>2</sup> | n-tʃkja <sup>2</sup> | ‘tortilla’ | tʃkjo <sup>3</sup> | n-tʃkjo <sup>3</sup> | ‘cough’ | ka <sup>2</sup> -tʃkwe <sup>3</sup> | ka <sup>2</sup> -n-tʃkwe <sup>3</sup> | ‘spider’ |
| <i>sg</i>  | <i>pl</i>   |            |  |                                 |   |        |                              |                               |        |  |           |           |  |                    |                      |            |                    |                      |         |                                     |                                       |          |
| ʃt <sup>l</sup> oʔ <sup>2</sup>  | ka <sup>2</sup> -n-t <sup>l</sup> oʔ <sup>2</sup> | ‘neck’     |  |                                 |   |        |                              |                               |        |  |           |           |  |                    |                      |            |                    |                      |         |                                     |                                       |          |
| ʃk <sup>ẽ</sup> <sup>3</sup>   | ŋ-k <sup>ẽ</sup> <sup>3</sup>                     | ‘head’     |  |                                 |   |        |                              |                               |        |  |           |           |  |                    |                      |            |                    |                      |         |                                     |                                       |          |
| <i>sg</i>  | <i>pl</i>   |            |  |                                 |   |        |                              |                               |        |  |           |           |  |                    |                      |            |                    |                      |         |                                     |                                       |          |
| tʃkja <sup>2</sup>   | n-tʃkja <sup>2</sup>                              | ‘tortilla’ |  |                                 |   |        |                              |                               |        |  |           |           |  |                    |                      |            |                    |                      |         |                                     |                                       |          |
| tʃkjo <sup>3</sup>   | n-tʃkjo <sup>3</sup>                              | ‘cough’    |  |                                 |   |        |                              |                               |        |  |           |           |  |                    |                      |            |                    |                      |         |                                     |                                       |          |
| ka <sup>2</sup> -tʃkwe <sup>3</sup>  | ka <sup>2</sup> -n-tʃkwe <sup>3</sup>             | ‘spider’   |  |                                 |   |        |                              |                               |        |  |           |           |  |                    |                      |            |                    |                      |         |                                     |                                       |          |

The retention of /tʃ/ in (26b) can be attributed again to the need to maintain the underlying palatal POA, which would not be possible if /tʃ/ were deleted and the N placed immediately before [k]. In this context, denasalizing the prefix would not help, since [l] is neither palatal nor [-ant]. Nevertheless, this solution raises another problem. Assuming that /ʃ/ is deleted due to CCC in (26a), why is its palatal POA allowed to be disregarded in the [ŋ] of the realized form? We have little to say on this issue beyond the following: as illustrated in the general fortition of /ʃ/ into [k], it seems that loss of the POA of the original /ʃ/ does not pose a problem in Amuzgo.

Finally, two examples were found in which a [-ant] consonant precedes a nasal. In both, the consonant is deleted and a nasal preserving its place of articulation marks the plural. (27a) is only expected, with the /ʃ/ deleting due to \*CCC and the remaining [n] corresponding to both the stem and the prefixal morph; (27b) is interesting in that it illustrates how /tʃ/ is deleted before a consonant which allows for its place to be preserved in the surface representation, making way for an entirely nasal word.

## (27) [-ant] consonants in N\_CN

- |  |   |                      |
|--|---|----------------------|
| <p>a. ʃn<sup>dj</sup>u<sup>1</sup></p> | <p>ka<sup>1</sup>-n<sup>dj</sup>u<sup>1</sup></p> | <p>‘penis’</p>       |
| <p>b. tʃʔm<sup>ã</sup><sup>2</sup></p> | <p>nʔm<sup>ã</sup><sup>2</sup></p>                | <p>‘bellybutton’</p> |

To summarize this section on stem-initial clusters, a principle of POA preservation interacts with a ban on triconsonantal clusters to yield the deletion of /s, ts, ʃ/ but the retention of /tʃ/ (before oral vowels), as well as the denasalization of the prefixal nasal into [l] when necessary. This concludes our discussion of Amuzgo plurals; the next section concludes this short paper.

## 4 Conclusion

This short paper presented the data and analysis of plural formation in Xochistlahuaca Amuzgo. It was shown that the plural morph, a prefix /N/, brings about a host of alternations, depending on the phonological properties of the stem it attaches to.

The analysis, though not fully formalized within any specific framework, proposed at least two rationales that are relevant for larger formal issues. First, it was proposed that one driving force behind the various alternations is contrast preservation (here, between sibilants and affricates with the same place of articulation). Second, on the related logic of chain shifts, it was claimed that the establishment of a chain shift among [-ant] consonants is blocked because the items on the chain would not share place of articulation, and that blocking results in saltation. This rationale contributes to the study of chain shifts and saltations, and their limitations and motivations.

Other aspects of the analysis were more specific to the phenomenon at hand. For instance, various hierarchized constraints assuring faithfulness to underlying features were proposed; and a denasalized realization of the plural prefix was shown to emerge when the more general nasal realization is problematic.

All in all, the complex patterns attested in plural nouns in Amuzgo end up stemming from phonological generalizations about the language, its inventory and its contrast requirements, such that even though there are many scenarios, for a given singular form, it is possible to predict the plural form.

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