A Brief Introduction to Tangari Phonology[1]

BY JENNIFER HERINGTON, AMY KENNEMUR, JOSEPH LOVESTRAND, KATHRYN SEAY, MEAGHAN SMITH, AND CARLA VANDE ZANDE
Graduate Institute of Applied Linguistics Students

ABSTRACT
The present paper provides an overview of the phonology of Tangari, a previously undescribed variety of Senufo spoken in Côte d'Ivoire. Tangari has three contrastive register tones. Tone has both a lexical and a grammatical function; for example, tone is used to mark the difference between definite and indefinite plural nouns in some noun classes. Vowel harmony is a important feature of suffixes in Tangari and other Senufo languages. Vowel harmony operates in terms of the effects of stem vowels on suffixes. Debuccalization, where /g/ is realized as [ʔ], is another common morphophonemic process that occurs in noun classes. Vowel reduction appears to be a feature of fast speech in Tangari.

1. Introduction

Tangari is a variety of Senufo spoken in north-central Côte d'Ivoire. According to Gordon (2005), the Senufo subgroup of the Niger-Congo language family contains fifteen languages. Other varieties of Senufo are spoken throughout Mali, Burkina Faso, and Côte d'Ivoire.[2] The dominant Senufo variety in Côte d'Ivoire is Cebaara.[3] According to our consultant, Cebaara was spoken by the ruling family in the Senufo area and became prominent during the time of colonization.[4] In 1993, the number of Cebaara speakers was estimated to be 862,000 (Gordon 2005).

2. Suprasegmental Features

2.1 Stress and tone

Stress in Tangari most commonly falls on the initial syllable of the word. However, this stress pattern is not consistent. If the second syllable of a word contains a coda, it tends to attract stress. Stress also usually occurs on the second part of a compound word.

Stress is difficult to determine because of the similarity in realization of stress and tone, and stress is usually related to tone. Very often, stress is found on the syllable with the highest tone in any word, as shown in (1).[5] An exception to this pattern is seen in (2).

(1) /bàˈba/ [bàˈba] 'father'

(2) /ˈwòfige/ [ˈwòvige] 'something white'

Stress is non-contrastive in Tangari. No words are distinguished from each other only by their stress pattern. Rather, words with the same phonemic pattern are distinguished by tone. This probably means that stress patterns are unimportant in Tangari (Michael Cahill, personal communication).

[1] The data for this paper was collected between August and December 2008 from Pierre Soro during language learning and field methods courses at the Graduate Institute of Applied Linguistics. Soro grew up in the Ivory Coast. His parents, who are from the Tangari speaking area, highly valued speaking their native language in the home, though Soro has lived outside of the Tangari area for most of his life. He lived in predominantly Cebarra and Kafire speaking towns and is fluent in both dialects. Soro is also fluent in French and English and has studied Spanish and German in school. He currently resides in Dallas, Texas.

[2] According to our consultant, Senufo has over twenty varieties. The names of the Senufo varieties given by him are different from those in Gordon (2005).

[3] According to Mills (1984:xiv), Tangari is 93% intelligible with Cebaara.

[4] One result of this prominence is seen in the translation of the Bible into Cebaara rather than other surrounding dialects of Senufo.

[5] Mid tone is unmarked throughout the paper.

Tangari has three level tones: high, mid, and low. All three contrast in both one- and two-syllable words, as seen in tables 1 and 2. Table 2 shows tonal contrast within the same part of speech.

Table 1: Three-way Tone Contrast on One-Syllable Words

Tone Pattern	Phonemic Form	Phonetic Form	Gloss	Part of Speech
High	/kár/	[kár]	'go'	Verb
Mid	/kar/	[kar]	'meat'	Noun
Low	/kàr/	[kàr]	'turn (over)'	Verb

Table 2: Three-way Tone Contrast on Two-Syllable Words

Tone Pattern	Phonemic Form	Phonetic Form	Gloss	Part of Speech
High	/ˈfɔ́lɔ́/	[ˈfɔ́lɔ́]	'own'	Verb
Mid	/ˈfɔlɔ/	[ˈfɔlɔ]	'wither'	Verb
Low	/ˈfɔ̀lɔ̀/	[ˈfɔ̀lɔ̀]	'accept'	Verb

Tangari also has rising and falling tones; however, we suspect that these are a result of morphological processes rather than separate tonemes. For example, in (3) the stem for the word 'child' has a low tone, but when the definite Gender 1 suffix is added, the tone rises. This particular suffix carries a mid tone but is not syllabic. Therefore, the two tones combine resulting in a rising tone.

(3) /pì/ + /-w̄/ → [pw̌]
'child' 'DEF.G1S' 'the child (G1)'

Some morphemes in Tangari are distinguished by tone, while other morphemes have no specific tone attached to them. For example, the distinction between definite and indefinite on plural endings in Genders 1 and 3 is marked solely by tone. Only the plural forms mark this distinction with tone. At this time, we do not know enough about tone to understand what the tones are on these two endings, but there is a clear tonal difference. However, the meanings of some words do not change depending on tone. Our language consultant provided the example of the word *n̩d͡ʒaʔa* 'today', which can have two different tone patterns depending on the speaker, as in (4) and (5).

(4) L M M
n̩ d͡ʒa ʔa 'today'

(5) L M L
n̩ d͡ʒa ʔa 'today'

Tone also differentiates lexical items among Senufo dialects. The phrase *je jɪrɪ* means 'stand up' in Tangari when said with a low tone. When said with a high tone, the same phrase means 'get out' in Cebaara. Speakers of the two dialects make a clear distinction between the two tones.

2.2 Syllable structure

The most common syllable type is CV. The maximal syllable template is CCVC. The syllable patterns are shown in table 3.

Table 3: Syllable Structure

CV	/nò/	[nò]	'the cow'
CVC	/kar/	[kar]	'go'
CCV	/flò/	[flò]	'cry'
CV.CV	/'kò.lò/	['kòlò]	'a chair'
CCVC	/njin/	[njɪn]	'out'
CCV.CV.CV	/blà.wɛ.ri/	[blàwɛr]	'the leaf of a type of tree'
CCV.CCV.CV	/njŭ.bri.mi/	[njŭbrim]	'the brain'
CV.CVC.CV	/kǎ.gor.gi/	[kǎgorg̃]	'the tree bark'

A nasal consonant can function as a single syllable. For example, /n̩ˈdani/ 'hat' has a syllable template N.CVCV. A V syllable is also possible; however, it has only been found in loan words, as in (6), and in single-syllable auxiliaries and particles, such as (7).

(6) /àba/ [àˈba] 'father'

(7) /i/ [i] 'PRES.IMPFV'

There are restrictions on what phonemes can appear in which slots in the syllable. The simple onset is the least restricted. Any consonant phoneme can appear in this slot. The first segment of a complex onset must be an obstruent or a nasal and the second must be a liquid or a glide. The only exception is the sequence [k͡pm], the only case of a nasal in the second position of an onset. We have treated it as two underlying segments rather than one because of the asymmetry it would introduce to the consonant inventory. Also, our consultant's intuition is that an underlying vowel separates the labial-velar stop [k͡p] and the nasal [m]. Similarly, Welmers (1973:23-24) argues that in one dialect of Senari, an underlying vowel /u/ separates the two consonants /k͡p/ and /m/, and /u/ surfaces as a zero allophone.

The simple coda is restricted to nasals, liquids, and glides. The Gender 2 definite singular suffix is /-gi/ which is frequently realized as [g̃], as in /t͡ʃ̂igi/ [t͡ʃ̂ig̃] 'the tree'. This results in word-final [g] which is the only stop that occurs in the coda position. The only example of an apparent complex coda in the collected data is [kǎˈgorg̃] 'the tree bark', where [r] precedes [g̃]. This complex coda is questionable, however, due to the underlying phonemic form of the definite suffix /-gi/. Our consultant's intuition is that the underlying form of the definite suffix contains a final vowel following the consonant /g/, and this underlying vowel is deleted in the surface phonetic form.[6] In the case of [kǎˈgorg̃] 'the tree bark', the phonemic representation is /kǎˈgorgi/, and the syllable template is CV.CVC.CV. The complex coda is, therefore, found only phonetically and not phonemically. For this reason, the maximal syllable template does not include a complex coda.

3. Segmental phonemes

Tangari has twenty-four consonant phonemes and sixteen vowel phonemes.

3.1 Consonants

The consonant inventory is shown in table 4, and contrast between the consonants is illustrated in table 5.

[6] The same phenomenon is found in Senari, according to Welmers, who calls this absence of a word-final surface vowel a zero allophone (1973:23).

Table 4: Consonant Phonemes

	BL		LD		ALV		POST		PAL	VEL		LBVL		GL
Stops	p	b			t	d				k	g	k͡p	g͡b	ʔ
Affricates					t͡ʃ	d͡ʒ								
Fricatives			f	v	s	z	ʃ	ʒ						
Trill						r								
Approx./Lat.						l			j		w			
Nasals		m				n					ŋ			

Table 5: Consonant Contrasts

	#			V__V		
/p/	/pã/	[pã]	'to come'	/njɔ̃píli/	[njɔ̃píl]	'eye'
/b/	/bà/	[bà]	'father'	/bàˈba/	[bàba]	'father'
/t/	/tásangi/	[táˈsaŋ]	'bowl'	/sìtugòw/	[sìtugów]	'cat'
/d/	/dag͡ba/	[dag͡ba]	'Dagba Village'	/bòràdá/	[bòɾàdá]	'banana'
/k/	/ˈkóló/	[kóló]	'tap'	/kàkelέw/	[kàkɪlέw]	'the lizard'
/g/	/ˈgólò/	[gólò]	'chicken'	/ˈfaʔaga/	[ˈfaʔaga]	'big and light'
/k͡p/	/k͡pagi/	[k͡pagⁱ]	'the house'			
/g͡b/	/g͡bá/	[g͡bá]	'drink (verb)'	/jag͡bali/	[jag͡bal]	'the cup'
/f/	/feʔew/	[feʔew]	'ring'	/kafɛlégi/	[kafɛlégⁱ]	'wind'
/v/	/vàlăw/	[vàlăw]	'agriculture'			
/s/	/séˈd͡ʒɛnè/	[séd͡ʒɛnè]	'bird'	/gàsani/	[gàsən]	'tooth'
/z/	/zùˈnú/[7]	[zů̃ˈnů̃]	'louse'			
/ʃ/	/ʃɔ̃/	[ʃɔ̃]	'person'	/siʃàwi/	[siʃàw]	'blood'
/ʒ/	/ʒeri/	[ʒer]	'nest/fibers'			
/t͡ʃ/	/t͡ʃò/	[t͡ʃò]	'grab'	/ˈsít͡ʃɛra/	[sít͡ʃɛrə]	'four'
/d͡ʒ/	/d͡ʒò/	[d͡ʒò]	'tell'	/séd͡ʒɛnè/	[séˈd͡ʒɛnè]	'bird'
/m/	/mɔ/	[mɔ̃]	'2S'	/g͡bã̀ˈʔãmã̀/	[g͡bã̀ˈʔãmã̀]	'hard'
/n/	/ˈnɔnɔ/	[nɔ̃nɔ̃]	'milk'	/mɛ́̀nè/	[mɛ́̀nè]	'string'
/ŋ/	/ŋɔni/	[ŋɔ̃n]	'knife.DEF'			
/l/	/lɔgi/	[lɔgⁱ]	'water'	/ˈkòlò/	['kòlò]	'chair'
/r/	/rà/	[rà]	'FUT'	/korótar/	[korótar]	'eight'
/ʔ/				/ˈnjaʔana/	[njaʔana]	'day'

The distinctive features of the consonants are shown in table 8 of Appendix 1.

[7] This form is indeterminate because the vowels may be nasal in their underlying form. However, we have chosen to analyze nasalization of vowels as caused by adjacent nasal consonants; see (3.2.1).

3.1.1 Obstruents

Voiceless, aspirated stops occur in free-variation with their unaspirated counterparts, as seen in (8) and (9) (cf. (3)).

(8) /pìw/ [pʰĭw] 'the child (G1)'

(9) /pìw/ [pĭw] 'the child (G1)'

The consonant [g] occurs in complementary distribution with [g̚], as shown by Rule 1 and examples (10), (11), and (12).

Rule 1: Word Final Unrelease

/g/ → { [g̚] / ___# ; [g] / elsewhere }

(10) /kɛg/ [kɛg̚] 'the arm'

(11) /ˡgólò/ [ˡgólò] 'a chicken'

(12) /ˡkángòlò/ [ˡkáŋgòlò] 'a rock'

Although listed as phonemes, we are uncertain whether voiced fricatives are separate phonemes or allophones of their voiceless counterparts. It appears that [v] is an allophone of /f/ as a result of a morphological process. [v] is only found in three instances, all of which are derived words. They include valáw 'agriculture', nàvìgè 'white man', wòvige 'something white'. The word /fi/ 'white', appears in certain contexts with a [v] rather than a [f], as shown in (13).

(13) /ˡjafige/ [ˡjafige] 'something white'

/ˡwòfige/ [ˡwòvige] 'something white, anaphoric'

At this time, we have insufficient data to demonstrate the reasons behind this change, but see §4.2 for a possible explanation. Because of the limited occurrences of [ʒ] and [z], they are possibly allophones of their voiceless counterparts.

3.1.2 Sonorants

The phoneme /r/ has three allophones in complementary distribution: [r], [r̝], and [ɾ]. The trill becomes a flap intervocalically and is devoiced word finally, as shown in Rule 2. However, in deliberate speech, all three allophones appear as [r].

Rule 2: Trill

/r/ → { [ɾ] / V_V ; [r̝] / ___# ; [r] / elsewhere }

(14) /si͡tʃɛrɛ/ [si͡tʃɛrɛ] 'four'

(15) /deniri/ [denɪr̝] 'tree root.DEF'

3.2 Vowels

The Tangari vowel system is complex due to the number of suprasegmental features which play a part. The vowels are based on a seven vowel system, with contrastive length and nasalization as well. The sixteen vowel phonemes are shown in table 6, and contrast between the vowels is illustrated in table 7.

Table 6: Vowel Phonemes

	front	central	back
high	i		u
mid	e		o
	ɛ, ɛ̃, ɛː, ɛ̃ː[8]		ɔ, ɔ̃, ɔː, ɔ̃ː
low		a, ã, aː, ãː	

Table 7: Vowel Contrasts

	C_C		
/e/	/t͡ʃeri/	[t͡ʃer]	'skin/flesh'
/ɛ/	/t͡ʃɛr/	[t͡ʃɛr]	'cut'
/ɛ̃/	/njɛ́̃r/	[njɛ́̃r]	'pray'
/ɛː/	/ɛː/	[ɛː]	'yes'
/o/	/k͡pógi/	[k͡pógᵑ]	'drum'
/ɔ/	/k͡pɔ́gi/	[k͡pɔ́gᵑ]	'big'
	/tófɔ̃lɔ/	[tófɔ̃lɔ]	'some fathers'
/ɔː/	/tófɔ̃ːlɔ̀/	[tófɔ̃ːlɔ̀]	'the fathers'
/ɔ̃/	/k͡pmɔ́̃/	[k͡pmɔ́̃]	'hit'
/ɔ̃ː/[9]	/ɔ̃ːʔɔ̃/	[ɔ̃ːʔɔ̃]	'no'
/a/	/tari/	[taɾ]	'ground'
/ã/	/tã́r/	[tã́ɾ]	'walk'
/ãː/	/tãːri/	[tãːr]	'three'
/aː/	/raː/	[raː]	'FUT.ICPL'

The distinctive features of vowels are shown in table 9 of Appendix 1. The vowels exhibit little complementary distribution, leading to a large vowel inventory with few allophones. The phoneme /a/ occurs most frequently and follows consonants at all places of articulation. According to Welmers (1950:496), in the related language of Supyire, mid vowels are pronounced significantly higher than their French counterparts, so that they are often confused with mid-high vowels. The same pronunciation pattern seems to be true of Tangari, in that it is very difficult to distinguish [o] from [ʊ] and [e] from [ɪ].

There is some evidence of vowel reduction in casual or fast speech. The phoneme /a/ is realized as [ə] in fast speech, and /i/ frequently surfaces as [ɪ] or [ɨ]. The phoneme /e/ is also often realized as [ɪ] and [ɨ]. Although clear complementary distribution does not occur, our consultant had difficulty distinguishing between these vowels, which suggests that they are allophonic rather than phonemic. Because clear complementary distribution is not found, no rule has been written to show the relationship between these allophones.

3.2.1 Nasalization

Nasalization occurs on all vowels, but on [-ATR] vowels it is conditioned by a nasal consonant. Further investigation is needed in order to determine specific patterns of nasalization. The phonemes /i/,

[8] No examples of this phoneme are found in our current data. However, it is included for the sake of symmetry. This sound should appear in further study.

[9] Though the example given here is tenuous, this sound is also expected to maintain symmetry. Further study should reveal more examples.

/u/, /e/, and /o/ are only nasalized when preceded or followed by a nasal consonant. Cebaara has contrastive nasalization on the /i/ and /u/ phonemes (Mills 1984:92); it is possible that further study will reveal a similar pattern in Tangari, but as yet we have no evidence to that effect. However, /ɛ/, /ɔ/, and /a/ are nasalized both in environments without a nasal consonant and in environments with a nasal consonant. Clear contrast occurs between nasalized and non-nasalized low vowels, as seen in (16).

(16) /tar/ [tar] 'ground' /tã́r/ [tã́r] 'walk'

3.2.2 Length

[-ATR] vowels also contrast in length, as is seen in (17).

(17) /tã́r/ [tã́r] 'walk' /tãːr/ [tãːr] 'three'

Other vowels may be phonemically long, as in Cebaara, where all mid, low-mid, and low vowels show contrastive length (Mills 1984:92). Our data contains two examples of [oː] in the words *ʃoː* 'buy.IMPFV' and *t͡ʃɛ̀t͡ʃoː* 'Checho'; however, both were found in context, and are, therefore, most likely the result of vowel assimilation across morphological boundaries, where each one is followed by the particle [i]. If [oː] is phonemically long, then the absence of [eː] is a significant gap in the data. Length could be analyzed as two separate vowels with both negative and positive consequences. The vowel inventory would be significantly reduced if all lengthened vowels were considered geminates of the same vowel. Also, analyzing long vowels as geminates would allow contour tones to be analyzed as two level tones on adjacent vowels in most cases.

Alternately, length as two adjacent vowels creates an additional syllable template, either VC or CVVC, both of which would have very restricted distribution. Only two identical vowels would be allowed next to each other. In the case of a VC syllable type, the vowels would have to be identical across syllable boundaries, and in the case of a CVVC syllable type, the two vowels in the heavy syllable would have to be identical. Also, glides which have been analyzed as consonants would have to be reconsidered as to whether they are consonants or vowels. This paper considers long vowels as phonologically long rather than geminate vowels.

4. Phonological processes

Most of the morphological complexity in Tangari occurs on nouns. Due to the limited data collected, the morphophonemic processes described are the result of tentative analyses.

4.1 Nasal assimilation

Nasal consonants assimilate across morpheme boundaries. In Rule 3, the underlying nasal is posited as /n/ because the only example of a stem ending in a nasal consonant is *séd͡ʒɛn* 'bird'which ends in /n/. Since no other nasal consonants have been found stem-final, /n/ is considered the underlying form. We suspect that the same process occurs with other nasal stems but cannot demonstrate these changes at this time. Example (18) shows the phonological process of /n/ changing to [ŋ] at a morpheme boundary. When the indefinite plural suffix, which begins with /g/, is added, the final /n/ of the stem *séd͡ʒɛn* 'bird' changes to the allophone [ŋ].

Rule 3: Nasal Assimilation Rule:

/n/ → [α place] / ___ [C]
[α place]

(18) /séd͡ʒɛn/ + /-gèlè/ → [séd͡ʒɛŋgèlè]
'bird' '-DEF.G3P' 'the birds (G3)'

4.2 Voicing

According to Carlson (1994), the nominalization process in Supyire is caused by the addition of a nasal consonant before the verbal form of a word. Though this process does not occur in Tangari, it appears that voicing is conditioned by nasalization. Consonants tend to become voiced following a

nasalized vowel, as in (19). Because of the infrequency of the phoneme /v/, it seems likely that it is an allophone of /f/, in which case such a process would be a strong possibility.[10]

(19) /nã/ + /fi/ + /-gV/ → [nãvige]
'man' 'white' '-INDEF.G2S' 'a white man (G2)'

Other instances of voicing following a nasal vowel give further credence to this analysis, as in (20).

(20) /nã/ + /-pi/ + /-li/ → [nãbíl]
'man' 'small' '-DEF.G3S' 'the boy (G3)'

Voicing can also take place at morpheme boundaries in compound words, as seen in (21). The phoneme /k͡p/ in the word *k͡pɛ̌l* 'stick.DEF.G3S' is voiceless when the word appears alone, but voiced in a compound word.

(21) /bwɔ/ + /k͡pè/ + /-li/ → [bwɔg͡bel]
'bench' 'stick' '-DEF.G3S' 'the bench slat (G3)'

However, in some cases this process does not take place. In the compound word in (22), the /f/ remains voiceless. At this time, it is unclear when voicing occurs.

(22) /t͡ʃé/ + /fi/ + /-gV/ → [t͡ʃéfige]
'woman' 'white' '-INDEF.G2S' 'a white woman (G2)'

4.3 Vowel harmony

Vowel harmony is a significant feature of suffixes in Tangari and other Senufo languages. Following Carlson (1994), the indefinite suffixes are listed with empty V slots. Vowel harmony operates in terms of the effects of stem vowels on suffixes. If the last vowel of the stem is /e/, as in (23), then the indefinite suffix vowel will surface as [e]. The same is seen in (24) and (25) for the vowels /o/ and /a/. Notice in (25) that the nasalization carries over as well.

(23) /feʔe/ + /-wV/ → [feʔewe]
'ring' '-INDEF.G1S' 'a ring (G1)'

(24) /plo/ + /-wV/ → [plowò]
'slave' '-INDEF.G1S' 'a slave (G1)'

(25) /nã/ + /-wV/ → [nãwã̀]
'scorpion' '-INDEF.G1S' 'a scorpion (G1)'

One exception to this pattern is the vowel /i/, which does not condition another [i] in the suffix. Rather, the vowel surfaces as the close-mid [e], as seen in (26) and (27).

(26) /t͡ʃi/ + /-jV/ → [t͡ʃije]
'tree' '-INDEF.G2P' 'trees.INDEF.G2P'

(27) /njɔpi/ + /-lV/→ [njɔpìlè]
'eye' '-INDEF.G3S' 'eye.INDEF.G3S'

Grammatically, this change functions to distinguish the indefinite suffixes from the definite suffixes, which all end with /-i/. Phonologically, this may be due to the fact that the final vowel of the stem is a high vowel, according to Cahill. It is possible that every feature of the vowel is copied except [+high] (Michael Cahill, personal communication). Instead, in stems that end with [u], the vowel in the suffix appears as [o], as in (28).

[10] See §3.1.1.

(28) /sìtu/ + /-gV/ → [sìtugò]
'cat' '-INDEF.G2S' 'a cat (G2)'

Both the Gender 2 and Gender 3 indefinite suffixes follow this pattern. Though unlikely, it could be asserted that this is a case of /j/ or /l/ blocking vowel harmony. Examples (29) and (30) demonstrate why this is unlikely. The suffix vowel in *lò-jò* 'some water (G2)' harmonizes across the /j/, and the suffix vowel in *jag͡ba-la* 'a cup (G3)' harmonizes across the /l/.

(29) /lò/ + /-jV/→ [lòjò]
'water' '-INDEF.G2P' 'some water (G2)'

(30) /ja'g͡ba/ + /-lV/→ [ja'g͡bala]
'cup' '-INDEF.G3S' 'a cup (G3)'

4.4 Vowel laxing

A frequent change in vowel quality occurs when /i/ is realized as [ɪ]. This process was discussed briefly in §3.2 where it was stated that the language consultant, who is linguistically trained, had difficulty distinguishing between the two sounds—a strong sign that they are allophonic in his mother-tongue. The most prominent example of this change occurs in the first person singular pronoun /mi/ which frequently appears as [mɪ] in fast speech, as seen in (31).

(31) [d͡ʒói] [m̩=] [mɪ] [k͡pmɔ̃]
'Joey' 'PAST.PFV' '1S' 'hit'
'Joey hit me.'

One example of vowel laxing within word boundaries is illustrated by the change in the vowel quality in /t͡ʃi/ 'tree' when it is compounded with another word. When said in isolation, as in (32), the /i/ is realized as [i]. However, when the word is compounded, as in (33), the /i/ laxes to [ɪ].

(32) /t͡ʃi/ + /-gi/ → [t͡ʃigˈ]
'tree' '-DEF.G2S' 'the tree (G2)'

(33) /bla/ + /t͡ʃi/ + /-gi/ → [bla d͡ʒɪgˈ]
'blam.flower' 'tree' '-DEF.G2S' 'the blam flower tree (G2)'

4.5 Deletion

The definite and indefinite suffixes for Gender 3 singular nouns are /-li/ and /-lV/ respectively. However, when the suffix is added to a word with an underlying final /n/, the /l/ deletes. In (34) and (35), the /l/ deletes in both the definite and indefinite suffixes. Furthermore, /l/ never appears after /n/ in any context.

(34) /ŋɔ̃n/ + /-li/ → [ŋɔ̃n]
'knife' '-DEF.G3S' 'knife.DEF.G3S'

(35) /ŋɔ̃n/ + /-lV/ → [ŋɔ̃nɔ̃]
'knife' '-INDEF.G3S' 'knife.INDEF.G3S'

Note that the /n/ is part of the underlying stem. It is not inserted, nor is it an allophone of /l/. Example (36) demonstrates that even when the plural suffix, which does not begin with /l/, is added, the /n/ remains.

(36) /ŋɔ̃n/ + /-gèlè/ → [ŋɔ̃ŋgìlè]
'knife' '-DEF.G3P' 'the knives (G3)'

A similar process may take place in which /n/ causes /g/ to delete at a morpheme boundary as illustrated in (37) and (38), where the adjectival /t͡ʃɛn/ 'beautiful' in (38) is compounded with a noun and the final /-gi/ suffix is no longer prounounced. In (37), the adjectival /t͡ʃ̃ɛn/ 'beautiful' does not occur and the suffix /-gi/ appears in the surface form. In (38), however, /t͡ʃ̃ɛn/ 'beautiful', which ends in /n/, occurs, and the /-gi/ suffix does not appear, a possible case of deletion.[11]

(37) /kor/ + /k͡po/ + /wɔ/ + /-gi/ → [kork͡powɔgˈ]
'chair' 'big' 'black' '-DEF.G2S' 'the big black chair (G2)'

(38) /kor/ + /k͡po/ + /wɔ/ + /t͡ʃ̃ɛn/ + /-gi/ → [kork͡powɔt͡ʃ̃ɛn]
'chair' 'big' 'black' 'beautiful' '-DEF.G2S' 'the big black beautiful chair (G2)'

However, when the plural definite suffix /-j/ is added, the nasal is deleted rather than the /-j/, as seen in (39). Note that the final vowel remains nasalized.

(39) /kork͡powɔt͡ʃ̃ɛn/ + /-j/ → [kork͡powɔt͡ʃ̃ɛ̃j]
'chair.big.black.beautiful' '-DEF.G2P' 'big black beautiful chairs.DEF.G2P'

Example (39) is the only example in the data that shows a Gender 2 word ending in a nasal. However, several other examples of Gender 3 nouns end in nasals. It is possible that /kork͡powɔt͡ʃ̃ɛn/ is actually G3 and underlyingly has a deleted /-l/ suffix rather than a /-g/ suffix. Some of the other data collected shows an alveolar nasal assimilating in place of articulation to the velar stop of the Gender 2 ending. Evidence that nasal assimilation occurs before the deletion of /g/ is seen in the derivation in (40) where *tásàn* 'bowl'is realized as *tásàŋ* in Gender 2.

(40) Underlying Form: /tásàn/+/-gi/
Nasal Assimilation Rule: tásàŋg
Deletion Rule: tásàŋ
Phonetic Representation: [tásàŋ] 'bowl-DEF.G2S'

4.6 Vocalization

One example shows a glide changing to a vowel. The definite suffix /-w/ is realized as [u] following *zel* 'first'. In this case, the consonant must vocalize to fit syllable restrictions forbidding a coda containing two approximants. The process is shown in example (41).

(41) /fàʔàfo/ + /zel/ + /-w/ → [fàʔàfozelu]
'king' 'first' '-DEF.G1S' 'the first king (G1)'

4.7 Debuccalization /g/ → [ʔ]

Another common morphophonemic process that occurs with noun class suffixes is the loss of all the place features of the velar stop /g/ when it occurs between two identical vowels, as shown in Rule 4 and examples (42), (43), and (44).

Rule 4: Debuccalization Rule:

/g/ → [ʔ] / V ___ V
[α FT] [α FT]

[11] Some uncertainty remains about this example, since it is the only occurence of this process in the data. One possibility is that the noun is actually in Gender 3 and an /-l/ is deleted (see (34), above). This may also be the result of a transcription error or a speech error.

(42) /ke/ + /-gV/ → [keʔe]
'arm' '-INDEF.G2S' 'an arm (G2)'

(43) /bojò/ + /-gV/ → [bojòʔò]
'pig' '-INDEF.G2S' 'a pig (G2)'

(44) /k͡pa/ + /-gV/ → [k͡paʔa]
'house' '-INDEF.G2S' 'a house (G2)'

Debuccalization does not occur when the vowels are different, as in (45). This is seen most prominently when the vowel in the stem is /i/ and the vowel harmony rule changes the suffix /-gV/ into [-ge].

(45) /t͡ʃi/+ /-gV/ → [t͡ʃige]
'tree' '-INDEF.G2S' 'a tree (G2)'

It is also blocked by any other consonant next to the /g/ as in (46).

(46) /kàngor/+ /-gV/ → [kàŋgorgò]
'tree.bark' '-INDEF.G2S' 'a tree bark (G2)'

Steve Parker (personal communication) points out that the change from a voiced stop to a glottal stop would be a very rare phonological process. Since there is already a voicing rule in the phonological processes, the underlying form of the suffix /-gV/ may be /-kV/. The underlying voicelessness could be extended to parallel suffixes as well. This hypothesis would give a more natural picture of what is happening in Tangari phonology by positing that the underlying /k/ either becomes a voiced /g/ or a glottal stop. This hypothesis would also require that the /k/ → [ʔ] debuccalization rule be ordered before the voicing rule. The derivation in (47) shows the rule ordering that would occur in order for the underlying phoneme /k/ to appear as [ʔ] between identical vowels and [g] elsewhere.

(47) Underlying Form: /k͡pa/ + /-kV/
Debuccalization Rule: k͡paʔa
Voicing Rule: ----
Phonetic Representation: [k͡paʔa] 'house-INDEF.G2S'

Underlying Form: /k͡pa/ + /-kV/
Voicing Rule: k͡paga
Debuccalization Rule: ----
Phonetic Representation: *[k͡paga]

4.8 Tone patterns

Tone is assigned to most morphemes including bound roots, clitics, and suffixes. As noted in §2.1, some morphemes are not assigned a specific tone pattern; however, these are exceptions. Many tone languages have toneless suffixes, such as the neighboring language Supyire (Carlson 1994:43), but it seems that in Tangari this is not the case. The various endings which designate gender each have a specific tone assigned. For example, the Gender 1 definite suffix appears to carry a mid tone, as in (48), and the indefinite suffix in all genders appears to have a low tone, as in (49). What occurs in these two examples seems to be the underlying form of the tone appearing also on the surface, though tones are often changed in the surface form as will be seen in (51).

(48) M M M
/pɔ̃/ + /-w/ → [pɔ̃w]
'dog' '-DEF.G1S' 'the dog (G1)'

(49) M L M.L
/pɔ̃/ + /-wV̀/ → [pɔ̃wɔ̀̃]
'dog' '-INDEF.G1S' 'a dog (G1)'

The tone system on two-syllable suffixes is more difficult to determine. Shown here are the most typical tone patterns which we believe to be the underlying tone patterns. The definite plural suffix is ML, as in (50), and the indefinite plural suffix is MM, as in (51).

(50) M M.L M.M.L
/pɔ̃/ + /-belè/ → [pɔ̃belè]
'dog' '-DEF.G1P' 'the dogs (G1)'

(51) M M.M M.M.M
/pɔ̃/ + /-bele/ → [pɔ̃bele]
'dog' '-INDEF.G1P' 'some dogs (G1)'

All the factors which change tone patterns have not been determined; however, a few seem clear. Tangari has restrictions on tone patterns. For example, mid tones rarely occur in patterns of only two mid tones. Either only one mid tone occurs, or three mid tones occur. There are a few exceptions to this pattern, but generally it holds true. Conversely, three low tones rarely occur together. Exceptions occur here as well, as seen in (52). In most cases, a mid tone usually separates the low tones.

The addition of other morphemes to a word often changes the tone pattern as well. For example, in the word 'dog' /pɔ̃/ as shown in (51) above, the addition of 'white' to the compound noun changes the surface tone pattern When morphemes are combined into words, the tones often change in the surface form, as in (52).

(52) /M/ /L/ /M.M/ [M.L.L.L]
/pɔ̃/ + /-fì/ + /-bele/ → [pɔ̃vìbèlè]
'dog' 'white' '-INDEF.G1P' 'some white dogs (G1)'

Our consultant's attempt to reproduce a two-syllable suffix offers evidence of the difference between underlying tones and their surface forms. We recorded a noun with the suffix in question and isolated the suffix. Our consultant then attempted to repeat only the suffix just as he had produced it on the recording. However, he was unable to accurately reproduce the tone pattern. Though these phonetic changes are certainly taking place, we have yet to discover the rules governing them.

5. Phrase level phonology

Several words in Tangari cliticize to adjacent words and exhibit various phonological processes including nasal assimilation, laxing, and elision of vowels. The words that most clearly exhibit this behavior are pronouns and auxiliaries.

In (53) and (54) the auxiliary /i/ 'PRES.IMPFV' is phonetically indistinguishable from the previous word. It assimilates completely to the preceding vowel, which then becomes long.

(53) /t͡ʃét͡ʃò i wíjɛ̀ k͡pmɔ́/
[t͡ʃét͡ʃòː wíjɛ̀ k͡pmɔ̃́]
Checho PRES.IMPFV 3.G1S.REFL hit
'Checho is hitting herself.'

(54) /pĭw i lí/
[pĭw u lí]
child-DEF.G1S PRES.IMPFV eat
'The child is eating.'

6. Conclusion

Tangari is a tonal language in which stress plays little part. Nasalization and length are both contrastive on low-mid and low vowels. The language exhibits interesting phonological and morphophonemic processes primarily in relation to noun morphology. Significant processes include vowel harmony in gender suffixes and vowel reduction in fast speech. Debuccalization of the velar stops is also a noteworthy feature of the language. Tone is a suprasegmental feature which needs more investigation.

Appendix 1: Distinctive Features

Table 8: Distinctive Features of Consonants

	p	b	t	d	k	g	k͡p	g͡b	f	v	s	z	ʃ	ʒ	t͡ʃ	d͡ʒ	m	n	ŋ	l	r	j	w	ʔ
voice	–	+	–	+	–	+	–	+	–	+	–	+	–	+	–	+	+	+	+	+	+	+	+	–
sonorant	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+	+	+	+	+	+	+	–
continuant	–	–	–	–	–	–	–	–	+	+	+	+	+	+	–	–	–	–	–	–	+	+	+	–
nasal	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+	+	+	–	–	–	–	–
LABIAL	•	•					•	•	•	•							•						•	
round	–	–					–	–	–	–							–						+	
CORONAL			•	•							•	•	•	•	•	•		•		•	•			
lateral			–	–							–	–	–	–	–	–		–		+	–			
anterior			+	+							+	+	–	–	–	–		+		+	+			
strident			–	–							+	+	+	+	+	+		–		–	–			
distributed			–	–							–	–	+	+	+	+		–		–	–			
DORSAL					•	•	•	•											•			•	•	
high					+	+	+	+											+			+	+	
low					–	–	–	–											–			–	–	
back					+	+	+	+											+			–	+	

Table 9: Distinctive Features of Vowels

	i	e	ɛ	ɛ̃	ɛː	ɛ̃ː	u	o	ɔ	ɔ̃	ɔː	ɔ̃ː	a	ã	aː	ãː
nasal	–	–	–	+	–	+	–	–	–	+	–	+	–	+	–	+
round	–	–	–	–	–	–	+	+	+	+	+	+	–	–	–	–
high	+	–	–	–	–	–	+	–	–	–	–	–	–	–	–	–
low	–	–	–	–	–	–	–	–	–	–	–	–	+	+	+	+
back	–	–	–	–	–	–	+	+	+	+	+	+	+	+	+	+
ATR	+	+	–	–	–	–	+	+	–	–	–	–	–	–	–	–

List of abbreviations

ALV: alveolar
BL: bilabial
DEF: definite
FT: all features
FUT: future
G1: Gender Class 1
G2: Gender Class 2
G3: Gender Class 3
G4: Gender Class 4
G5: Gender Class 5
GL: glottal
H: high tone
ICPL: incompletive
IMPFV: imperfective
INDEF: indefinite
L: low tone
LBVL: labial-velar
LD: labiodental
M: mid tone
NOM: nominalizer
P: plural
PAL: palatal
PAST: past
PFV: perfective
POST: postalveolar
PRES: present
REFL: reflexive
S: singular
VEL: velar

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