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Tone and Inflection

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10 Abstract and concrete tonal classes in Itunyoso Triqui person morphology

1 Introduction

Oto-Manguean languages possess some of the most complex tonal inventories among the languages of the world. According to the *World Atlas of Linguistic Structures*, approximately 41.8% of the world's languages (220/527) are tonal (Maddieson 2011). Of these, 60% (132/220) have only 1–2 lexical tone contrasts and 40% have three or more tonal contrasts (88/220). Among the tone languages with large inventories, languages with between 3–6 tonal contrasts are relatively common, e.g. Thai (5), Mandarin (4), Vietnamese (6), Cantonese (6), Yoruba (3). Languages with more than six tones are rare, but many are Oto-Manguean. For instance, in Yoloxóchitl Mixtec, up to 8 tones may occur on a single mora and 20 tonal melodies on a bimoraic monosyllabic word (DiCanio et al. 2014). Quiahije Chatino has 14 tones (Cruz 2011), Tlacoatzintepec Chinantec has 7 (Thalin 1980), and Chiquihuitlán Mazatec has 17 (Jamieson 1977). In addition to such bewildering complexity in inventory size, Oto-Manguean languages also contain complex morphological processes where tone plays an integral role; a feature largely absent from many East and Southeast Asian tonal languages.

One domain where tone features heavily in Oto-Manguean morphology is the application of personal enclitics or suffixes to lexical stems. Personal clitics vary dramatically within sub-families, e.g. across Mixtec variants, and across the Oto-Manguean stock. At one extreme, tonal changes induced by certain personal suffixes/clitics may distinguish between a variety of inflectional paradigms, as in certain Chinantec languages (Chinantecan) (Foris 1994; Pace 1990) or in Ixcatec (Popolocan) (Fernández de Miranda 1961). In these languages, the tonal changes associated with person are not phonologically-conditioned, but must be lexically-specified.[1] At the other extreme, tonal changes induced by personal clitics/suffixes may be entirely phonologically or morphologically-conditioned, as in Yoloxóchitl Mixtec (Amith & Castillo García, no date; Castillo García, 2007), Jicaltepec Mixtec (Bradley 1970), and Isthmus Zapotec (Pickett et al. 2001). In

1 Though see Jamieson (1988) for a Mazatec variety in which verbal paradigms are predictable based on vowel qualities in stems.

these languages, the tonal changes associated with person are predictable based on non-arbitrary properties of the stem.

The tonal alternations associated with personal clitics in the Triqui languages (Mixtecan) lie somewhere between these two extremes: not arbitrarily affiliated with stems within a particular paradigm, but also not easily phonologically-predictable. The present paper provides the first description and analysis of clitic morphophonology in Itunyoso Triqui. Itunyoso Triqui [itunˈjoso ˈtriki], (ISO 639-3, trq) is spoken in the town of San Martín Itunyoso, Mexico. Like many other Oto-Manguean languages, it has a large tonal inventory (9 lexical tones) which interacts in nuanced ways with the clitic morphology. I show that personal clitic morphology is *phonologically*-conditioned for stems with most tones but, for words carrying tone /3/, it is also sensitive to an abstract distinction between a class which includes stem tone-raising and a class which does not. There are two distinct tonal processes affecting the application of clitics: stem-formation rules and clitic-conditioned tone spreading/deletion. Such processes are sensitive not only to the set of possible tone-glottal co-occurrence restrictions in the language, but also to general principles of tone-mora association/reassociation as described in autosegmental-metrical phonology (Goldsmith 1990). In the remainder of this section, I provide an introduction to Itunyoso Triqui (IT, henceforth) clitic morphology and a background on Triqui tonal phonology.

All data in this paper comes from original fieldwork done by the author on the San Martín Itunyoso variant of Triqui between 2004–2014. During this time a database of 356 nominal/verbal paradigms was compiled. The phonology and phonetics of segments and tone are discussed in depth in DiCanio (2008) (but see (DiCanio (2010)) for a brief overview). Segmental and tonal transcriptions in this paper follow the conventions used in these publications with three exceptions: First, "y" is used in place of phonological /j/. Second, geminates are represented using doubled consonants instead of a length diacritic, e.g. "tt" instead of /t:/. Third, tone /35/ is represented as tone /45/ in this text, an analysis which better reflects its phonetic realization and corresponds with the morphophonological alternations here. Except for this tonal transcription difference, tonal marking follows conventions used in DiCanio (2008, 2010, 2012a,b) and Hollenbach (1984), where /5/ is high and /1/ is low.

1.1 Background: IT morphology

In many Oto-Manguean languages, affixes are prefixal and only clitics may occur at the right edge of the word (Suárez 1983). This particular morphological structuring also occurs in all Triqui variants (cf. Hollenbach 1984; Longacre 1959). While

words of any part of speech may contain a personal enclitic, alienable nouns may be preceded by a single possessive prefix and verbs may be preceded by non-productive causative or iterative prefixes; and a productive aspectual prefix. Owing to the nature of clitics in the language though, they can freely attach to words of most parts of speech. General, verbal, and nominal morphological templates are shown below, followed by example sentences in (1)–(8).

General template: STEM = (NUM) + (CLITIC)
Nominal template: (POSS) – NOUN=(NUM) + (CLITIC)
Verbal template: (CAUS) – (ASP) – VERB = (SUBJECT.CLITIC) = (OBJECT.CLITIC)

(1) *ya^{3}ʔyoh^{3} tʃi^{4}ʔyãh^{4} tʃu^{3}βe^{3}*
daily bark dog
'The dog barks daily.'

(2) *na^{3}ʔmã^{4} βeʔ^{3}*
sink house
'The house is sinking.'

(3) *k^{w}eh^{3}=ɾeʔ^{1} ɾi^{3}ã^{32} tʃi^{3}ŋga^{4}*
PERF.jump=2S face fence
'You jumped over the fence.'

(4) *na^{3}βi^{43} si^{3}-sũh^{2} a^{3}k^{w}a^{4}ni^{43}*
finish.1S POSS-work.1S now
'I am finishing my work now.'

(5) *k-a^{2}ʔniʔ^{1}=ɾeʔ^{1} ββe^{4} tʃah^{3}*
POT-cut=2S hair head.1S
'You will cut my hair.'

(6) *na^{2}-ki^{3}-ʔyah^{3} saʔ^{1}=sih^{3} yã^{3}ʔã^{32}*
CAUS-PERF-make good=3SM light
'He is fixing the light.'

(7) *ri^{1}kih^{1} kkaʔ^{3} ɾi^{3}ã^{32}=ɾeʔ^{1}*
POT.give.1S candle face=2S
'I will give you a candle.'

(8) *tʃa²kah¹=ɾeʔ¹=ũh³*
marry=2S=3SF
'You are marrying her.'

While nouns and verbs may be inflected for person by a person enclitic, they may differ in their inflection.[2] Aspectual prefixes are not obligatory on verbs and those lacking them carry a progressive/habitual reading, as in examples (1) and (2). Perfective and potential aspect are marked by a prefix, but are distinguished from each other only by tone. For the perfective, consonant-initial verbs receive a /kV³-/ prefix, e.g. /ki³-ta²nih³=sih³/ 'he lowered', while vowel-initial verbs receive a /k-/ prefix with no tonal changes on the initial syllable of the stem, e.g. /k-a⁴ko⁴³=sih³/ 'he cried'. For the potential, consonant-initial verbs receive a /kV²-/ prefix, e.g. /ki²-ta²nih³=sih³/ 'he will lower', while vowel-initial verbs receive a /k-/ prefix which changes the initial syllable of the verb stem to tone /2/, e.g. /k-a²ko⁴³=sih³/ 'he will cry'. Examples (5)–(7) show aspectual prefixes on verbs. In example (8), we observe two enclitics applying to a Triqui verb, marking subject and object.

Nouns may be inflected only with a possessive prefix which varies by the semantic class of nouns on which it applies. Inalienable nouns take no prefix, e.g. /ya³²/ 'tongue' > /ya³²=sih³/ 'his tongue', while for animate nouns, personal clitics attach to a pre-nominal classifier, e.g. /tʃu³tʃe³²/ 'chicken', /tã⁴=ũh³ tʃu³tʃe³²/, owner=3SF chicken, 'her chicken.' Certain alienable nouns take an irregular prefix or undergo an onset consonant mutation, e.g. ya³ʔah³ 'chile pepper' > /ta³ʔah³=sih³/ 'his chile pepper.' However, most alienable nouns take a /si³-/ prefix. Bare, uninflected nouns are shown in examples (1)–(3) and (5)–(7). Inflected nouns are shown in examples (4), (5), and (7).

The problem with enclitics

Most of the person-number distinctions marked with enclitics in IT do not condition any stem tone changes. Table 1 provides the person enclitics in the language. There are only 8 morphologically distinct clitic forms in IT: 1S, 2S, 3S.Masc, 3S.Fem, 3S.ANIM, 1DU, 1.EXCL, and 1.INCL. With the exception of the 1st person forms, all non-singular person marking results from combining a numeral morpheme with one of the clitics. Thus, the 2nd and 3rd person dual forms are marked with the morpheme /nu²kʷe²/ and the 2nd and 3rd person plural forms are marked

2 A full account of aspectual and possessive allomorphy is provided in DiCanio (no date).

Table 1: Itunyoso Triqui enclitics

	Number		
Person	**Singular**	**Dual**	**Plural**
1st	=h ⇌ deletion	=ʔ	=neʔ^4 (inclusive) =ũh^4 (exclusive)
2nd	=ɾeʔ^1	=nu^{2}kʷe^{2}he^{4}ɾeʔ^1	=a^{3}niʔ^2=ih^{5}ɾeʔ^1
3rd Masculine	=sih^3	=nu^{2}kʷe^{2}sih^3	=a^{3}niʔ^2=sih^3
3rd Feminine	=ũh^3	=nu^{2}kʷe^{2}ũh^3	=a^{3}niʔ^2=ũh^3
3rd Animal	=tʃuh^3	=nu^{2}kʷe^{2}tʃuh^3	=a^{3}niʔ^2=tʃuh^3

with the morpheme /a^{3}niʔ^2/. There is reason to analyze these forms as synthetic. Different quantifiers may precede person clitics, including words like /ta^{2}ɾãʔ^3/ 'all', e.g. /ta^{2}ɾãʔ^3=tʃuh^3/ 'all of them (ANIM)'. The dual and plural morphemes condition segmental allomorphy with the 2nd person enclitic /=ɾeʔ^1/, which appears here as /=he^{4}ɾeʔ^1/ and /=ih^{4}ɾeʔ^1/, respectively. The only clitics which condition stem tonal changes are the 1S, 2S, and the 1DU.[3]

When one examines the tone-altering clitics on words of differing phonological and tonal shapes, it is difficult to observe clear patterns. Observe the data from possessed nouns in Table 2. While some tendencies are apparent here, most of the possessed forms are distinct. The stem tone on the bare root is *usually* identical to the stem tone preceding the 3SM clitic, but distinct for the forms in (e) and (g). The 1S forms show various tonal patterns on stems, only some of which match the bare stem tone. Of these, certain forms involve the addition of /-h/ (c–g), while others delete it (a–b). The 2S clitic /=ɾeʔ^1/ conditions either no change of stem tone (in (a), (e–g)), stem tone-raising to /4/ (in (c)), or stem tone lowering to /1/ (in (b) and (d)). The 1DU clitic /ʔ/ conditions either no stem tone change (in (d), (e), and (g)), or a stem tone change to /4/. Lest one consider that these alternations are predictable from the bare stem tone, consider that each of the pairs (c–d) and (e–f) have identical tonal patterns in bare stems, but show entirely distinct 1S, 2S, and 1DU forms. None of these forms are idiosyncratic; there are many examples of each type.

At first glance, these data might suggest that each IT word belongs to a particular paradigm, much like one observes in the Chinantecan and Popolocan branches of Oto-Manguean. Though, a deeper investigation reveals that

3 There is a process underway, however, of merging a reduced version of the 2P form with the stem, e.g. /ɾa^{3}ʔa^3=a^{3}ni^2=ih^{5}reʔ^1/ ~ /ɾa^{3}ʔaː^{35}hreʔ^1/ '*your (PL) hand(s)*.' Note that in this context, the plural morpheme, /a^{3}ni^2/, is redundantly omitted in favor of marking person with tone and coda aspiration.

Table 2: Stem-level tone changes with person marking in Itunyoso Triqui.

Bare stem	Gloss	1S	2S	3SM	1DU
(a) yo^{3}ʔoh^{45}	'land'	to^{3}ʔo^{32}	to^{3}ʔoh^{45}=reʔ^{1}	to^{3}ʔoh^{45}=sih^{3}	to^{3}ʔoʔ^{4}
(b) si^{4}tuh^{3}	'bellybutton'	si^{4}tu^{43}	si^{4}tuh^{1}=reʔ^{1}	si^{4}tuh^{3}=sih^{3}	si^{4}tuʔ^{4}
(c) ri^{3}ki^{3}	'stomach'	ri^{3}kih^{45}	ri^{3}ki^{4}=reʔ^{1}	ri^{3}ki^{3}=sih^{3}	ri^{3}kiʔ^{4}
(d) tu^{3}neʔ^{3}	'tail'	tu^{3}neh^{3}	tu^{3}neʔ^{1}=reʔ^{1}	tu^{3}neʔ^{3}=sih^{3}	tu^{3}neʔ^{3}
(e) sũ^{32}	'work'	si^{3}-sũh^{2}	si^{3}-sũ^{2}=reʔ^{2}	si^{3}-sũ^{2}=sih^{3}	si^{3}-sũʔ^{2}
(f) yã^{32}	'salt'	tãh^{3}	tã^{32}=reʔ^{1}	tã^{32}=sih^{3}	tũʔ^{3}
(g) ru^{3}si^{1}	'stick'	si^{3}-ru^{1}sih^{1}	si^{3}-ru^{1}si^{1}=reʔ^{1}	si^{3}-ru^{1}si^{1}=sih^{3}	si^{3}-ru^{1}siʔ^{1}

many of the patterns, especially for certain bare stem tones, follow from predictable phonological constraints/processes and stem-formation rules in the language. Once such processes are considered, the seeming arbitrariness of tonal alternations on the stem mostly disappears. Phonological constraints on tonal association in IT are examined in the following section.

1.2 Background: IT tonal phonology

There are nine contrastive surface tones in IT, though their distribution is sensitive to both the syllable on which the tone falls in the word and the presence/absence of a glottal consonant in the stem-final syllable's coda (the only codas in the language). Stem-final syllables are accentually prominent in IT. Prominence is indicated by a greater number of segmental contrasts which occur in final syllables as well as a larger inventory of possible tones (DiCanio 2008). These syllables are also phonetically lengthened (DiCanio 2010). Table 3 shows the surface tonal contrasts in IT on monosyllables with different final rimes.

In Table 3, we observe that, with the exception of tone /31/, all of the tones may surface on syllables with a coda /h/ and contour tones never surface on syllables with a coda /ʔ/. In addition to these patterns, tone /4/ only surfaces on the a syllable with a coda /ʔ/ when it co-occurs with the 1DU clitic /ʔ/. Otherwise, only three level tones occur preceding a coda /ʔ/. Most of the distributional patterns observed here in monosyllabic words also occur in polysyllabic words. While monosyllabic roots comprise approximately 21% of the IT lexicon, polysyllabic roots comprise approximately 79% of the lexicon (71% disyllabic, 8% trisyllabic).

The influence of prominence on tone distribution is clearly seen in polysyllabic words, shown in Table 4. We observe that contour tones only surface in final syllables and the tonal contrasts in non-final syllables are limited. Tones /4/ and /43/ may only be preceded by tones /3/ or /4/. Meanwhile, tones/2/ and /32/ may

Table 3: Surface tonal contrasts on different rime types in monosyllables

	Open syllable		Coda /h/		Coda /ʔ/	
Tone	**Word**	**Gloss**	**Word**	**Gloss**	**Word**	**Gloss**
/4/	yũ^{4}	'earthquake'	yãh^{4}	'dirt'	niʔ^{4}	'see.1DU'
/3/	yũ^{3}	'palm leaf'	yãh^{3}	'paper'	tsiʔ^{3}	'pulque'
/2/	ũ^{2}	'nine'	tah^{2}	'delicious'	ttʃiʔ^{2}	'ten'
/1/	yũ^{1}	'loose'	kãh^{1}	'naked'	tsiʔ^{1}	'sweet'
/45/			toh^{45}	'forehead'		
/13/	yo^{13}	'fast (adj.)'	toh^{13}	'a little'		
/43/	ra^{43}	'want'	nnãh^{43}	'mother!'		
/32/	rã^{32}	'durable'	nnãh^{32}	'cigarette'		
/31/	rã^{31}	'lightning'				

Table 4: Tones on disyllabic words (from DiCanio 2008)

σ_2	/4/	/3/	/2/	/1/	/43/	/32/
σ_1						
/4/	ku^{4}tu^{4} 'owl'	ta^{4}ko^{3} 'dry (tr.)'	X	X	sna^{4}ŋga^{43} 'day of the dead'	X
/3/	ka^{3}to^{4} 'shirt'	ta^{3}kã^{3} 'hill'	tʃi^{3}nũ^{2} 'bat'	ku^{3} t su^{1} 'rotten'	ka^{3}sti^{43} 'oil'	ti^{3}ni^{32} 'nopal cactus'
/2/	X	ya^{2}ko^{3} 'poor'	ru^{2}ku^{2} 'behind'	X	X	ka^{2}mi^{32} 'car'
/1/	X	ta^{1}mã^{3} 'bug'	X	ku^{1}nu^{1} 'deep'	X	X

only be preceded by tones /2/ or /3/. Tone /3/ may be preceded by any of the level tones and tone /1/ only by tones /3/ or /1/. Note that tone /31/ does not occur in polysyllabic words. Each of these patterns holds regardless of whether there is a coda /h/ or /ʔ/ on the final syllable.

Table 5 shows the tonal patterns which surface on disyllabic words with a final glottal consonant. With the exception of tone /45/, no contour tone may surface on a closed syllable in a polysyllabic word. Note that tone /1.3/ does not surface on words with a coda /ʔ/. Importantly, what both Tables 4 and 5 show is that tones /4/, /43/, and /45/ never co-occur with tones /2/, /1/, /32/, and /13/ on uninflected IT words.

Table 5: Disyllabic words with a final syllable codas

	Coda /h/		Coda /ʔ/	
4.4	ski^{4}tih^{4}	'ground nest'	tu^{4}ʔβiʔ^{4}	'our aunt (incl)'
4.3	tʃa^{4}tʃih^{3}	'tarantula'	a^{4}kĩʔ^{3}	'break, snap'
3.45	ta^{3}kĩh^{45}	'nose'		
3.4	ti^{3}kih^{4}	'shove in'	to^{3}ʔoʔ^{4}	'our lip (incl)'
3.3	ka^{3}tʃih^{3}	'cotton'	ka^{3}kĩʔ^{3}	'problem'
3.2	tʃa^{3}tʃih^{2}	'sheep'	tʃu^{3}tʃuʔ^{2}	'potato'
3.1	k^{w}e^{3}ʔnih^{1}	'Wednesday'	ka^{3}tʃũʔ^{1}	'shadow'
2.3	tʃu^{2}k^{w}ih^{3}	'name'	ta^{2}reʔ^{3}	'erase'
2.2	tʃa^{2}tʃih^{2}	'space'	nu^{2}k^{w}eʔ^{2}	'both'
1.3	nu^{1}k^{w}ah^{3}	'hard, strong'		
1.1	ni^{1}tʃih^{1}	'freeze'	ni^{1}tʃũʔ^{1}	'near'

This distributional gap and the structural symmetry of the IT tonal system is captured by dividing the system into distinct registers (DiCanio 2008).[4] The register distinction is shown in Table 6, following the featural system in Yip (1993, 2002). Tone /31/ is excluded from the register system on phonological grounds (see DiCanio 2008:153–156).

Table 6: Tonal Register in Itunyoso Triqui (from DiCanio, 2008)

Tone Feature		Level Tone	Falling Tone	Rising Tone
+Upper	+High	/4/	/43/	/45h/
	–High	/3/		
–Upper	+High	/2/	/32/	/13/
	–High	/1/		

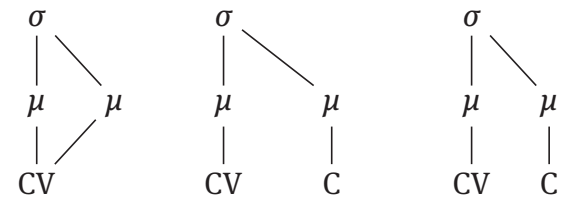
Viewed in terms of register, the IT tonal system is symmetrical. There are two level tones in each register, as well as a falling and a rising tone. This distinction also helps explain the tones which surface in non-final syllables in IT. With two exceptions, non-final syllables on uninflected IT words must agree in register with the final syllable tone. These exceptions to this principle are underlying tones specified on a non-final syllable, described below.

4 Hollenbach (1984) also divides Copala Triqui tone into two registers.

1.2.1 The autosegmental representation of Itunyoso Triqui words

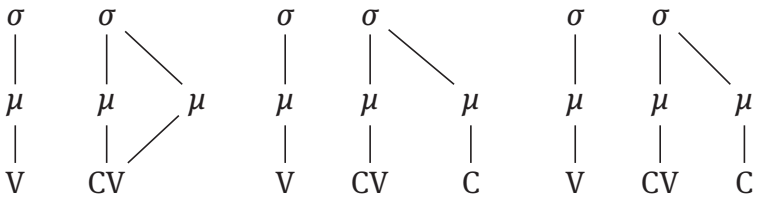
Following DiCanio (2008), stem-final syllables in IT are bimoraic. The final syllable may contain either a moraic coda consonant, /ʔ, h/, or a long vowel. Representations of this analysis are shown in (9) for monosyllabic words and (10) for disyllabic words. Note that the preglottalized prenasalized stop in the latter example is a single, laryngeally-complex segment (cf. DiCanio 2008).

(9)



kkã^{3}	kkã^{3} ʔ	kkã^{3} h
‘squash’	‘spicy pozole’	‘sandal’

(10)



a ʔŋga^{32}	a ʔŋga^{3} ʔ	a ʔŋga^{3} h
‘is born (3S)’	‘is laughing (3S)’	‘is sore (3S)’

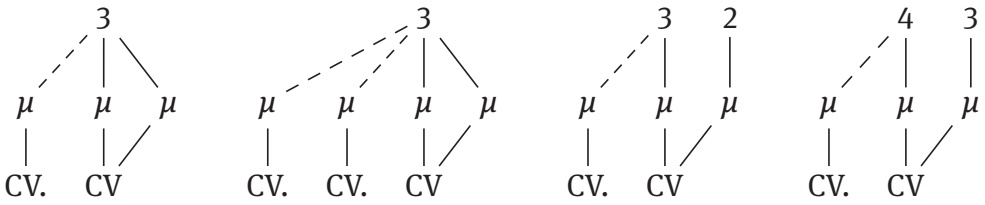
All stem-final syllables in IT are heavy, while non-final syllables are obligatorily light. Many languages demonstrate this strong connection between syllable weight and stress, known as the *weight to stress* principle (Hayes 1981). The representations above reflect such a connection. However, evidence from the asymmetries in the distribution of consonant and vowel types bolsters this argument. Many of the consonant and vowel types in IT are licensed only within word-final syllables. Final prominence is not simply a feature of Itunyoso Triqui words, but is also found in Copala and Chicahuaxtla Triqui (Hollenbach 1977, 1984).[5]

Tones are represented in IT words in autosegmental-metrical (AS) terms (Goldsmith 1990). Tone numbers are used here as shorthand for tonal feature

5 Yip (2002:234) also examines the Copala Triqui system in terms of prominence.

specification and contour tones are analyzed as sequences of level tones. For most IT words, only one level or one contour tone is specified on the final syllable of a word. Preceding syllables on polysyllabic words receive a surface tonal specification through a leftward tonal association convention. These principles produce the following tonal represenations, shown in (11), for the words /tʃu^{3}ku^{3}/ 'animal', /tʃi^{3}ko^{3}yo^{3}/ 'tadpole', /ɾu^{3}ne^{32}/ 'bean', and /ɾu^{4}ne^{43}/ 'avocado.'

(11)

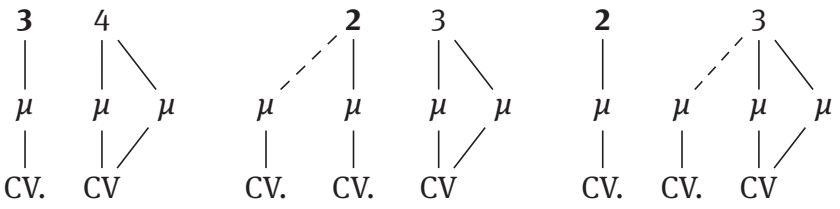


In (11), we observe level tones associated with disyllabic and trisyllabic words containing level and contour tones. Tonal alignment in IT proceeds from right to left. The rightmost tone level is associated with right edge of the word first (the location of prominence) and then all preceding tones are affiliated with preceding moras. Many IT words lack an underlying tone on non-final syllables and this right-to-left association maintains the same register for all syllables in the word. This leftward association from the final syllable parallels other phonological processes in IT, such as nasal spreading and mid-vowel licensing, both of which proceed leftward from the final syllable in the root (DiCanio 2008). The rule is formulated in (A) below.

(A) *Leftward association convention*: Assign a tone or tone contour, right to left, starting on the rightmost mora (TBU) of the word and then associate the leftmost tone in the word to all preceding moras within the word.

Non-final syllables may also carry a contrastive, underlying tone /2/ or /3/, shown in (12) for words /ka^{3}to^{4}/ 'shirt', /tu^{2}k^{w}a^{2}na^{3}/ 'swallow', /tʃi^{2}ɾa^{3}kĩ^{3}/ 'cockroach', and /ti^{2}kyũ^{32}/ 'study.' Note that this contrastive tone may occur in the penult or in the antepenult, as (10b) and (10c) demonstrate.

(12)



On trisyllabic words, both the penult and antepenult may have a contrastive tone. For the penult, these tones include /4, 3, 2/. Tone /1/ only occurs on non-final syllables as a result of leftward tonal association. For the antepenult, only level tones /3, 2/ may occur. While tone /3/ may co-occur with any tone, each of these underlying tones must agree in register with the tone on the final syllable, i.e. tone /2/ never co-occurs on the same stem with tone /4/. The presence of contrastive tones on non-final syllables blocks the leftward association convention in (A).

Implicit in this representation in (11) and (12 is the notion that only a single tone may be associated with a mora. Contours are only possible on final syllables because they are bimoraic. Furthermore, this principle accounts for tonal association on words with glottal coda consonants (see below). An additional constraint in IT requires that every tone be associated with a mora; no floating tones are permitted on the word. These two rules are stated in (B) and (C) below.

(B) *Moraic tonal specification*: A mora may be associated with only a single tone.
(C) *No floating tones*: Every tone must be associated with a mora.

1.2.2 Coda glottal consonants as TBUs

The tonal patterns surfacing on words with final syllable coda glottal consonants are distinct from those on open syllables. While no contour tone may precede a coda /ʔ/, the distribution of tone is sensitive to word size for words ending in a coda /h/. In polysyllabic words, final falling tones never surface preceding a coda /h/. However, in monosyllabic syllables with a coda /h/, any contour tone may surface, except for tone /31/ which never surfaces on a closed syllable. Tones in monosyllabic words with coda consonants are represented in (13) below for words /sĩʔ^{3}/ 'child', /kkĩh^{3}/ 'masa', /nnãh^{32}/ 'cigarrette', /nnãh^{43}/ 'mother!', /sĩh^{45}/ 'man', and /yah^{13}/ 'dust.'

(13)

3		3		3	2	4	3	4	5	1	3				
μ	μ	μ	μ	μ	μ	μ	μ	μ	μ	μ	μ				
CV	C	CCV	C	CCV	C	CCV	C	CV	C	CV	C				
sĩ	ʔ	kkĩ	h	nnã	h	nnã	h	sĩ	h	ya	h				

Note that there is a phonetic difference between the two IT codas. Whereas /h/ is typically voiced, [ɦ], glottal stops /ʔ/ are produced with at least some glottal closure (DiCanio 2012a). The voicing in the former permits pitch information to

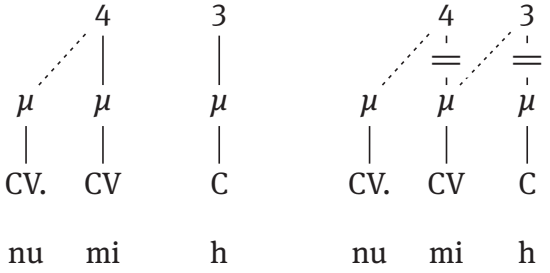
be carried along with breathy phonation. The tonal patterns here are captured by permitting tone to be associated to an /h/ coda mora, but not a /ʔ/ coda mora.

However, this pattern only holds on syllables with a coda /h/ in *monosyllabic* words. With the exception of tone /45/, no contour may surface on a syllable with a coda in polysyllabic words. Observe the words in Table 5. While we observe tones /43/, /32/, and /13/ followed by a coda /h/ in (13), no falling tone may surface on a syllable with a coda here, i.e. *3.32h, *2.32h, *4.43h, *3.43h, *1.13h. This distributional restriction can be captured with a constraint specifying that a modal vowel is the preferred tone-bearing unit. Whereas the individual levels composing a contour tone may associate with a laryngeal coda, this is avoided if tones are able to associate leftward on the word. Since leftward tonal association is not possible on monosyllabic words (and IT lacks tone sandhi) contours surface on monosyllables with a coda /h/. The principle accounting for the general ranking of TBU types is given in (D) below.

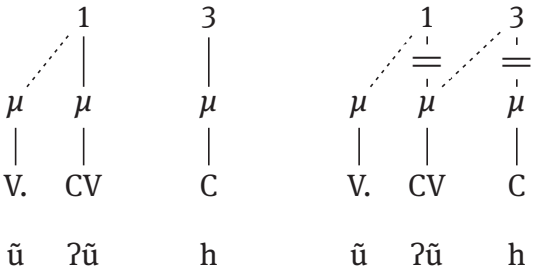
(D) *Preferred TBU ranking*: the syllable nucleus (vowel) is the preferred TBU for tonal assignment, followed by a coda /h/; i.e. V >> /h/ [ɦ].

Both the leftward association convention and the preferred TBU ranking are general principles which interact with a stronger tendency in IT for tones to be maintained on lexical roots (an identity constraint in Optimality-theoretic terms (Prince & Smolensky 1993)). On monosyllabic words, the constraint against floating tones results in tonal association to a lower ranked TBU, as contour tones are allowed to surface on a closed syllable. In polysyllabic words, the initial level composing a contour tone is associated leftward to avoid association of the final tone with a laryngeal coda. This process accounts for both the distribution of tones on polysyllabic words across the IT lexicon and processes specific to the 1S clitic, described in the following section. It is schematized in (14) for /nu^{4}mih^{3}/ 'tie, knot' and (15) for /ũ^{1}ʔũh^{3}/ 'five (pron.)'.

(14) Leftward association TBU Preference



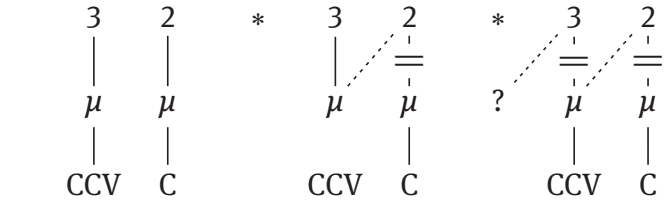
(15) Leftward association TBU Preference



In each of these examples, the final tone /3/ is not associated with the coda consonant. Since no tone may delete in IT (Rule C), this process causes spreading of the final tone leftward. This causes delinking of tones on preceding moras. Though both (14) and (15) show leftward association before the TBU preference condition, no ordering is assumed here. Both orders are possible.

When monosyllabic words are considered, the preferred TBU for the final tone of a contour is obligatorily the coda, as shown in (16a) for the word /nnãh^{32}/ 'cigarrette'. Reassociation of the final tone to the preceding mora is not possible since it would produce a violation of Rule (B), as in (16b), where a single mora is associated with more than a single tone. A possible repair strategy for this reassociation is shown in (16c), where the preceding tone is delinked. However, this would result in tonal stranding, violating rule (C). Rules (B) and (C) are never violated in IT.

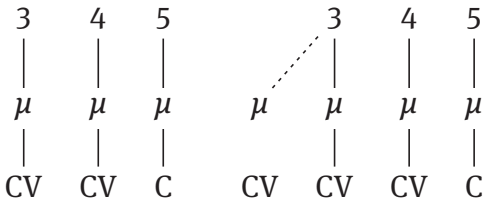
(16)



The alignment of tone /45/ is one exception to this preferred TBU ranking. It never dissociates on polysyllabic words nor on words with a coda /h/. However, note that this is the only tone that *obligatorily* occurs on stem-final rimes with a coda /h/. This particular difference in distribution is at odds with the more typical pattern both in Triqui and cross-linguistically for open syllables to be the preferred position for contour tones (DiCanio 2008; Zhang 2004). All other contour tones in Triqui occur on both open syllables and /Vh/ rimes. When tone /45/ surfaces on a polysyllabic word, it is always preceded by a phonologically specified tone /3/

on non-final syllables.[6] The representation of polysyllabic words with tone /45/ in the stem-final syllable is given in (17a) and (17b).

(17)



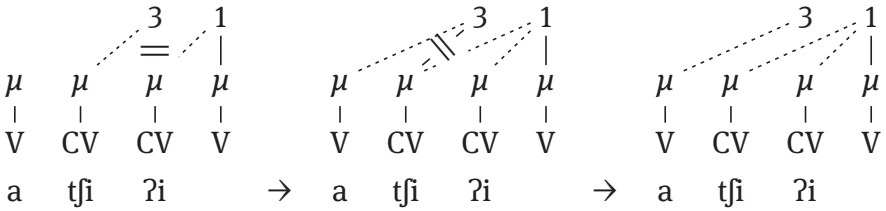
a. 'pig' b. 'grasshopper'

The establishment of these constraints on tonal association provides a framework for the analysis of the tonal processes associated with Itunyoso Triqui enclitics.

1.2.3 Tone /31/ and alignment

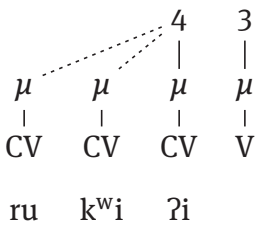
So far, we have excluded one of the contour tones from our analysis. Unlike the other contours, tone /31/ never surfaces on a syllable with a coda /h/. This is not the only odd behavior specific to this tone though. Whereas other contour tones (/43/, /32/, /13/, /45/) surface on final open syllables, tone /31/ does not. Moreover, there is a clear distinction in alignment between tone levels. For tone /31/, tone level /3/ obligatorily surfaces on the leftmost syllable in the word where every syllable to the right surfaces as tone level /1/, shown in (18) for the word /a^{3}tʃi^{1}ʔi^{1}/ 'begin'. In other words, there are no tonal patterns of the shape */3.31/ on disyllables nor */3.3.1/ or */3.3.31/ on trisyllables. By contrast, for tone /43/, the contour surfaces on the rightmost syllable where every syllable to the left receives tone level /4/ via leftward spreading. An example of this is shown in (19) for the word /ɾu^{4}k^{w}i^{4}ʔi^{43}/ 'peach'.

(18)



6 Tone /3/ behaves as a default tone on words with multiple tonal specifications, cf. DiCanio (2008).

(19)



The representation in (18) shows a process of leftward spreading of tone /1/, as described in DiCanio (2008). This is a general phonological property of tone /1/ when it is assigned on the final mora of IT words. This process is iterative but does not violate principle (C). This low tone spreading is schematized in the rule below:

(E) *Low tone spreading*: A low /1/ tone associated to the rightmost mora must spread leftward iteratively to the leftmost edge of the phonological word.

Importantly, this rule interacts with a constraint barring unlinked tones on the left edge of the phonological word. In OT terms, such a constraint barring floating tones is crucially ranked more highly than the low tone spreading rule.

2 Stem tonal allomorphy and clitic-application

Throughout this paper, we have been assuming the existence of bare stem forms for nouns and verbs in Itunyoso Triqui. Insofar as we assume that such a form is isomorphic with words in isolation, the stem shape is obvious in the case of alienable nouns. The phonological shape of stems is less apparent when we consider certain verbs or inalienable nouns. Some inalienably-possessed nouns, like kinship terms, have an obligatory enclitic and certain verb roots are obligatorily marked for aspect.[7] While these patterns suggest the absence of a bare form, note that most enclitics do not condition segmental or tonal changes on the word. Only the 1st person singular, the 2nd person singular, and the 1st person dual cause changes in the phonological structure of the stem. Other clitics do not condition stem-level changes. Thus, for most words, it is convenient to consider the unmodified stem, with no phonological alternations, as something akin to a regular stem allomorph for the word. For verbs, this stem also happens to be the form used with all full NP subjects.

7 There is no infinitive verb form. All verbs in an infinitival clause are marked for aspect.

Yet, for a subset of nouns (no verbs) in the IT lexicon (29/356 words in the database), *all* cliticized words share a distinct stem tonal allomorph unrelated to the bare noun's tone. The stem tones in these nouns is always tone /2/ and all words which undergo this stem alternation carry tone /32/ or /4/ in the bare noun form. Yet, the presence of these tones in the bare noun is not a predictor of whether an alternate stem tone will be used; this must be lexically-specified. Observe the paradigms given in Table 7 below for bare nouns with tone /32/.

Table 7: Stem-level tonal changes with bare root tone /32/

Bare noun	(a) $ku^{3}ɾu^{32}$	(b) $ni^{3}tī^{32}$	(c) $ɾi^{3}ã^{32}$	(d) $tʃi^{3}lu^{32}$
Gloss	'granary'	'chayote'	'face'	'knife'
1S	si^{3}-$ku^{2}ɾuh^{2}$	si^{3}-$ni^{2}tīh^{2}$	$ɾi^{3}ãh^{3}$	si^{3}-$tʃi^{3}luh^{3}$
2S	si^{3}-$ku^{2}ɾu^{2}$=$ɾeʔ^{1}$	si^{3}-$ni^{2}tī^{4}$=$ɾeʔ^{1}$	$ɾi^{3}ã^{1}$=$ɾeʔ^{1}$	si^{3}-$tʃi^{3}lu^{1}$=$ɾeʔ^{1}$
3S.Masc	si^{3}-$ku^{2}ɾu^{2}$=sih^{3}	si^{3}-$ni^{2}tī^{2}$=sih^{3}	$ɾi^{3}ã^{2}$=sih^{3}	si^{3}-$tʃi^{3}lu^{2}$=sih^{3}
1DU	si^{3}-$ku^{2}ɾuʔ^{2}$	si^{3}-$ni^{2}tīʔ^{4}$	$ɾi^{3}ũʔ^{3}$	si^{3}-$tʃi^{3}luʔ^{3}$

In the paradigms shown in Table 7, the 3S.Masc form reflects the stem form found in the remainder of the paradigm, e.g. with the 3S.Fem, 3S.ANIM, 2P, and 3P forms. As mentioned, for most words, only the 1S, 2S, and 1DU clitics condition tonal changes on the stem. Yet, we observe an alternate 3S.Masc form in this table. Examples (a) and (b) show a tonal change for all inflected stems where the penultimate syllable in both words no longer carries tone /3/, but /2/. The 3S.Masc stem, which normally does not show any clitic-induced tonal changes undergoes changes here. (The tonal changes on the stem-final syllable for the 2S and 1P.DU forms for 'chayote' are the result of separate processes, described later.) However, not all noun stems with tone /32/ are affected by this rule. Examples (c) and (d) show that the penultimate tone /3/ is maintained; only the stem-final syllable is influenced by the addition of the clitic.

Bare nouns with tone /4/ also may undergo this stem change to tone /2/, as shown in Table 8 below. The words (a) and (b) show the stem alternation whereas the words in (c) and (d) show the more common pattern where the stem tone is unaffected.

These irregular stem allomorphs must be lexically-specified. Note that this is not dissimilar from other stem allomorphy in IT. For instance, the word /$a^{4}sih^{3}$/ 'clothing' takes an alternate stem form when possessed /si^{3}-$kã^{3}ʔãh^{45}$/ 'my clothing', as does /$βeʔ^{3}$/ 'house' > /$tu^{3}k^{w}ah^{45}$/ 'my house'. Whereas these stems are segmentally distinct from their bare roots, the examples in Tables 7 and 8 are only tonally distinct. With these exceptions specified as such, it is possible to discuss

Table 8: Stem-level tonal changes with bare root tone /4/

Bare noun	(a) ko^{3}no^{4}ʔo^{4}	(b) snã^{4}ʔãh^{4}	(c) ka^{3}to^{4}	(d) stĩ^{4}
Gloss	'medicine'	'language'	'shirt'	'fingernail'
1S	si^{3}-ko^{2}no^{2}ʔoh^{2}	si^{3}-snã^{2}ʔã^{2}	si^{3}-ka^{3}toh^{45}	stĩh^{45}
2S	si^{3}-ko^{2}no^{2}ʔo^{2}=reʔ^{2}	si^{3}-snã^{2}ʔãh^{2}=reʔ^{1}	si^{3}-ka^{3}to^{4}=reʔ^{1}	stĩ^{4}=reʔ^{1}
3S.Masc	si^{3}-ko^{2}no^{2}ʔo^{2}=sih^{3}	si^{3}-snã^{2}ʔãh^{2}=sih^{3}	si^{3}-ka^{3}to^{4}=sih^{3}	stĩ^{4}=sih^{3}
1DU	si^{3}-ko^{2}no^{2}ʔoʔ^{2}	si^{3}-snũ^{2}ʔũʔ^{2}	si^{3}-ka^{3}toʔ^{4}	stĩʔ^{4}

most of the tonal morphophonology on IT words as either a strictly local process influencing the adjacent, final stem syllable, or as a result of the regular phonological rules/constraints outlined in section 1.2.1.

One such regular rule is the process of low tone spreading for words with tone /31/. As described in the previous section, this tone surfaces as a contour tone on monosyllabic words, but always dissociates on polysyllabic words, e.g. /3.1/, /3.1.1/. When a possessive prefix /si^{3}-/ precedes words with tone /31/, low tone spreading results in the absorption of tone level /3/ into the prefix. Some representative examples are given in Table 9.

Table 9: Phonological changes with tone /31/

Bare noun	(a) ru^{3}si^{1}	(b) si^{3}siʔ^{1}	(c) tʃa^{3}koʔ^{1}	(d) tʃa^{31}
Gloss	'stick'	'sweets/candy'	'daughter-in-law'	'head'
1S	si^{3}-ru^{1}sih^{1}	si^{3}-si^{1}sih^{1}	tʃa^{3}koh^{1}	tʃah^{3}
2S	si^{3}-ru^{1}si^{1}=reʔ^{1}	si^{3}-si^{1}siʔ^{1}=reʔ^{1}	tʃa^{3}koʔ^{1}=reʔ^{1}	tʃa^{31}=reʔ^{1}
3S.Masc	si^{3}-ru^{1}si^{1}=sih^{3}	si^{3}-si^{1}siʔ^{1}-sih^{3}	tʃa^{3}koʔ^{1}=sih^{3}	tʃa^{31}=sih^{3}
1DU	si^{3}-ru^{1}siʔ^{1}	si^{3}-si^{1}siʔ^{3}	tʃa^{3}koʔ^{1}	tʃoʔ^{4}

3 First person singular cliticization

Once one accounts for the phonological constraints on tonal association/spreading as well as irregular stem tonal allomorphs, the tonal patterns associated with clitic marking in IT more easily reveal themselves. The following sections describe the segmental and tonal processes associated with 1S clitic marking. Distinct tonal processes occur for each of the 1S allomorphs. The /=h/ allomorph involves the insertion of a tone /45/ to the right edge of the stem when the stem contains an upper register tone. This process instigates leftward tonal spreading on the stem. When the stem does not contain an upper register tone, no tonal insertion takes

place and, instead, the tone in the final mora is lost. The allomorph which involves the deletion of a coda /h/ involves the insertion of tone /3/ to the final mora when the stem contains a +Upper, +High tone, but insertion of tone /2/ to the final mora when the stem contains a +Upper, –High tone. This process is described below.

3.1 Toggling

The tonal phonology associated with the 1S clitic is by far the most complex within IT morphology. Two phonological processes are used to mark the 1S clitic: /h/-toggling and tonal alternations. A morphological toggle, or reversal, refers to a process where "a morphological opposition seems to reverse its function across environments" (Baerman 2007). In order to explain this process, recall that there are three possible rime types which occur in final syllables: /V:/, /Vh/, and /Vʔ/. Final syllables are either open with a long vowel or closed by a glottal consonant with a shorter vowel. Non-final syllables are all open with short vowels. For all IT words, the 1S enclitic is marked by affixing a coda /h/ on a final open syllable rime and shortening the modal vowel, or by deleting a coda /h/ from a /Vh/ rime (with compensatory lengthening the vowel). This process is often accompanied by tonal changes on the final syllable of the stem. Examples of toggling are shown in Table 10.[8]

Table 10: /h/-toggling of 1st person singular in Itunyoso Triqui

Bare/3S stem	Gloss	Inflected stem	Gloss
(a) $a^3tʃi^3$	'peel'	$a^3tʃih^{45}$	'I peel'
(b) $so^3ʔo^3$	'be deaf'	$so^3ʔoh^{45}$	'I am deaf'
(c) nne^3	'plough'	si^3-neh^{45}	'my plough'
(d) ku^3ru^{32}	'granary'	si^3-ku^2ruh^2	'my granary'
(e) yo^{32}	'sugarcane'	toh^3	'my sugarcane'
(f) $a^4tʃih^3$	'grow (intr.)'	$a^4tʃi^{43}$	'I grow'
(g) $ŋgah^3$	'be lying'	$ŋga^{43}$	'I am lying'
(h) $nneh^3$	'dream'	si^3-ne^{32}	'my dream'
(i) ka^2kih^3	'nail'	si^3-ka^2ki^2	'my nail'
(j) $na^2rãh^3$	'close (tr.)'	$na^2rã^3$	'I close'

8 Monosyllabic words with an initial geminate undergo degemination when prefixed, cf. DiCanio (2009).

In the toggling data, /h/ is deleted and added, depending on its presence or absence in the bare stem. In examples (a–e), note that the bare or 3S stem form does not contain a stem-final /h/, but this is present in the 1S inflected forms on the right. In examples (f–j), the bare/3S stem forms contain a stem-final /h/, but this is absent in the 1S inflected form on the right. This segmental alternation is regular in IT, however the tonal changes which accompany it are rather more complex. For examples (a–c), 1S forms with a stem-final /h/ are accompanied by tone /45/, but the forms in (d) and (e) are accompanied by distinct tones. Similarly, for examples (f–j), 1S forms with a stem-final open syllable are accompanied by four distinct surface tones (/43, 32, 3, 2/).

With few lexical exceptions, all nouns and verbs undergo toggling and it is a productive process. Following Baerman's criteria for morphological reversals, a reversal occurs when an alternation exists between two morphological exponents such that the values are switched in two different contexts. The /h/ toggling pattern clearly fits this criterion. This pattern does not match Baerman's second criterion, however; the paradigms observed in each context are not mirror images of each other. Words with /V?/ rimes undergo an alternation changing /V?/ to /Vh/. There is no pattern where the opposite alternation occurs.[9] In fact, there are two ways in which the 1S enclitic can affect words with a final /V?/ rime. Most words undergo a replacement of the glottal coda, e.g. /V?/ > /Vh/. Examples of this are shown in part (a) of Table 11.

Table 11: Regular (a) and irregular (b) 1S marking on /V?/ rime stems

	Bare stem	Gloss	Inflected stem	Gloss
(a)	na^{3}tʃãʔ^{3}	'turn'	na^{3}tʃãh^{45}	'I turn'
	ʔnaʔ^{3}	'come'	ʔnah^{3}	'I am coming'
	ka^{3}siʔ^{3}	'honey'	si^{3}-ka^{3}sih^{45}	'my honey'
	kkãʔ^{3}	'corn dough'	si^{3}-kãh^{3}	'my corn dough'
(b)	kĩʔ^{3}	'smell (intr.)'	kĩ^{3}ʔĩh^{45}	'I smell'
	na^{2}rãʔ^{3}	'pick up (mass N.)'	na^{2}rã^{3}ʔãh^{45}	'I pick up'
	ka^{3}tʃũʔ^{1}	'shadow'	si^{3}-ka^{1}ʃũ^{1}ʔũh^{1}	'my shadow'

Certain words with /V?/ rimes do not undergo a replacement of the glottal coda. Instead, a /V+h/ sequence is appended to the stem with no change to the stem's phonological shape, as shown in part (b) of Table 11. The vowel in this sequence is always an exact copy of the final vowel in the stem. The words which undergo

9 Yet, certain subtypes, discussed in section 3.2, may satisfy both criteria.

this pattern are lexically-specified. Words of various sizes and with different final rime vowels may receive the reduplicated /-Vh/ clitic allomorph.

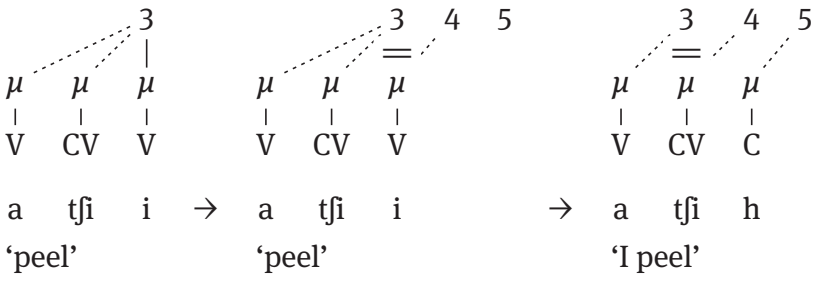
There are some substantial differences in clitic morphology between Triqui variants. The general process of /h/-toggling does not occur in Copala Triqui (Hollenbach 1984:334). Instead, /-h/ is appended to all stems as one exponent of the 1S clitic (the other exponent being different tonal alternations). Like Itunyoso Triqui, certain stems with final /V?/ rimes receive a reduplicative /Vh/ allomorph. In Chicahuaxtla Triqui, an /h/ toggling process similar to the one found in Itunyoso Triqui occurs for the 1S and the 3S.Fem clitics (Longacre 1959; Good 1979), but with a different set of tonal alternations. These three segmental allomorphs of the 1S in IT are summarized in Table 12.

Table 12: 1S segmental allomorphy

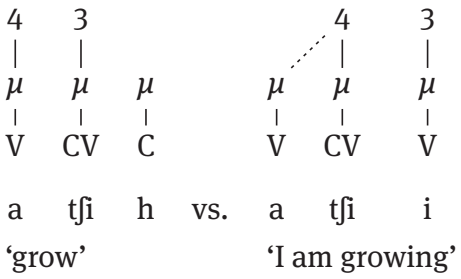
Stem-final rime	Allomorph assigned
V:	-/h/ inserted
Vh	-/h/ deleted
V?	-/h/ inserted (regular)
	-/Vh/ vowel reduplication (irregular)

Regardless of which allomorph of the 1S clitic is applied to IT words, the final syllable remains bimoraic. Thus, when /-h/ is appended as a clitic, it occupies the final mora of the syllable and the modal portion of the vowel is shortened. When /-h/ is deleted, the vowel lengthens. This process is formalized in the autosegmental representations in (20) for the word /a^{3}tʃi^{3}/ 'peel' and in (21) for the word /a^{4}tʃih^{3}/ 'grow.' In (20) we observe an initial stage where leftward tonal association has resulted in the association of a single tone, /3/, across the word. The addition of the 1S clitic results in the insertion of /h/ and a contour tone on the right of the stem. This tone, via the constraint against floating tones, associates leftward on to the stem, delinking the stem on the preceding mora. In (21), we observe what superficially looks like the opposite process. Since the /-h/ coda is no longer present, tonal well-formedness conditions require that the rightmost mora receive tone /3/ and that preceding tones associate rightward, which results in a final contour tone on the long vowel. A contour is not possible in syllables with a coda /h/ as a tone would be associated to a coda glottal consonant and this would violate principle (D).

(20)



(21)



3.2 Tonal Alternations specific to the 1st person singular enclitic

The set of tonal alternations associated with the 1S enclitic are quite complex. I present the most frequent patterns first and discuss the exceptions in section 3.2.3. It is possible to identify four *types* of tonal processes: tonal alternations occurring with /h/ deletion, tonal alternations occurring with /h/ addition, tone /4/ stem allotony, and irregular tonal changes. Many tonal changes are phonologically predictable based on the tonal/glottal features present in the final syllable of the stem.

3.2.1 *Tonal Alternations associated with /h/ deletion*

Many words which undergo /h/ deletion possess a falling tone /43/ on the stem-final syllable. This tone occurs only when /h/ is deleted from the final stem and only on words whose stem-final syllable carries an upper register tone, e.g. /4h/ and /45h/. Stems with a final tone /3h/ undergo an alternation with tone /32/ instead. Examples of these alternations are given in Table 13.

The tonal alternations shown here illustrate a frequent pattern among upper register tones. This process is completely regular for tone /45/ with no exceptions, but does not apply to all stems with a final tone /4/ or /3/. By contrast, lower register tones do not undergo a process of lowering when /h/ deletion occurs. Tone on lower register words remains unaltered. The patterns found on words with lower

Table 13: /h/ deletion resulting in stem-final falling tones

Tone	Bare stem	Gloss	Inflected stem	Gloss
/45/	kuh^{45}	'bone'	si^{3}-ku^{43}	'my bone'
	si^{3}nuh^{45}	'crazy'	si^{3}nu^{43}	'I am crazy'
/4/	βãh^{4}	'dig'	βã^{43}	'I dig'
	a^{3}rah^{4}	'sing'	a^{3}ra^{43}	'I sing'
/3/	nneh^{3}	'dream'	si^{3}-ne^{32}	'my dream'
	ya^{3}ʔah^{3}	'chile pepper'	ta^{3}ʔa^{32}	'my chile pepper'

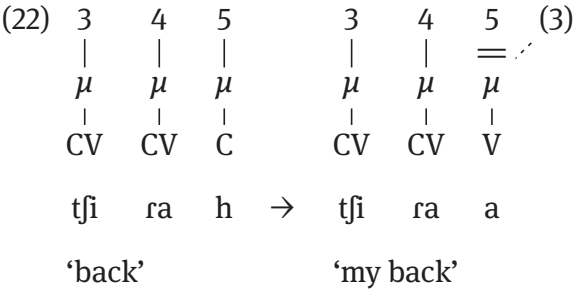
Table 14: Absence of tonal alternation with /h/ deletion in lower register

Tone	Bare stem	Gloss	Inflected stem	Gloss
/32/	kk^{w}eh^{32}	'edible green'	si^{3}-k^{w}e^{32}	'my edible green'
	yyah^{32}	'flower'	tta^{32}	'my flower'
/2/	koh^{2}	'separate corn kernels'	ko^{2}	'I separate corn kernels'
	ku^{2}k^{w}ah^{2}	'tepache jug'	si^{3}-ku^{2}k^{w}a^{2}	'my tepache jug'
/1/	βa^{3} kãh^{1}	'be naked'	βa^{3} kã^{1}	'I am naked'
	na^{1}ʔah^{1}	'shame'	si^{3}-na^{1}ʔa^{1}	'my shame'
/13/	yah^{13}	'powder'	tah^{13}	'my powder'

register tones (/32/, /2/, /1/, /13/) are completely regular with no exceptions. Some representative examples are shown in Table 14.[10]

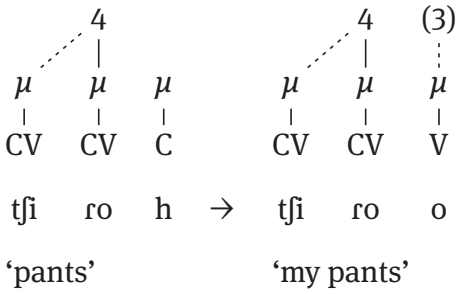
From an autosegmental perspective, tonal lowering with the 1S clitic can be generalized as a process which not only deletes the coda /h/, but any tone associated with this coda as well. For stems with tones /4h/ and /45h/, a floating tone /3/ delinks the preceding mora's tone and associates it with the final mora. For stems with tone /3h/, the floating tone is /2/. This process is shown in (22).

(22)



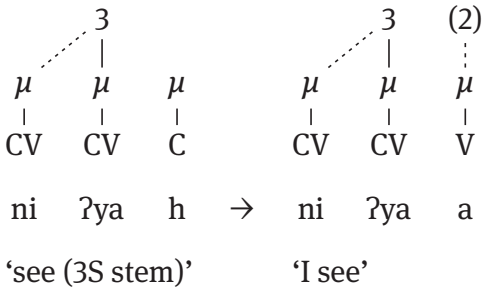
10 While tone /13/ surfaces on /Vh/ stems, the tone is quite rare (only 12 words attested). Stems with this tone are mostly adverbs and discourse particles, neither of which usually receive a personal enclitic. For this reason, only one example of this tone is given here.

(23)



From an autosegmental perspective, the tonal alternations for the 1S enclitic affecting final stem tones /4h/ and /45h/ are the result of the same exact process. In (22), the elimination of the final /h/ results in the erasure of tone level /5/. A floating tone /3/ then associates to the right edge of the word. In (23), the elimination of the final /h/ does not result in any tonal loss since the final mora has no tonal affiliation. A similar type of process applies to stems with tone /3h/ with a floating tone /2/, as shown in (24).

(24)



In sum, for those stems with a coda /h/ in the final syllable, the 1S enclitic is marked by the deletion of both the coda consonant from the stem and any tone associated with this mora. A floating tone /3/ attaches to the right edge of stems with a preceding tone /4/ whereas a floating tone /2/ attaches to the right edge of stems with a preceding tone /3/. These tones are associated with the stem-final (vocalic) mora.

3.2.2 *Tonal Alternations associated with /h/ insertion*

The tonal alternations associated with /h/ insertion are more complex than those associated with /h/ deletion. Like the tonal alternations occurring with /h/ deletion, lower register tones /2/, /1/, and /13/ do not undergo tonal changes. Most of the tonal alternations are restricted to upper register tones. Recall that seven tones surface in stem-final open syllables (/4, 3, 2, 1, 43, 32, 31/) and three on /Vʔ/ rimes (/3, 2, 1/). Stems with tone /4/ and *most* stems with tone /3/ undergo an al-

ternation to tone /45/ when /h/ is added to the stem. This process of tonal raising with /h/ insertion mirrors the process of final moraic tonal deletion discussed in the previous section. However, the morphotonal exponents for individual stem tones are not identical. For instance, when /h/ is deleted, tone /3/ > /32/ and tone /4/ > /43/. Yet, when /h/ is inserted, the stem tones neutralize to /45h/. Examples of this process are shown in Table 15.

Table 15: Tone raising with stem tones /3/ and /4/

Tone	Bare stem	Gloss	Inflected stem	Gloss
/4/	stĩ^{4}	'fingernail'	stĩh^{45}	'my fingernail'
	t si^{3}ʔi^{4}	'excrete'	t si^{3}ʔih^{45}	'I excrete'
/3/	yũ^{3}	'palm leaf'	tũh^{45}	'my palm leaf'
	ni^{3}kĩʔ^{3}	'stand'	ni^{3}kĩh^{45}	'I am standing'

As a mirror image of the /4/ > /43/ tonal change with /h/ deletion, stems with tone /43/ undergo a change to tone /4/ when /h/ is added. Like /h/-toggling, the tonal patterns are a type of morphological reversal. This process is regular in Itunyoso Triqui and it affects loanwords. All monosyllabic stems and most disyllabic stems with tone /43/ in a final syllable undergo this toggling (just 2/27 exceptions). Examples of are shown in Table 16.

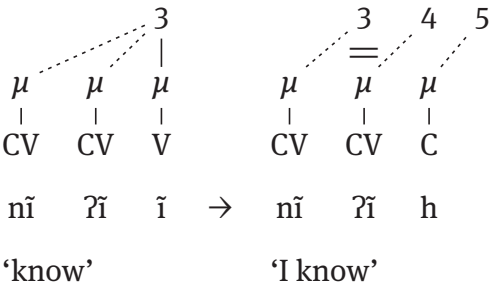
Table 16: Tone /43/ ⇌ /4h/ toggle

Bare stem	Gloss	Inflected stem	Gloss
/h/-insertion			
ru^{4}ne^{43}	'avocado'	si^{3}-ru^{4}neh^{4}	'my avocado'
le^{4}tu^{43}	'bother'	le^{4}tuh^{4}	'I bother'
ʃũ^{43}	'take off'	ʃũh^{4}	'I take off'
/h/-deletion			
tʃi^{4}roh^{4}	'pants'	tʃi^{4}ro^{43}	'my pants'
a^{4}rah^{4}	'construct'	a^{4}ra^{43}	'I construct'
sih^{4}	'arrive'	si^{43}	'I arrive'

The alternation affecting each of these upper register tones (/4, 43, 3/) is captured by the autosegmental insertion of a floating /45/ tone with a coda /h/ at the right edge of the stem. For instance, the example in (25) shows the delinking of stem-final tone /3/ and the leftward association of tone /45/ onto the final syllable for the word 'know'. By contrast, the final tone /3/ on the stem is deleted with /h/

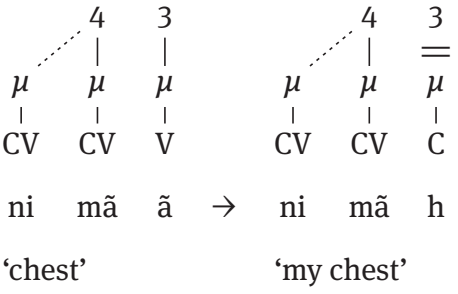
insertion in the example in (26) but no additional tone is associated with the final mora.

(25)



‘know’ ‘I know’

(26)



‘chest’ ‘my chest’

Level tones /2/ and /1/ do not undergo tonal raising when /h/ is inserted. This parallels the pattern in section 3.2.1 where no floating tones attach to the low register tones. However, the absence of tonal raising is also found for certain lexical stems with tone /3/. Within the corpus, 106/356 roots contain a stem-final tone /3/ without a coda /h/. 76 of the 106 undergo the raising pattern shown in Table (15), while 19 undergo no tonal alternation, 6 are irregular, and 5 take an alternate stem tone /4/ (see section 3.2.3). Examples of the lack of a tonal alternation are shown in Table 17. Note that lower register stems with a /Vʔ/ rime do not change tone even when they receive the reduplicative allomorph, /Vh/, as illustrated by the word ‘return (tr.)’ in the data set.

Table 17: Absence of tonal changes with /h/ addition

Tone	Bare stem	Gloss	Inflected stem	Gloss
/3/	ka^{2}ɾĩ^{3}	‘wheel’	si^{3}-ka^{2}ɾĩh^{3}	‘my wheel’
	si^{3}keʔ^{3}	‘mud’	si^{3}-si^{2}keh^{3}	‘my mud’
/2/	a^{3}rũ^{2}	‘smoke’	a^{3}rũh^{2}	‘I smoke’
	na^{2}ʔniʔ^{2}	‘wash (dishes)’	na^{2}ʔnih^{2}	‘I wash (dishes)’
/1/	tʃa^{1}kã^{1}	‘be tall’	tʃa^{1}kãh^{1}	‘I am tall’
	na^{1}koʔ^{1}	‘return (tr.)’	na^{1}ko^{1}ʔoh^{1}	‘I return’

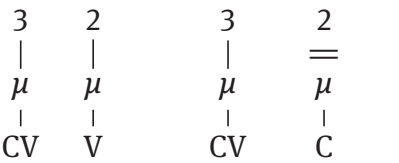
Table 18: Contour tone neutralization to tone /3/ in association with /h/ addition

Tone	Bare stem	Gloss	Inflected stem	Gloss
/32/	ka^{3}ʔnga^{32}	'be born (PERF)'	ka^{3}ʔngah^{3}	'I was born'
	yã^{3}ʔã^{32}	'light'	tã^{3}ʔãh^{3}	'my light'
/31/	mmi^{31}	'bridge'	tu^{3}mih^{3}	'my bridge'
	nne^{31}	'meat'	si^{3}-neh^{3}	'my meat'

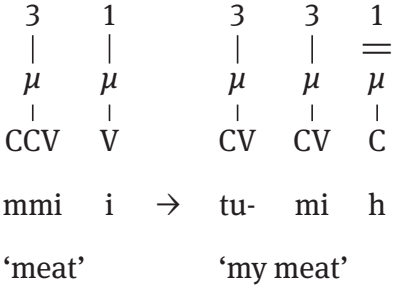
For words containing tonal melodies /32/ and /31/, there are two possible tonal realizations of the 1S clitic when /h/ is inserted. For those tone /32/ nouns which undergo a stem change to tone /2/ (see Table 7 in section 2), no surface tonal alternation takes place. In derivational terms, the change of tone on the stem blocks further tonal rules from applying. The remainder of words with these tones undergo a change to tone level /3/ when /h/ is added to the stem. The alternation occurs in both monosyllabic and disyllabic stems with tone /32/, but only occurs on monosyllabic stems with tone /31/. Examples of this process are given in Table 18.

The general pattern here is captured in autosegmental terms by the replacement of the final mora of the stem with a coda /h/ and the erasure of the stem-final mora, in a process identical to that for tone /43/, shown in (26). The AS representations for words with tones /32/ and /31/ are shown in (27) and (28). In both cases, the insertion of a coda /h/ for the 1S allomorph delinks the tone associated with the final mora.

(27)



(28)



For tonal melody /31/, the tonal rule associated with the 1S enclitic involves the deletion of tone /1/ at the right edge of the stem. This pattern would seem to interact with the more general low tone spreading rule (rule E), described in section 1.2.3. Low tone spreading involves the reassociation of tone /1/ to the penultimate mora on the final syllable and to other preceding moras on the word as long as no tone is deleted. If /h/ insertion involves the delinking of only the final mora of the stem, then low tone spreading predicts that it will fail to produce any surface tonal changes on polysyllabic words carrying this tone melody. In other words, a disyllabic stem like /tʃi^{3}ʔii^{1}/ 'disease, illness', would be produced with the same tones on the stem-final syllable when /h/ is inserted, e.g. /si^{3}=tʃi^{1}ʔih^{1}/ 'my disease, illness.'

However, the deletion of the final moraic tone does not, in fact, conflict with the low tone spreading rule. Note that this rule appears to apply almost entirely to monosyllabic words with a tone /31/ melody in IT. On such words, tone /1/ is *only* associated with the final mora. Tone /1/ is entirely deleted with the final mora. With few exceptions (3/17 polysyllables), the surface tonal melody on polysyllabic words carrying /31/ does not change. The attested 1S form for 'disease' is, in fact, /si^{3}=tʃi^{1}ʔih^{1}/, where the final syllable retains tone /1/. Thus, on the surface, words with a /31/ melody show distinct patterns when inflected with the 1S clitic, but this is only a phonological consequence of differences in tonal association related to word size. When low tone spreading takes place in polysyllabic words, tone /1/ is not lost on the stem since it can spread leftward. A consequence of this pattern is that, in derivational terms, low tone spreading must precede tonal rules associated with cliticization.

In sum, there are three major types of tonal alternations for the 1S allomorph which inserts a coda /h/ to the right edge of the stem. For bare/3S stems containing tone /4/ or /3/, the 1S allomorph attaches a /45/ tonal melody at the right edge. Constraints preventing floating tones and requiring only one tone per mora produce a leftward association of these tones and a delinking (or absorption in the case of tone /4/) of tones on the final syllable of the stem. For bare/3S stems containing a falling tone (/43/, /32/, /31/), the 1S allomorph deletes any tone associated with the final mora. For bare/3S stems containing tones /1/, /2/, and, in some cases, /3/, the 1S allomorph does not involve any tonal alternations.[11]

11 Tonal melody /13/ has been left out here, but this tone usually surfaces, like tone /45/, on a /Vh/ rime. Thus, all cliticized cases, when they occur, involve /h/ deletion, not insertion. Furthermore, as most stems with tonal melody /13/ are discourse particles, enclitics are rarely attached to them.

3.2.3 *Tone /4/ Stem Allotony*

In section 2, we discussed certain words which undergo a tonal stem alternation when cliticized. These stem allomorphs are lexically-specified and comprise the base form onto which clitic-specific processes apply. However, there are also words for which the entire base carries tone /4/. Unlike the stem-changes discussed above, this stem tonal change also influences any possessive prefix that applies to the root. Some examples of this process are given in Table 19.

Table 19: Tone /4/ stem allomorphy in association with /h/ addition

Tone	Bare stem	Gloss	Inflected stem	Gloss
/3/	nneʔ^{3}	'straw rope'	tu^{4}-neh^{4}	'my straw rope'
			tu^{3}-neʔ^{3}=sih^{3}	'his straw rope'
/2/	u^{3}tu^{2}	'scratch'	u^{4}tuh^{4}	'I scratch'
			u^{3}tu^{2}=sih^{3}	'he scratches'
	tʃu^{3}ʔnu^{2}	'huipil'	tʃu^{4}ʔnuh^{4}	'my huipil'
			tʃu^{3}ʔnu^{2}=ũh^{3}	'her huipil'
/32/	kka^{32}	'corn tassle'	si^{4}-kah^{4}	'my corn tassle'
			si^{3}-ka^{2}=sih^{3}	'his corn tassle'
	ββe^{32}	'maguey cactus'	tu^{4}-βeh^{4}	'my maguey cactus'
			tu^{3}-βe^{2}=ũh^{3}	'her maguey cactus'
/31/	nne^{31}	'meat'	si^{4}-neh^{4}	'my meat'
			si^{3}-ne^{2}=sih^{3}	'his meat'
	to^{3}koʔ^{1}	'hang (tr.)'	to^{4}koh^{4}	'I hang'
			to^{3}koʔ^{2}=sih^{3}	'he hangs'

Unlike the stem tonal alternations where tone /32/ and /4/ neutralize to tone /2/, this stem tonal allomorphy occurs with the 1S clitic and, as we shall see, with the 1DU clitic as well. When other clitics apply to these words, the stem tone on the word remains identical to the bare/3/S form. In the examples 'my straw rope' and 'my corn tassle', we observe a tonal change not only on the lexical root, but on the possessive prefix as well. This tonal change applies both the phonologically-conditioned possessive prefix allomorph /tu-/ and to the regular possessive prefix allomorph /si^{3}-/. This stem tonal allomorph is not restricted to roots where 1S formation involves /h/-insertion, but also occurs with /h/-insertion. Only roots with tone /3/ undergo this pattern, shown below in Table 20.

The inflected forms in Table 20 appear on the surface to resemble those 1S forms for stems with tone /4h/ or /45h/. Recall that such forms underwent an alternation of /45h, 4h/ > /43/ with the 1S clitic. Yet, when we examine the tone on the 3S.Masc forms, the stem is not raised.

Table 20: Tone /4/ stem allomorphy in association with /h/ deletion

Bare stem	Gloss	Inflected stem	Gloss
tʃuh^{3}	'pot'	si^{3}-tʃu^{43}	'my pot'
		si^{3}-tʃuh^{3}=sih^{3}	'his pot'
ni^{3}ʔyah^{3}	'salsa'	si^{3}-ni^{3}ʔya^{43}	'my salsa'
		si^{3}-ni^{3}ʔyah^{3}=sih^{3}	'his salsa'
ŋgah^{3}	'be lying'	ŋga^{43}	'I am lying'
		ŋgah^{3}=sih^{3}	'he is lying'

3.2.4 Summary of stem selection and 1S morphology

There are four possible stem types that serve as the base for the application of 1S clitic morphophonology in Itunyoso Triqui. These stem types are the bare noun form, the 3S stem (for verbs and inalienably-possessed nouns), a tone /2/ stem, and a tone /4/ stem. The irregular tonal stems serve as the base for 1S glottal consonant toggling, but no additional tonal changes apply to these stems to indicate the 1S clitic. For regular stems, the directionality of the toggling process (/V:, Vʔ/ → /Vh/, /Vʔ/ → /VʔVh/, or /Vh/ → /V:/) determines the type of tonal alternation that will apply. Table 21 summarizes the exponents of the 1S clitic by rime type and tone.

The presence of both alternate stem types for cliticized IT words and a plethora of possible tone-rime combinations in final syllables renders the set of morphotonal alternations with the 1S clitic superficially opaque. However, a small set of tonal rules, described in section 1.2, as well as the autosegmental rules for tonal association permit clearer generalizations to be made regarding IT

Table 21: The application of 1S morphophonology

Final syllable rime	Final syllable tone	Inflected final rime
V:	/3, 4/	Vh^{45}
V:	/43, 32, 31/	Vh + final mora tone deletion
V:	/2, 1/	Vh
Vʔ	/3ʔ/	Vh^{45}
Vʔ	/1ʔ , 2ʔ , 3ʔ/	Vh
Vʔ	/3ʔ/	VʔVh^{45} (redup.)
Vʔ	/1ʔ , 2ʔ/	VʔVh (redup.)
Vh	/45h, 4h/	V:^{43}
Vh	/3h/	V:^{32}
Vh	/2h, 1h, 32h, 13h/	V:

cliticization. First, no tones are inserted when the 1S clitic is attached to a stem with a lower register tone. In these cases, the /h/-toggling process simply involves the insertion/deletion of the coda glottal consonant.

Second, disregarding irregular /Vʔ/ roots for which a reduplicated form occurs, e.g. /ka^{3}ɣaʔ^{3} > ka^{3}ɣaʔ^{3}ah^{45}/ 'bottle > my bottle', for stems which undergo /h/ insertion, only high register level tones involve the association of a floating /45/ tonal melody. Stems with falling tones involve the deletion of the tone on the stem-final mora. Third, for stems which undergo /h/ deletion, only high register tones receive a floating tone (/3/ or /2/) attached to the right edge of the stem, producing final contours /43/ and /32/. None of the other tones (low register) undergo regular alternations here. These major rules governing 1S cliticization are given below.

1S /h/ insertion rule: Replace the rightmost mora of the stem with /h/. If the rightmost associated tone on the base is [+Upper] and level, insert tone /45/ at the right edge. If not, delete any tone associated with the rightmost mora.

1S /h/ deletion rule: Delete both /h/ and the tone from the rightmost mora of the stem. If the rightmost associated tone on the base is [+Upper, +High], insert tone /3/ at the right edge. If the rightmost associated tone on the base is [+Upper, –High], insert tone /2/ at the right edge. If the rightmost associated tone is [–Upper], do not associate any additional tone.

The strength of the rules above is that it is unnecessary to specify how floating tones will associate on IT words. The existing rules on tonal well-formedness account for this. However, one pattern in Table 21 remains unexplained: while most words with tone /3/ undergo tonal alternations (to /45/), other words with this tone do not. Just what predicts this pattern is made clearer by considering the remainder of the clitic morphology, which we turn to next.

4 Second person marking

Whereas the morphophonological alternations associated with the 1S clitic are particularly complex, both segmentally and tonally, the morphology of the 2S and 1DU clitics is rather simpler. The 2S enclitic morpheme in Itunyoso Triqui is /=ɾeʔ^{1}/. The clitic is associated with three tonal alternations on the stem onto which it attaches: it may condition low tone spreading on the preceding syllable, tone raising on the preceding syllable (to tone /4/), or no tonal changes on the stem. The process of low-tone spreading is unique to Itunyoso Triqui. Chicahuaxtla Triqui has a similar process of tone-raising conditioned by the 2nd person

enclitic, but no process of low-tone spreading (Longacre 1959). The same is true for Copala Triqui (Hollenbach 1984).

4.1 The Low Tone Spreading 2S allomorph

For the 2S allomorph which conditions low tone spreading, the low tone on the enclitic spreads just one syllable to the left, changing the final stem syllable tone to /1/. Note that the 2S morpheme is the only clitic in IT to contain tone /1/. Thus, this process can be seen as another instance of a more general rule of low tone spreading (LTS) described above. 2S LTS occurs for all stems carrying a falling tonal melody, e.g. /32, 3.2, 3.2.2, 3.3.2, 43, 4.3, 4.43, etc./ and on (mostly) upper register level tones which contain a stem-final coda, e.g. /3ʔ, 3h, 4ʔ/.[12] Words with tonal melody /31/ obligatorily undergo low tone spreading, as per the general LTS rule, so they are excluded here. As most Spanish loanwords take tonal melody /43/, this rule applies to these loanwords as well. Examples of the low tone spreading process are given in Table 22.

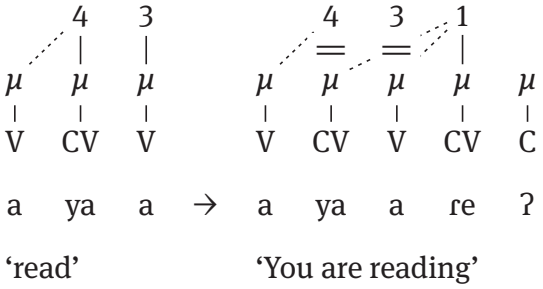
Table 22: Low tone spreading with 2S clitic

Tone	Bare stem	Gloss	Inflected stem	Gloss
/43/	a^{4}ya^{43}	'read'	a^{4}ya^{1}=ɾeʔ^{1}	'you read'
	tʃa^{4}βi^{43}	'key'	si^{3}-tʃa^{4}βi^{1}=ɾeʔ^{1}	'your key'
/32/	ya^{3}ʔa^{32}	'cord'	ta^{3}ʔa^{1}=ɾeʔ^{1}	'your cord'
	kka^{32}	'corn tassle'	si^{3}-ka^{1}=ɾeʔ^{1}	'your corn tassle'
/4.3/	si^{4}tuh^{3}	'navel'	si^{4}tuh^{1}=ɾeʔ^{1}	'your navel'
	a^{4}tʃih^{3}	'believe'	a^{4}tʃih^{1}=ɾeʔ^{1}	'you believe'
/3.2/	a^{3}ɾũ^{2}	'scratch'	a^{3}ɾũ^{1}=ɾeʔ^{1}	'you scratch'
	a^{3}ʔβi^{2}	'grind (in mortar)'	a^{3}ʔβi^{1}=ɾeʔ^{1}	'you grind'
/4/	ɾa^{4}ʔyãh^{4}	'be in a hurry'	ɾa^{4}ʔyãh^{1}=ɾeʔ^{1}	'you are in a hurry'
	yã^{4}ʔãh^{4}	'guitar'	tã^{4}ʔãh^{1}=ɾeʔ^{1}	'your guitar'
/3/	ni^{3}ʔyah^{3}	'see'	ni^{3}ʔyah^{1}=ɾeʔ^{1}	'you see'
	nneh^{3}	'dream'	si^{3}-neh^{1}=ɾeʔ^{1}	'your dream'
/2/	tʃa^{2}kah^{2}	'get married'	tʃa^{2}kah^{1}=ɾeʔ^{1}	'you got married'
	ttʃeʔ^{2}	'be short'	ttʃeʔ^{1}=ɾeʔ^{1}	'you are short'

12 Tone /4/ only surfaces on a /Vʔ/ rime with the 1DU clitic; in an inflected context.

Table 22 shows stems with tone /2/ which also undergo LTS with the 2S clitic allomorph. These two words are the only examples of stems with tone /2/ which undergo this process. Most words with tone /2/ do not undergo any tonal alternation with the 2S clitic. This process is represented in autosegmental terms in (29) for /a^{4}ya^{43}/ 'read.'

(29)



The tonal spreading with the 2S allomorph in (29) is slightly different from the general LTS process described earlier. In the latter, no tone may be deleted from the stem. In the former, any tone associated with the final *syllable* of the stem is delinked and erased. Those tones affiliated with any non-final syllable, are unaffected.

4.2 The tone raising 2S allomorph

A smaller set of words in Itunyoso Triqui undergo a process of tone raising with the 2S enclitic. For this allomorph, the final syllable of the stem raises to tone /4/. While the process of low tone spreading applies to stems with varying underlying tonal patterns, tonal raising applies, without exception, only to stems with an underlying level tone /3/. Examples of tone raising stems with the 2S enclitic are given in Table 23.

Table 23: Tone Raising Stems with 2S enclitic

Bare stem	Gloss	Inflected stem	Gloss
ɾa^{3}ʔa^{3}	'hand'	ɾa^{3}ʔa^{4}=ɾeʔ^{1}	'your hand'
u^{3}nu^{3}	'hear, understand'	u^{3}nu^{4}=ɾeʔ^{1}	'you hear'
si^{3}kiʔ^{3}	'chewing gum'	si^{3}-si^{3}kiʔ^{4}=ɾeʔ^{1}	'your chewing gum'
ya^{3}ʔah^{3}	'chile pepper'	ta^{3}ʔah^{4}=ɾeʔ^{1}	'your chile pepper'

The phonological behavior of this process parallels that of the LTS rule. In both cases, the tones associated with the final syllable of the stem are replaced by a tone specified by the clitic allomorph. Yet, there is a difference in representation. In this particular case, tone /4/ is hypothesized to be a floating tone attached to the left edge of the clitic. It is this tone which attaches at the right edge of the stem.

For the most part, words which undergo low tone spreading with the 2S clitic have distinct stem tones from words which undergo stem tonal raising. However, comparing the data in Table 23 to that in 22, we observe that words with a tone /3/ melody may undergo either process. What accounts for the difference between these words? This distinction between different stems with tone /3/ is better understood once we consider those stems which fail to undergo any tonal alternation with the 2S clitic.

4.3 The neutral 2S allomorph

Many Itunyoso Triqui roots do not undergo tonal alternations with the 2S enclitic. Non-alternating stems vary in their underlying tonal melodies, which consist of /2/, /3/, /43/, and /32/. There is a surface tonal neutralization between stems which undergo tone raising and stems with an underlying tone /4/, as well as a neutralization between stems which undergo low tone spreading and stems with an underlying tone /1/. For the purposes of classification, I will leave aside these words. However, it is notable that stems with melodies /4/ and /45/ fail to undergo low tone spreading and stems with tones /1/ and /2/ fail to undergo tonal raising. Examples of non-alternating stems with the 2S enclitic are shown in Table 24.

Table 24: Non-alternating stems with 2S enclitic

Tone	Bare stem	Gloss	Inflected stem	Gloss
/43/	tʃa^{43}	‘eat’	tʃa^{43}=rɐʔ^{1}	‘you eat’
/32/	na^{2}nu^{32}	‘get dressed’	na^{2}nu^{32}=rɐʔ^{1}	‘you get dressed’
/3/	ya^{2}ʔnã^{3}	‘mask’	ta^{2}ʔnã^{3}=rɐʔ^{1}	‘your mask’
/2/	ku^{2}k^{w}ah^{2}	‘tepache jug’	si^{3}-ku^{2}k^{w}ah^{2}=rɐʔ^{1}	‘your tepache jug’

Leaving aside stems with a tone /3/ and /2/ melody, it appears that stems with tonal melody /32/ may either undergo LTS or no tonal alternation. However, upon closer inspection, there is an important distinction among these different stems. The stems with tone /32/ which undergo LTS are those which do not involve a melodic stem change to tone /2/, whereas those stems which involve a melodic

change from /32 > 2/ do not undergo any tonal alternation. In other words, the process of stem /2/ selection prevents any further changes to the tonal shape of the word. This stands in contrast with those words which involve a stem change to tone /4/ for only the 1S or 1DU clitics, described in section 3.2.3.

Yet, not all of the roots which carry tone /32/ and fail to undergo a tonal alternation with the 2S clitic also undergo a stem-/2/ alternation. The word /tʃa^{43}/ 'eat' in Table 24 does not undergo a stem alternation but fails to undergo tonal alternations. Why do words of this shape fail to undergo low tone spreading? The explanation relies on the same principles that constrain the general low tone spreading in IT; the avoidance of tonal deletion due to word size. Monosyllabic words like /kka^{32}/ 'corn tassle' undergo low tone spreading, e.g. /si^{3}-ka^{1}=ɾeʔ^{1}/ 'your corn tassle' because a prefix is present on the inflected form. For verbs or inalienably-possessed nouns where a prefix is not present, low tone spreading may not result in the deletion of the tonal content on the final (only) stem syllable. (Recall that the 2S LTS process affects the tones associated on the entire final syllable, not just the final mora.) The same constraint barring tonal deletion from the general process of iterative LTS for tone /1/ bars LTS from deleting tones on inflected monosyllabic words for the 2S clitic.

4.4 Paradigmatic uniformity and clitic boundaries

So far, we have no explanation for why stems with tonal melodies /3/ and /2/ appear to receive the low tone spreading 2S clitic allomorph, the tone-raising allomorph, or the neutral allomorph. If the stem tone is not a predictor of the tonal changes which these stems undergo with the 2S clitic, what is? Recall in Table 21 that certain roots containing tone /3/ undergo both final syllable tone raising to /45/ with /h/-insertion, while other roots containing tone /3/ do not undergo any tone raising. When we compare these alternations with those affecting the 2S clitic, a pattern emerges: all of the lexical stems which undergo tone raising with the 2S enclitic also undergo tone raising to tone /45/ with the 1S enclitic (see Table 15) if the stem involves /h/-insertion. Words which do not undergo tone raising with the 1S enclitic either undergo no tonal changes or low tone spreading with the 2S enclitic.

One way to capture both the non-predictability of the tonal raising process for tone /3/ and its uniformity within the 1S and 2S clitic morphology is to posit two abstract tonal categories for stems containing tone /3/. Certain lexical stems in Itunyoso Triqui which contain a tone /3/ melody are specified as *tone-raising*, while others are not tone-raising. Yet, if this binary abstract tonal classification is created, how do we distinguish those tone /3/ and tone /2/ stems which in-

volve LTS with the 2S clitic allomorph from those which involve no tonal changes at all?

Another way to resolve this is to argue that there are two types of *clitic boundaries* within Itunyoso Triqui. There are those clitics that have a substantive influence on the phonology of the final syllable of the stem and those which do not. The former case might be analyzed as word-internal cliticization and the latter, word-external cliticization. Such a distinction is not purely stipulative. There is evidence for two types of clitic boundaries in the application of personal clitics in Copala Triqui (Hollenbach 1984). In this work, Hollenbach distinguishes the phonological behavior of 1S, 2S, and 1DU clitics (word-internal morphology) from the other clitics which do not influence the phonology of the stem (word-external morphology). The distinction here in Itunyoso Triqui is that this split divides the same morpheme; there are word-internal 2S clitic allophones which influence stem tone and word-external 2S clitics which do not. Among the word-internal clitics, there are those roots which are specified as tone-raising and those which are not. A consequence of this distinction is that there are not three tonal allomorphs of the 2S clitic in IT, but only two: a lexically-specified form with tone-raising and another without tone raising. The distinction between stems which undergo low tone spreading and those which do not lies in the type of morphological boundary at the right edge of the stem.

Based on the complex tonal alternations, there may be good phonological evidence for treating *word-internal* clitics as suffixal and *word-external* clitics as true clitics. However, clitics which condition complex tonal alternations apply equally to all parts of speech in Itunyoso Triqui and regularly attach to the right edge of a verb+adverb domain; e.g. /ka^{3}-tʃi^{4}nih^{4}/, PERF-get.drunk.1S, 'I got drunk.' vs. /ka^{3}-tʃi^{4}ni^{43} yũh^{45}/ PERF-get.drunk again.1S, 'I got drunk again.' In the first example, the 3S stem tone on the verb is /43/ and this tone undergoes the regular changes with /h/-insertion. In the second, the 1S clitic is attached to the post-verbal adverb and the stem tone (/4/) here undergoes different, but regular tonal changes to tone /45/ with /h/-insertion. Clitics typically attach on syntactic domains larger than the morphological word (Spencer 1991) and IT clitics do not differ in terms of their morphological attachment sites, only in terms of their phonological properties. Insofar as these phonological effects alone are sufficient to distinguish affixes from clitics in IT morphology, then there is evidence a difference in stem boundary type.

5 First person dual marking

The 1DU enclitic, =/ʔ/, conditions two phonological processes on Itunyoso Triqui words. There is a segmental alternation and a tonal alternation which affects words with stem tone /3/. The segmental alternation affects words where the final syllable of the stem has a central vowel: /a/ or /ã/. These vowels are rounded before the 1DU clitic to /o/ and /ũ/, respectively. In stems with identical vowels separated by an intervocalic glottal stop, e.g. /V_1ʔV_1/, both vowels undergo this alternation. Stems ending in a non-central vowel do not undergo any alternation. The vowel alternation is completely regular and affects loanwords as well, e.g. /me^{4}sa^{43}/ 'table' > /me^{4}soʔ^4/ 'our (excl) table'. Examples are shown in Table 25.

Table 25: Vowel alternations with 1DU clitic

Bare stem	Gloss	Inflected stem	Gloss
sã^{3}ʔãh^2	'money'	si^3-sũ^{2}ʔũʔ^2	'our money'
na^{2}ɾãh^3	'close (tr.)'	na^{2}ɾũʔ^3	'we close'
ɾa^{3}ʔa^3	'hand'	ɾo^{3}ʔoʔ^4	'our hand'

One consequence of this process is its unique interaction with a phonological constraint in IT regarding labial consonants. Rounded vowels are not permitted in the same syllable as labial consonants in any Triqui variant (DiCanio 2008; Longacre 1957; Silverman 2006); i.e. none the consonants /p, β, ββ, m, mm, k^w, kk^w, ʔβ, ʔm/ may co-occur with the vowels /u, ũ, o/. When the 1DU applies to a word containing a labial onset consonant followed by /a/ or /ã/, the labial consonant is lost. For instance, the word /tu^{3}ʔβa^3/ 'lips' is /to^{3}ʔoʔ^4/ when inflected with the 1DU clitic.

Certain lexical stems undergo a process of tone raising to tone /4/ before the 1DU enclitic. In uninflected lexical stems, tone /4/ never surfaces on a /Vʔ/ rime. In this way, tone /4/ is purely a grammatical tone on /Vʔ/ rimes, conditioned by enclitic morphology. All of the words which undergo this alternation possess a tone /3/ on the final syllable of the root or 3S stem. A majority of these words undergo tonal raising (to /45/) with the 1S clitic and to tone /4/ in the 2S clitic (49/61 paradigms). The remaining 11 exceptions do not satisfy the phonological conditions for tonal raising; the stem either contains a coda /h/ and /h/-deletion occurs with the 1S clitic, or the stem possesses a falling melody like /4.3/ and will undergo low tone spreading with the 2S clitic. Examples of tone raising are given in Table 26. Examples with lower register tone and no tonal raising are given in Table 27.

Table 26: Tone raising with the 1DU enclitic

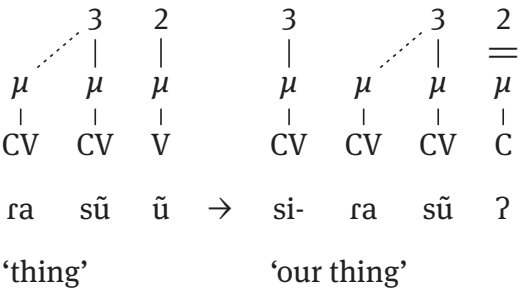
Tone	Bare stem	Gloss	Inflected stem	Gloss
/3/	a^{3}ʔnãʔ^{3}	'be sick'	a^{3}ʔnuʔ^{4}	'we are sick'
	tʃa^{3}tã^{3}	'pineapple'	si^{3}-tʃa^{3}tũʔ^{4}	'our pineapple'
	nni^{3}	'mother'	nniʔ^{4}	'our mother'

Table 27: Absence of tone raising with the 1DU enclitic

Tone	Bare/3S stem	Gloss	Inflected stem	Gloss
/4/	tʃi^{4}ɾoh^{4}	'pants'	tʃi^{4}ɾoʔ^{4}	'our pants'
	yo^{4}	'basket'	toʔ^{4}	'our basket'
/3/	kkãʔ^{3}	'corn flour'	si^{3}-kũʔ^{3}	'our corn flour'
	kĩʔ^{3}	'smell (intr.)'	kĩʔ^{3}	'we smell'
/2/	sã^{3}ʔãh^{2}	'money'	si^{3}-sũ^{2}ʔũʔ^{2}	'our money'
	ttʃeʔ^{2}	'be short'	ttʃeʔ^{2}	'we are short'
/1/	tʃi^{3}ʔi^{1}	'illness'	si^{3}-tʃi^{1}ʔiʔ^{1}	'our illness'
	ka^{1}tĩ^{1}	'be skinny'	ka^{1}tĩʔ^{1}	'we are skinny'
/43/	ɾu^{4}ne^{43}	'avocado'	si^{3}-ɾu^{4}neʔ^{4}	'our avocado'
	ya^{4}ku^{43}	'garlic'	si^{3}-ya^{4}kuʔ^{4}	'our garlic'
/32/	ko^{3}ʔo^{32}	'drink'	ko^{3}ʔoʔ^{3}	'we drink'
	na^{2}ʔneh^{3} ɾi^{3}ã^{32}	'dream (V.)'	na^{2}ʔneh^{3} ɾi^{3}ũʔ^{3}	'we dream'
/31/	mmi^{31}	'bridge'	tu^{3}miʔ^{3}	'our bridge'
	nna^{31}	'farm'	tʃi^{3}-noʔ^{3}	'our farm'
/45/	ta^{3}kĩh^{45}	'nose'	ta^{3}kĩʔ^{4}	'our nose'
	yo^{3}ʔoh^{45}	'land'	to^{3}ʔoʔ^{4}	'our land'

While there is no tone raising shown for the words in Table 27, there are surface tonal changes on stems. All stems which contain a contour tone in the final syllable undergo contour simplification to a level tone. Recall that no contour tones may surface preceding a glottal stop in Itunyoso Triqui. For each of the contour tones listed above, we can posit a general phonological rule for the 1DU which replaces the final mora on the stem with a /ʔ/ and delinks (and erases) the tone associated with it. This rule is identical in its behavior to /h/ insertion rule for the 1S clitic except for the fact that a /ʔ/ is inserted here instead. An AS representation of the rule is given in (30) for an example with tone /32/.

(30)



6 Discussion and conclusions

Itunyoso Triqui clitic morphology is characterized by lexically-specified paradigms, suppletive tonal stem allomorphy, and a large number of phonologically predictable segmental and tonal alternations. Most of the phonological processes triggered by clitics are phonologically-conditioned. For the clitics conditioning phonological changes on the stem (1S, 2S, 1DU), the stem tonal register predicts whether it will undergo tonal alternations. No tonal raising occurs on words which contain lower register tones (/2/, /1/, /13/, /32/, /31/ (derived /1/)). The only tonal alternations which surface on words with lower register tones result from either final moraic deletion of tone /32/ (→ 3h for 1S, → 3ʔ for 1DU) or from low tone spreading with the 2S clitic. These are both phonologically-predictable from the tonal type (contour, falling melody). For a subset of words with tonal melody /32/, an alternate tonal stem /2/ is used.

The remaining phonological conditions determining tonal changes on the stem are those related to the presence of either a final contour tone and the final rime type. Final contour tones undergo regular patterns of final mora deletion when the clitic contains a glottal consonant, e.g. /T_1T_2 → T_1+(h/ʔ)/. Falling tonal melodies regularly undergo low tone spreading with the 2S clitic. Finally, the presence/absence of /h/ as a final stem coda determines the set of tonal alternations a stem may undergo.

A set of phonological well-formedness conditions, couched within an autosegmental-metrical framework, account for all regular clitic-induced phonology in IT. First, the various processes of contour levelling (43 > 4+(h, ʔ), 32 > 3+(h, ʔ), 31 > 3+(h, ʔ), 45 > 4+(ʔ)) which occur with cliticization are generalized by assuming that the attachment of a glottal consonant to the final mora of the syllable results in tonal erasure. Second, the process of tonal raising with /h/ insertion for upper register tones (/3/ (+tone raising), /4/, /43/) is also derived via the general principle of leftward tonal spreading. Third, the lack of tonal alternations on unprefixed monosyllabic roots (and other processes) are captured by assuming both a strong constraint against tonal deletion on the left edge of the lexical stem

and a strong constraint specifying that a mora may only be associated to a single tone. Seen this way, it is not necessary to specify such alternations as lexeme or paradigm-specific. Were one to specify a set of all possible alternations entirely paradigmatically, one would lose the much broader phonological generalizations regarding tonal structure in the language.

However, there are also two ways in which clitic morphology in IT is not phonologically-predictable. First, certain roots undergo stem tonal alternations prior to cliticization. These tonal stems are largely suppletive in the same way as suppletive *segmental* stem allomorphs are in the language, e.g. /βeʔ^{3}/ 'house' > /tʃu^{3}k^{w}ah^{45}/ 'my house'. That is, the same suppletive stem allomorph appears before all clitics. Second, all roots with a tone /3/ melody must be specified as either tone-raising or non-tone-raising. Those within the first category undergo final syllable stem tone-raising with the 2S and 1DU clitics and with the 1S clitic if and only if they do not contain a stem-final /h/ (and therefore undergo /h/-insertion). Thus, even those roots lacking a tonal conditioning environment for tonal raising must contain the appropriate rime type for it to be produced. Paradigms for tone-raising and non-raising roots with tone /3/ are shown in Table 28.

Table 28: Raising and Non-raising tone /3/ stems in Itunyoso Triqui

	Raising stems		**Non-raising stems**	
Bare noun	(a) ya^{3}tãʔ^{3}	(b) nĩ^{3}ʔĩ^{3}	(c) tu^{3}neʔ^{3}	(d) ttãʔ^{3}
Gloss	'foam'	'know'	'tail'	'corncob'
1S	si^{3}-ya^{3}tãh^{45}	nĩ^{3}ʔĩh^{45}	tu^{4}neh^{4}	si^{4}-tãh^{4}
2S	si^{3}-ya^{3}tãʔ^{4}=reʔ^{1}	nĩ^{3}ʔĩ^{4}=reʔ^{1}	tu^{3}neʔ^{1}=reʔ^{1}	si^{3}-tãʔ^{1}=reʔ^{1}
3S.Masc	si^{3}-ya^{3}tãʔ^{3}=sih^{3}	nĩ^{3}ʔĩ^{3}=sih^{3}	tu^{3}neʔ^{3}=sih^{3}	si^{3}-tãʔ^{3}=sih^{3}
1DU	si^{3}-ya^{3}tũʔ^{4}	nĩ^{3}ʔĩʔ^{4}	tu^{4}neʔ^{4}	si^{4}-tũʔ^{4}

Paradigms (a) and (b) show stems for which an abstract tonal specification (raising) results in tone-raising in the final syllable of the stem with the 1S, 2S, and 1DU clitics. Paradigms (c) and (d) do not undergo any of these alternations and are specified as non-raising stems (though both take stem tone /4/ with the 1S and 1DU forms). While the remainder of the tonal melodies in the language undergo regular tonal alternations or non-alternations, it is only words with tone /3/ that necessitate this abstract classification.

The phonological characteristics of the stem and the set of phonological well-formedness conditions described in section 1.2 account for the clitic-specific morphology in IT. Resultingly, one can conclude that clitic morphology is not primarily paradigmatic in nature in IT. However, the phonological patterns are opaque

from the surface phonological representations which blend together suppletive tonal stem allomorphy with regular phonological constraints. Most of the suppletive stem tonal allomorphy is not triggered by specific clitics, but by person-marking as a general inflectional process. Once one accounts for these processes, the conditioning phonological environments for tonal alternations emerge. The major exception to these regularities is the ambiguous status of tone /3/, which must be specified at an abstract level as tone-raising or non-raising.

Clitic morphology varies substantially among the different Triqui variants, especially with respect to tonal alternations. However, a few shared patterns are striking. First, for most Triqui variants, bare stems with tone /3/ or with sequences containing tone /3/ will undergo processes of tone-raising with the 1S, 2S, and 1DU enclitics. The fact that tone-raising occurs with all of these enclitics for a specific tonal class suggests that tone /3/ functioned as a neutral tone at a historical stage in Triqui. Neutral tones are prone to tonal alternations because they are phonologically unspecified for tone. Adjacent floating tones on clitics are more often realized on stems with neutral tones, creating a surface-level tonal alternation on the stem's tone.

Second, for all Triqui variants, there is a tendency for lower tones to resist processes of tonal raising. The same resistance of lower register tones to tonal alternations in Itunyoso Triqui is found in Chicahuaxtla Triqui with the 1S and 1DU clitics. In Copala Triqui, tones /2/ and /1/ do not participate in any clitic-conditioned tonal alternations. While Hollenbach (1984) does not connect register to tonal alternations in Triqui morphology, she does discuss argue that tones /2/ and /1/ belong to a lower tonal register in featural terms. As I have argued here, such a distinction is useful in explaining morphological toggling and tonal alternations in Itunyoso Triqui. It may be useful in explaining these patterns in Chicahuaxtla Triqui as well.

Oto-Manguean languages present unique challenges to work on inflectional systems. Complex tonal systems and alternations result in surface phonological patterns which appear phonologically capricious. The clitic morphology of Itunyoso Triqui is neither neatly phonologically-predictable nor strictly paradigmatic, but reflects a combined system where many stem-specific alternations must be taken into account prior to an examination of the phonological alternations. As a result, an in-depth understanding of the general phonological conditions for tonal well-formedness is crucial to revealing systemic regularities in morphological tonal alternations. The separation of processes of inflectional stem-formation and clitic-induced morphology is particularly crucial in this regard. After such a distinction is made for the IT data, principled exceptions of tonal alternations remain. These can be captured by positing a distinction between abstract tone-raising roots and those which do not induce raising.

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