

Máíhǎ̀kì tone in comparative Tukanoan perspective

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Abstract

This paper describes the tonal system of Máíhìkì (ISO-639: ore), a Western Tukanoan language, and compares it to the prosodic systems of other Tukanoan languages. Máíhìkì exhibits two contrastive surface tones, H and L, and morphemes (which are canonically bimoraic) are underlyingly specified for tone only on their leftmost morpheme, with many morphemes (including roots) being tonally unspecified. All underlying tones are realized on the surface, and spread to the right edge of the morphemes with which they are associated. If necessary, an additional H tone is assigned to a tonally-unspecified mora to yield as left-aligned an HL contour as possible, with L being subsequently assigned to any remaining tonally unspecified moras. This pattern resembles the H obligatoriness found in several Eastern Tukanoan languages and in Koreguaje, the only other Western Tukanoan language described as tonal. However, unlike recently-analyzed Eastern Tukanoan languages, Máíhìkì neither exhibits a mixed stress-tone system nor does the assignment of tone depend on metrical structure. An analysis of the Máíhìkì tonal facts is presented that does not depend on either contour tones or extra-tonality, unlike recent analyses of Eastern Tukanoan languages, but does make reference to the previously-mentioned tonal target.

Keywords: Máíhìkì, Orejón, Tukanoan, Amazonia, tone, stress, prosody

1 Introduction

This paper provides a thorough description and analysis of the tonal system of Western dialect of Máíhìkì (ISO-639: ore),¹ a little-described Western Tukanoan language of northern Peruvian Amazonia, and compares the tonal system of this language to the better known ones of the Eastern branch of the family, in order to improve our understanding of the

¹This language is better known in the literature as *Orejón* (lit. ‘big ear’, Sp.), a name that speakers of Máíhìkì deem pejorative. They prefer that others employ the established autonym *Máíhùnà* (lit. ‘people’). The Máíhùnà name for their language is *Máíhìkì* (lit. ‘people’s speech’ or ‘our speech’), although many Máíhùnà also refer to the language with the ethnonym when speaking with non-Máíhùnà.

characteristics broadly shared by the tonal systems of Tukanoan languages, and the ways in which tonal systems of the Eastern and Western branches differ.

The Máíhîkî tonal system presents several interesting characteristics in light of current approaches to analysis of Tukanoan prosodic systems. Tukanoanists have disagreed, for example, whether these systems should be analyzed as pitch-accent systems (Barnes 1999), as mixed stress-tone systems, or restricted tone systems (Chacon 2012, Gomez-Imbert 2001, Stenzel 2004). The seeds of this debate lie in the fact that these languages tend to exhibit low-density tone systems² that show obligatoriness and/or culminativity effects reminiscent of stress languages, leading to disagreement over whether these systems are best analyzed as tonal or (pitch) accent languages (cf. Hyman 2006). The Máíhîkî system is more prototypically tonal than those of Eastern Tukanoan languages, exhibiting greater tonal density, and weaker constraints on tonal obligatoriness and culminativity.

Of interest to the broader issue of the analysis of Tukanoan prosodic systems, we advance an analysis of the Máíhîkî tonal system that does not rely on contour tones, unlike more recent analyses of Eastern Tukanoan languages, and instead relies on level tones and a process of high tone insertion that makes reference to a violable requirement that words exhibit a high-low tone contour aligned with the left edge of the word. We show that this analysis explains a number of features of the Máíhîkî tonal system, including the tonal inventory of nominal and verbal roots, and the distribution of spreading and non-spreading high tones, which must be stipulated under a contour analysis. We also show that a contour analysis requires additional stipulations to account for the tonal behavior of serial verbs in Máíhîkî, diminishing the parsimony of such an analysis for this language.

Comparison of Máíhîkî with Eastern Tukanoan languages also reveals a number of themes that re-appear in varying form among the languages of the family, including processes of tonal erasure, where only the leftmost morpheme of a word retains its underlying tones, and constraints that require or constrain certain tonal contours. Máíhîkî also differs markedly

²That is, tone systems in which the number of syllables in any given word with underlying tonal specifications is relatively low.

from Eastern Tukanoan languages in certain respects, especially in that there is no evidence of a stress system in the language.

The TBU in Máíhǎ̀kì is the mora, which can bear underlying H or L, or be unspecified for tone. There is no evidence of stress in the language (such as the rhythmic lengthening found in Tukanoan languages exhibiting mixed stress-tone systems like Kubeo (Chacon 2012: 156-159). All syllables surface as H or L, with H and L spreading from left to right within morphemes. Principles of default tone assignment to $\emptyset$ -tones syllables militate to produce an HL contour as close to the left edge of the word as possible without altering surface tones derived from underlying tones. Máíhǎ̀kì exhibits two tonal subsystems: a ‘verbal’ system that applies to a significant subset of finite verbs, and a ‘nominal’ system that applies to all remaining word classes, including nouns. The nominal system is distinguished from the verb one by tonal erasure, which applies to all non-initial morphemes, and limits the word to at most one HL contour. The verbal system also exhibits spreading of underlying H to inflectional suffixes, which is not found in the nominal system.

This paper is based on fieldwork carried out by the authors as part of the Máíhǎ̀kì Project, a multi-year collaborative project to document and describe Máíhǎ̀kì, develop materials to support language preservation and revitalization in Máíhùnà schools, and support home-based language revitalization efforts. This paper describes the tonal system of the Western dialect and is based on work by the authors and colleagues with speakers of that dialect in the community of Nueva Vida during summer field seasons from 2010 to 2012.

The analysis presented in this paper builds on [removed for anonymous review] initial analysis of the Máíhǎ̀kì tonal system, which was refined by [removed for anonymous review] in collaboration with [removed for anonymous review]. The sole prior discussion of Máíhǎ̀kì tone is found in Velie (1975: 7) and Velie et al. (1976: 10), which briefly describe the inventory of root tone patterns.

The remainder of the paper is organized as follows: §2 provides basic sociolinguistic and linguistic background relevant to the description of the Máíhǎ̀kì tonal system, while

§3 provides the basic description of the surface tonal patterns found in the language. §4 presents our analysis of the tonal system, and in §5 we compare this analysis and the basic surface tonal patterns of the language to those of other Tukanoan languages. We present a brief discussion and conclusion in §7; Appendix A provides data on attested tone shapes in the languages in terms of the suffixal classes described earlier in the paper.

2 Background

2.1 Sociolinguistic Background

Speakers of Máíhìkì (lit. ‘people’s speech’ or ‘our speech’) refer to themselves as *Máíhùnà* (lit. ‘people’), deprecating the term *Orejón* (of Spanish origin) both as an ethnonym and as a name for their language. There are approximately 100 fluent speakers of Máíhìkì, out of an ethnic population of approximately 400, who are distributed among four Máíhùnà communities: Nueva Vida, Puerto Huamán, Tótoya, and Sucusari, and the multi-ethnic town of El Estrecho, located near the community of Tótoya, on the Peruvian side of Peruvian-Colombian border.

There are three major geographically-delimited dialects of Máíhìkì: the Western dialect, spoken in the communities of Nueva Vida and Puerto Huaman, which are both located on the Yanayacu River (a tributary of the Napo River), the Eastern dialect, spoken in the community of Sucusari, located on the Sucusari River (a tributary of the Napo River, located downriver of the Yanayacu River), and the Northern dialect, spoken in the community of Tótoya, located on the Algodón River (a tributary of the Putumayo River), and among migrants to El Estrecho (located on the Putumayo River). This paper focuses exclusively on the tonal system of the Western dialect.

Most fluent speakers of Máíhìkì are 50 years of age or older, although there are a small number of younger speakers, especially in the community of Totoya. Younger Máíhùnà exhibit a wide spectrum of active and passive fluency.

2.2 Linguistic Background

The Máíhìkì phonemic inventory includes 12 phonemic consonants (shown in Table 1) and 6 phonemic vowels (shown in Table 2).

	Bilabial	Alveolar	Postalveolar	Velar	Glottal
Voiceless Stop	p	t		k, k ^w	
Voiced Stop	b [b, β, m]	d [d, ɾ, n]		g [g, ɣ], g ^w [g ^w , ɣ ^w]	
Voiceless Affricate			tʃ [tʃ, ʃ]		
Voiced Affricate			dʒ [dʒ, j, ɲ]		
Fricative		s [ts, s]			h

Table 1: Máíhìkì Phonemic Consonant Inventory

	Front	Central	Back
High	i [i, ĭ]	ɨ [ɨ, ĥ]	u [u, ũ]
Mid	e [e, ě]		o [o, õ]
Low		a [a, ǎ]	

Table 2: Máíhìkì Phonemic Vowel Inventory

Surface nasal consonants (*m*, *n*, *ɲ*), and nasal vowels arise due to the docking of a morpheme-level nasal feature to leftmost nasalizable consonant (b, d, y) and subsequent morpheme-internal non-local consonant harmony or, by docking to the leftmost vowel if there are no nasalizable consonants in a morphem, followed local vowel harmony (Sylak et al., in prep.). As a result of this harmony process either the only nasalizable consonant, or both nasalizable consonants, in a morpheme may nasalize, or only the leftmost vowel (or vowel cluster), if there are no nasalizable consonants in the morpheme. Nasal harmony does not affect heteromorphemic nasalizable consonants or vowels. Morpheme-level nasalization has been posited for most Tukanoan languages (Gomez-Imbert 1993 :242), but nasal harmony is restricted in Máíhìkì in comparison to most Tukanoan languages, since nasal harmony does not affect all segments in a given morpheme.

We have thus far found no segmental or prosodic phenomena that require that we posit the existence of syllables as such in Máíhìkì. The language exhibits no consonant clusters.

Verb roots exhibit a bimoraic minimum size requirement, but nominal roots exhibit no such restriction.

Verbal morphology in Máìhǎ̀kì is exclusively suffixing, although the language exhibits productive serialization in which complex stems are formed with two or – much more rarely – three verb roots. The only obligatory suffix on the verb is a highly syncretic verb-final inflectional suffix that expresses person, number, gender, mood, and tense (Michael 2012b). Other suffixes born by finite verbs include negation (*-má*), a causative (*-gopɔ*), a benefactive applicative (*-kai* ~ *-ka* ~ *-kani*) two frustratives (*-pia* and *-da*), a telic Aktionsart suffix (*-hǎ́*), a universal verbal quantifier (*-sao*), and several quasi-aspectual suffixes including the prioritive (*-suba*), the terminative (*-tǎi* ~ *-tǎ* ~ *-tǎni*), the initiative (*-bio*). Of the verbal suffixes, only the verb-final inflectional suffix and the ‘frustrative of intent’ *-da*, which immediately precedes it, have fixed positions (Farmer 2012). Of the remaining suffixes, order is determined by semantics, where the suffix to the left has scope over the suffix to the right.³ Máìhǎ̀kì speakers are generally averse to placing more than two non-inflectional suffixes on a verb, generally opting for analytical constructions involving subordinated verbs rather than highly morphologically complex verbs.

Nominal morphology is suffixing, with the exception of a closed set of prefixes which express stative properties including color, dimension, age, and evaluation (i.e. ‘good’ and ‘bad’). Nominal suffixes include two plural suffixes and a large set of classifiers.

3 Surface tonal generalizations

Máìhǎ̀kì distinguishes two surface tones, H and L, which can be appreciated by contrasting the monomoraic forms in (1) and (2) and the bimoraic forms in (3) and (4).

- (1) a. *má* ‘macaw, *Ara spp.*’
 b. *mà* ‘path’

³For example, both the orders *ábí-sàò-má-hǎ́* ‘not everyone bathed’ and *ábí-má-sàò-hǎ́* ‘everyone didn’t bathe’ are attested.

- (2) a. *ké* ‘which (interrogative word)’
b. *kè* ‘that (demonstrative)’
- (3) a. *násó* ‘Woolly Monkey, *Lagothrix lagothericha*’
b. *nàsò* ‘*apacharama*, *Hirtella sp.*’
- (4) a. *tótò* ‘clay’
b. *tòtò* ‘Brazilian porcupine, *Coendou prehensilis*’

The Máíhǎ̀kì tone system exhibits two subsystems, one that assigns tone to a major subset of finite verbs, and a second one that assigns tone to words of all other classes, and in particular, nouns. We refer to the first subsystem as the *verbal tone* system and the second subsystem as the *nominal tone* system. As will become apparent, a significant fraction of finite verbs actually exhibit ‘nominal’ tone behavior, which is probably attributable to the fact that several finite verbal inflections were historically nominalizers.

3.1 Verbal tone

The surface tonal pattern of morphologically complex Máíhǎ̀kì verbs is predictable wholly on the basis of knowledge of: 1) the tonal pattern of the verb root; and 2) the class membership of the morphemes to its right.⁴

For purposes of tone assignment, we distinguish four classes of suffixes: 1) Class I suffixes, which always exhibit a surface high tone in regular declarative present tense and past tense paradigms⁵; 2) Class II suffixes, which always exhibit the same tone as the final tone of immediately preceding roots or Class I suffixes (but not, crucially, Class III suffixes); 3) Class III suffixes, which surface with either H or L tones, depending on whether a H tone

⁴Typically the latter morphemes are suffixes, but in the case of serial verbs, may include verb roots as well.

⁵In interrogative mood paradigms of all tenses, and future tense paradigms (i.e. both declarative and interrogative) Class I suffixes behave like Class III suffixes. As will become clear, this particular behavior can be explained as a result of verbs of these paradigms exhibiting nominal tonal behavior, a fact we attribute to the fact that the inflectional suffixes in these paradigms were historically nominalizers.

appears anywhere to their left in a word; and 4), the causative, which exhibits idiosyncratic tonal behavior.

We begin with a description of the tonal properties of roots, and turn to the suffix classes. Note that in addition to the examples provided in this section, words exemplifying the possible tone patterns for all combinations of root and suffix tone patterns are given in Appendix A.

Roots surface with one of three tonal patterns: HH, HL, or LL; LH roots are not attested in the language. In (5) we exemplify the three verb root patterns; the inflected verbs in these examples consist of a root and the first person present tense suffix *-yi*,⁶ a Class II suffix that, like all members of its class, appears with the same tone as the mora immediately to its left.^{7,8} HH roots and LL roots, as in (5a) and (5c) respectively, are tonally invariant, but HL roots, as in (5b), exhibit more variable behavior, as we discuss in greater detail below. Forms like that (5b) lead us to consider the mora to be the TBU in Máíhîkî.

(5) a. béóyí

béó *-yi*
sleep.with.child -1sg.PRES
'I am sleeping with a child.'

b. bèòyì

beo *-yi*
lie.in.hammock -1sg.PRES
'I am lying in a hammock.'

c. bèòyì

⁶Because of the syncretism exhibited by this inflectional suffix, this is somewhat of an oversimplification, as is the case with the glosses given for a number of inflectional suffixes in this paper. The reader is referred to Michael (2012b) for clarification.

⁷The first line of each example provides a surface tonal representation for the word or words, while the morphologically segmented line provides the underlying tones according to the analysis we develop below.

⁸The following abbreviations are employed in the morpheme gloss line: feminine: fem; first person: 1; causative: CAUS; classifier: CL; frustrative of intent: FRUS; imperative: IMPER; interrogative mood: INTERROG; masc: masculine; negation: NEG; past tense: PAST; pluractional telic: PLURACT.TELIC; present tense: PRES; prioritive: PRIOR; singular: sg; universal quantifier (verbal): UNIV.QUANT

bèò *-yi*
 give.name -1sg.PRES
 ‘I am giving a name.’

Class I suffixes are the next most tonally invariable set of morphemes. These suffixes surface with an invariant tone in regular⁹ declarative present tense and past tense verbs (we discuss their behavior in other verbal forms further below). There are three Class I suffixes: the monomoraic H tone telic Aktionsart suffix *-hǒ* and negation suffix *-má* ‘NEG’, and the bimoraic LL pluractional telic suffix *-hě̀ằ*.

The tonally invariant behavior of the H Class I suffixes is illustrated in (6) with the negative suffix *-má*, where negative appears following roots of each tonal type, surfacing with a high tone in each case. The tonally invariant behavior of the LL Class I suffix is illustrated in (7), where it is shown surfacing as LL with roots of all three tone shapes.

(6) a. *gárámáyí*

gára *-má* *-yi*
 roll.about.on.ground -NEG -1sg.PRES
 ‘I am not rolling about on the ground.’

b. *gàràmáyí*

gara *-má* *-yi*
 be.exhausted -NEG -1sg.PRES
 ‘I am not exhausted.’

c. *gàràmáyí*

gàrà *-má* *-yi*
 huddle -NEG -1sg.PRES
 ‘I am not huddling (e.g. because of the cold).’

(7) a. *tóméhě̀ằgì*

⁹The language exhibits two sets of inflectional paradigms, the large ‘regular’ set and the much smaller ‘*ni*-class’ set (Michael 2012b).

tómé -hě̀ă -bî
 fall -TELIC.PLURACT -3pl.mascPAST
 ‘they fell’

b. *bíàhě̀ăgì*

bíà -hě̀ă -bî
 lift -TELIC.PLURACT -3pl.mascPAST
 ‘they lifted them’

c. *dèòhě̀ăgì*

dèò hě̀ă -bî
 grow -TELIC.PLURACT -3pl.mascPAST
 ‘they grew’

Class II suffixes consist of the finite inflections in the regular past and present declarative paradigms (see Michael (2012b) for further information about these suffixes), and surface with a high tone when immediately preceded by a high-toned mora belonging to a root or a Class I suffix.

Bimoraic Class III suffixes surface as either LL or HL, while monomoraic suffixes of this class surface as either L or H. The HL (or H) form appears only in a very restricted environment: following an LL root. This behavior is illustrated in (8), where the prioritive *-suba* appears with roots of all three tone shapes.

(8) a. *bótàsùbàyì*

bótá -suba -yì
 remove -PRIOR 1sg.PRES
 ‘I am removing (e.g. leaves) first.’

b. *bótàsùbàyì*

bota -suba -yì
 split.off -PRIOR 1sg.PRES
 ‘I am splitting off (e.g. a branch) first.’

c. *bòtàsúbàyì*

bòtá *-suba* *-yi*
 wipe.off -PRIOR 1sg.PRES
 ‘I am wiping off first.’

In all other environments, Class III suffixes surface as low. We illustrate this with verbs exhibiting all three root shapes, where in (9) the Class III suffix appears following another Class III suffix.

(9) a. *bótàsàòsùbàgò*

bótá *-sao* *-suba* *-go*
 remove -UNIV.QUANT -PRIOR -3sg.fem.PAST
 ‘she finished removing first (e.g. leaves)’

b. *bótàsàòsùbàgò*

bota *-sao* *-suba* *-go*
 split.off -UNIV.QUANT -PRIOR -3sg.fem.PAST
 ‘she finished splitting off first (e.g. a branch).’

c. *bòtàsáòsùbàgò*

bòtá *-sao* *-suba* *-go*
 wipe.off -UNIV.QUANT -PRIOR -3sg.fem.PAST
 ‘she finished wiping off first.’

There is one qualification to mention with respect to generalization regarding the surface tone of class III suffixes: monomoraic members of this class never surface as high in word-final position. This is true even when they follow an LL root, a context in which Class III suffixes otherwise surface as H. This behavior is evident in (10), where the Class III imperative suffix *-ma*, appears immediately following HH, HL, and LL roots, in that order. Crucially, this word-final Class III suffix surfaces as L in (10c), immediately following the LL root *bòtá* ‘wipe off’.

(10) a. *bótámà*

bótá *-ma*
 remove -IMPER
 ‘remove (it) (e.g. leaves)!’

b. *bótàmà*

bota *-ma*
 split.off -IMPER
 ‘split (it) off (e.g. a branch)!’

c. *bòtàmà*

bòtà *-ma*
 wipe.off -IMPER
 ‘wipe (it) off!’

The inventory of Class III suffixes includes suffixes that are intrinsically members of this tonal class as well as derived members of this class which result from tonal erasure process characteristic of the nominal tonal system (see §3.2). Intrinsically Class III verbal suffixes include all verbal suffixes other than the Class I and Class II suffixes, discussed above, and the causative, discussed below. Class III suffixes appear to be the default class for verbal suffixes. We note in passing that nominal suffixes behave like Class III suffixes.

Class IV suffixes consist of two valency-increasing suffixes, the causative *-gopo* and the ‘assistive’ *-kãĩ*, which adds an argument that denotes the person whom the subject assisted in carrying out the activity denoted by the verb. We illustrate the behavior of this class of suffixes with the causative. When the causative follows an HH root it surfaces as LL, as in (11a); when it follows an HL root it surfaces as HH, as in (11b); and when it follows an LL root, it surfaces as HL, as in (11c). Note that the H tone in the HH form of the causative in (11b) spreads to the Class II inflectional suffix.

(11) a. *dóágòpòyì*

dóá *-gopo* *-yi*
 wash -CAUS -1sg.PRES
 ‘I am making (someone) wash.’

b. tíàgónóyí

tia -gónó -yí
sharpen -CAUS -1sg.PRES
'I am making (someone) sharpen (e.g. a machete).'

c. dòàgónòyì

dòà -gónò -yì
paddle -CAUS -1sg.PRES
'I am making (someone) paddle.'

d. ábísubàgónóbí

ábí -suba -gónó -yí
bathe -PRIOR -CAUS -1sg.PAST
'I made (someone) bathe first.'

e. kwàkòsubàgónóbí

kwàkò -suba -gónó -yí
bathe -PRIOR -CAUS -1sg.PAST
'I made (someone) cook first'

One final descriptive issue remains before we develop our analysis of verbal tone in the language: the tonal behavior of serial verbs. Thus far we have only considered verbs consisting of a single root with one or more suffixes. For purposes of tonal assignment to suffixes following the two roots, tonal assignment attends only to the tonal pattern of the rightmost of the two roots. If the rightmost root is HH, for example, the suffixes on the verb behave in the same way as those following a single HH root in a non-serial verb. The crucial issue thus becomes how the tonal pattern of the two roots affect each other.

If we compare the surface tone of roots in serial verbs with their surface tone in non-serial verbs, we find that the following generalizations obtain: 1) HH and LL roots remain HH or LL in serial verbs, whether they are the first or second serialized verb; and 2) HL roots remain HL if they are the first verb in a serial verb, but surface as either: a) LL, when

following and HH or HL root; or b) HL, if following an LL root. These generalizations are schematized in Table 3 and exemplified in (12).

Table 3: Surface tones of serialized verb roots

	HH	HL	LL
HH	HH-HH (12a)	HH-LL (12b)	HH-LL (12c)
HL	HL-HH (12d)	HL-LL (12e)	HL-LL (12f)
LL	LL-HH (12g)	LL-HL (12h)	LL-LL(12i)

(12) a. dérótíyóbí

déró -tíyó bí
 bend -break -1sg.PAST
 ‘I broke (it), bending it’

b. hápútìtòbì

hápú -tìtò -bí
 pour -awaken 1sg.PAST
 ‘I poured (e.g. water) on (someone), awakening them’

c. sááchìmàbì

sáá -chìmà -bí
 leap -slip -1sg.PAST
 ‘I leapt and slipped’

d. éöyétéyí

eo -yéte -yi
 set.trap -learn -1sg.PRESS
 ‘I am learning to set traps’

e. nágùtìtòbì

nagu -tìto -bí
 step.on awaken -1sg.PAST
 ‘I stepped on (someone), awakening (them)’

f. náǵùchìmàbì

nagu -*chìma* -*bi*
step.on -slip -1sg.PAST
'I step on (something) and slipped'

g. bìyàyéyéí

bìyà -*yété* -*yi*
swim -learn 1sg.PRES
'I am learning to swim'

h. chìmàtanìhǒbí

chìma -*tani* -*hǒ* -*bi*
slip -fall -TELIC -1sg.PAST
'I slipped and fell'

i. tòtètètèyì

tòtè -*tìtè* -*yi*
pound -cut.into.pieces -1sg.PRES
'I'm cutting (it) into pieces by pounding'

3.2 Nominal tone

The nominal tone system is similar to the verbal tonal system. Bimoraic nominal roots in isolation exhibit three possible surface tone patterns, HH, HL, and LL, as evident in (13a-c), and as is the case with verbal roots, there are no surface LH nominal roots.

(13) a. bátí 'shadow, spirit'

b. ínè '*pìjuayo*, *Bactris gasipaes*'

c. hǎsò 'manioc, *Manihot esculenta*'

There is a significant difference between the nominal and verbal tone systems however: in the nominal tone system, all morphemes other than the leftmost morpheme behave like Class

III suffixes. This single difference has three significant consequences which are responsible for three surface differences between the nominal and verbal tone systems.

First, the tone of nominal roots is affected by whether or not they are preceded by another morpheme in the same word: when they are, they behave like Class III suffixes. The reader will recall that HH and LL verb roots appear with the same surface tone regardless of whether they are preceded by another morpheme, as happens, for example, in serial verb constructions.¹⁰ Nominal roots, in contrast, surface as either HL when immediately preceded by an LL morpheme (or L if monomoraic), or as LL, when preceded by either an HH or HL morpheme (or H if monomoraic).

We see in (14) that roots of the three tone shapes given in (13) all surface as LL when preceded by the HH adjectival prefix *háí-* ‘large’, but as HL when preceded by the LL adjectival prefix *yàrí-* ‘small’, as in (14).

(14) a. *háíbàtì*

háí- bátí
large- shadow
‘large shadow’

b. *háínè*

háí- ine
large- *píjuayo*
‘large *píjuayo*’

c. *háíhàsò*

jáí- hàsò
large- manioc
‘large manioc’

(15) a. *yàribátì*

¹⁰Recall that this is not true of HL verb roots, which appear as LL following HH or HL verb roots in a serial verb.

yàrì- b́átí
 small- shadow
 ‘small shadow’

b. *yàrìínè*

yàrì- íne
 small- pijuayo
 ‘small pijuayo’

c. *yàrìhàsò*

yàrì- hàsò
 small- manioc
 ‘small manioc’

The same behavior is evident in noun-noun compounds, where the tone of the leftmost element erases that of the the rightmost element (which is the head of the compound). In (16a-c) we see examples in which the leftmost elements are HH, HL, HH words in isolation erasing the tone of the head.

(16) a. *mákákùrà*

máká -kúrá
 forest -chicken
 ‘bird sp., *Odontophorus gujanensis*’

b. *gáhògòhè*

gáhò -góhé
 ear -hole
 ‘ear canal’

c. *bìyà-kómè*

bìyà -kómè
 palm.fruit.oil -fish.genus
 ‘fish sp.’

Second, all nominal suffixes behave like Class III suffixes, meaning that they surface as LL (or L, if monomoraic), except when immediately following an LL morpheme in leftmost position in the word, in which case they surface as HL (or L, if monomoraic and in word-final position). This behavior is evident in the behavior of the plank classifier *-pere*, exemplified in (19), below.

Third, not only do all nominal suffixes behave like Class III suffixes, we find that erst-while Class I verbal suffixes undergo conversion to Class III suffixes when a morphologically complex verbal stem containing a Class I suffix undergoes nominalization. This conversion process can be appreciated by comparing (17a), a verb stem bearing finite verbal inflection, with 17b), in which the stem is nominalized. In (17a) the verbal stem *népá-má* ‘hang-NEG’ appears with a Class II verbal inflectional suffix, and as expected, the negation suffix *-má* surfaces with its inherent H tone, as we would expect of a Class I suffix on a verb. In (17b), however, the same stem has undergone nominalization with the nominalizer *-ko*, and the negation suffix *-má* now surfaces with low tone. This behavior suggests that the negation suffix is behaving as a Class III suffix in this nominalized verb, a conclusion confirmed by the behavior of the negation suffix in nominalized verbs when immediately following an LL root, as in (18b). In this form, the negation suffix surfaces with H, thereby exhibiting – when compared with (17b)– the post-LL root H-conditioning typical of Class III morphemes.

(17) a. *népámáyí*

népá -má -yi
hang -NEG -1sg.PRES
‘I am not hanging (something)’

b. *népámàkò*

népá -má -ko
hang -NEG -3sg.fem.NOMZ
‘not hanging (3sg feminine agreement)’

(18) a. *kwàkòmáyí*

kwàkò -má -yi
 cook -NEG -1sg.PRES
 ‘I am not cooking’

b. *kwàkòmákò*

kwàkò -má -kò
 cook -NEG -3sg.fem.NOMZ
 ‘not cooking (3sg feminine agreement)’

The tonal behavior of Class I verbal suffixes under nominalization suggests not only that nominal suffixes behave like Class III suffixes, but that all morphemes to the right of the leftmost morpheme undergo conversion into Class III suffixes.¹¹ There is further evidence in favor of this conclusion in the tonal behavior of classifiers. Classifiers typically appear following nominal roots, and as such, behave like Class III suffixes, as is evident in (19), where the plank classifier in (19c) exhibits the characteristic HL pattern following an LL root.

(19) a. *másópèrè*

másó -péré
ojé -CL:plank
 ‘plank of *ojé* wood’

b. *hóràpèrè*

hórà -péré
añuje.rumo -CL:plank
 ‘plank of *añuje rumo* wood’

c. *bitòpèrè*

bitò -péré
leche.caspi -CL:plank
 ‘plank of *leche caspi* wood’

¹¹All roots of a serial verb retain their verbal tone under nominalization; we reconcile this behavior with the generalization given here in §4.

Classifiers can, however, appear as the leftmost element in certain constructions, including the ‘singulative’ construction in (20).¹² Here, the plank classifier surfaces as HH, indicating that they undergo conversion to Class III suffixes when they are not in leftmost position in a word.

(20) *pérébì*

péré *-bí*
 CL:flat.slender -CL:default
 ‘*capillejo*, type of basket’

We conclude our discussion of nominal tone system by considering its extent in terms of the word classes which fall under its scope. We have already seen that nouns and deverbal nominalizations pattern together for purposes of tone assignment. In addition to these expected participants in the nominal tone system we find that subordinated verbs exhibit nominal tonal behavior, including verbs in relative clauses and adverbial subordinations involved in constructions expressing temporal sequencing and temporal simultaneity. There are also classes of finite verbs, however, that pattern with nouns and deverbal nominalizations. In the cases of these tonally nominal-like subordinate verbs and finite verbs, the respective subordination markers and inflections largely overlap in form with independently-attested nominalizers in the language, suggesting that the tonally nominal behavior of these verbal or quasi-verbal words stems from their origin – be it diachronic or synchronic – in nominalization constructions.

For reasons of space we here focus our discussion on finite verbs that exhibit tonally nominal-like behavior. These include all declarative future tense verbs, all interrogative mood verbs, and in addition, *ni*-class declarative past tense verbs. All suffixes to the right of the root in such verbs behave like Class III suffixes, as we expect of nouns, including erstwhile H Class I suffixes, which surface as L, as in (21) and (22a), unless they directly

¹²The singulative construction consists of a classifier bearing the singulative suffix *-bí*, and typically indicates a single entity that falls into the category delimited by the classifier.

follow a LL root, in which case they surface as H, as in (22b). In both (21) and (22), the erstwhile Class I suffix in question is the negation suffix *-má*; in (21) and (22a) it surfaces as L, as we would expect of a Class III suffix that does not immediately follow an LL root, while in (22b) it surfaces as H, likewise the expected behavior of a Class III suffix.

(21) kwàkòsúbàmàyì.

kwàkò -suba -ma -yi.
 cook -PRIOR -NEG -1sg.FUT
 ‘I will not be the first to cook.’

(22) a. ábíàyì.

ábí -ma -yi
 bathe -NEG -1sg.FUT
 ‘I will not bathe.’

b. kwàkòmáyì.

kwàkò -ma -yi
 cool -NEG -1sg.FUT
 ‘I will not cook.’

4 An analysis of the Máíhǎkì tonal system

Having provided a surface description of verbal and nominal tone patterns in Máíhǎkì, we now develop an analysis that accounts for the attested inventory of morpheme tonal patterns and for tonal interaction between morphemes.

4.1 Analysis of verbal tone

The starting point for our analysis of the verbal tone system is the observation that surface H and L tones in verbs each fall into two classes in terms of how they co-occur with tones on adjacent morphemes. H tones associated with HH roots and Class I suffixes uniformly

condition an H tone on an immediately following Class II suffix, as in (23a) and (23b), respectively. H tones associated with Class III suffixes, in contrast, do not condition an H tone on immediately following Class II suffixes, as evident in (24). We provisionally refer to the first kind of H as ‘active H’ and the second, ‘inactive H’.

(23) a. ábíyí

ábí *-yi*
bathe -1sg.PRES
‘I am bathing’

b. kwàkòmáí

kwàkò *-má* *-yi*
cook -NEG -1sg.PRES
‘I am not cooking’

(24) kwàkòdábì

kwàkò *-dá* *-bì*
cook -FRUS -1sg.PAST
‘I was going to cook (but did not).’

We analyze the fact that active H conditions H on immediately following Class II suffixes as spreading of H from HH roots and Class I morphemes to Class II morphemes. We furthermore treat HH roots and Class I morphemes as being lexically specified for H tone, while Class II morphemes are not. In favor of this analysis, note that HH roots and Class I morphemes always bear H,¹³ whereas Class II morphemes only bear H when immediately preceded by and HH root or a Class II morpheme. We return to the analysis of inactive H after briefly considering the two types of L tones.

Surface L can likewise be divided into active and inactive types on the basis of the how surface L conditions H tones on adjacent morphemes. Active L, found in LL roots and the

¹³At least when they appear in words whose tone is assigned by the verbal tone subsystem, to which we are currently restricting our attention.

LL Class I pluractional telic suffix *-hẽã*, conditions an H on the first mora of an immediately following Class III suffix, as exemplified in (25a).¹⁴

Inactive L does not condition an H on immediately following Class III suffixes, and is found at the right edge of HL roots, as well as on class III suffixes themselves. An HL root, *yúà* ‘sweep’, is given in (25b), and we see that it fails to condition a surface H on the first mora of the following Class III suffix, the prioritive *-suba*. We see in (25c) that the surface L on the final mora of the prioritive likewise fails to condition a surface H on another following Class III suffix, in this case the frustrative of intent *-da*.¹⁵

- (25) a. bɪ̀bɪ̀sùbàbɪ̀
- bɪ̀bɪ̀ -suba -bɪ̀
run -PRIOR -1sg.PAST
'I ran first'
- b. yúàsùbàbɪ̀
- yua -suba -bɪ̀
sweep -PRIOR -1sg.PAST
'I swept first'
- c. yúàsùbàdàbɪ̀
- yua -suba -da -bɪ̀
sweep -PRIOR -FRUS -1sg.PAST
'I was going to sweep first (but did not)'

Since active H and L condition surface tones on adjacent morphemes, while inactive H and L do not, we posit that active tones are lexically specified, while the inactive ones are assigned by default principles of tone assignment that we discuss below. We provisionally

¹⁴For the LL Class I suffix, this property depends in part on the position of the root or suffix in the word. Specifically, the Class I suffix conditions an H on the following Class III suffix when it immediately follows an LL root (e.g. *kwàkò-hě̀-áò-bì* ‘I cooked them’), thereby creating an uninterrupted sequence of L tones between the left edge of the word and Class III suffix. This distributional fact is related to the HL target contour, discussed below.

¹⁵Although we talk of ‘active’ and ‘inactive’ H and L tones, these labels are only shorthand descriptions of their behavior, and our analysis will not distinguish ‘active’ and ‘inactive’ tones, instead deriving their behavioral differences from different ways in which these tones are assigned to words by the tonal system.

assume that moras bearing inactive tones to be underlyingly unspecified for tone, entailing that the Máíhìkì tone inventory is H, L, and $\emptyset$.

With the distinction between lexically-specified and default H and L in hand, we can now account for the surface inventory of root patterns. Let us first consider the two root patterns that contain a surface H: HH and HL. Since the final H in the HH root is an active H, it is plausible that this second H in fact spread from the position of the first H in the HH root. On this analysis, it is only necessary to specify tone on the first mora of the root, such that a surface HH root results from an underlying $H\emptyset$ root.

HL roots in contrast exhibit an initial inactive H, since H does not spread to the second mora of the root and does not condition an H on an adjacent Class II suffix. The final L of the HL root is also inactive, since it fails to condition an H on the first mora of a following Class III suffix. If we adopt the idea suggested above that inactive tones stem from default principles of tone assignment to tonally unspecified moras, it follows that surface HL roots in fact result from underlying $\emptyset\emptyset$ roots. We will return shortly to important question of how such roots surface as HL.

The final attested surface root tonal pattern is LL. Since roots of this type condition a surface H on following Class III roots, the final L on such roots is ‘active’, leading us to treat such roots as involving a lexically specified L. If we assume that LL roots result in the same way from lexically specified L as HH roots do from lexically specified H, this leads us to conclude that surface LL roots result from underlying $L\emptyset$ roots, where the initial L spreads to the right edge of the morpheme boundary.

The relationship between surface and underlying root tonal pattern just proposed is summarized in (26).

- (26) a. $H\emptyset \rightarrow HH$
 b. $\emptyset\emptyset \rightarrow HL$
 c. $L\emptyset \rightarrow LL$

We now return to the issue of how $\emptyset\emptyset$ roots surface as HL. To this end, it is helpful to consider the more general question of how inactive H and L are distributed. Beginning with inactive H, we note that it occurs in HL roots, as schematized in (27a), or in Class III suffixes immediately following an LL root, as exemplified in (A.1.2, (1c)) and (A.1.3, (3c)) and schematized in (27b). In the latter case, Class III suffixes surface as HL when bimoraic, suggesting that Class III suffixes exhibit the same underlying tonal specification as $\emptyset\emptyset$ roots. This suggests that inactive H is assigned to the first null-toned mora of the word, as in (27a&c), provided that this mora is not preceded by an underlying H, as in (27c). (We return to, and qualify, this provisional generalization below.) Note that this provisional generalization explains why roots that surface as HL in non-serial verbs, surface as LL when preceded by either an HH root or an HL (i.e. underlying $\emptyset\emptyset$) root: in the former case the root in question follows an underlying H, and in the latter, the initial mora of the root is not the leftmost underlying $\emptyset$ -toned mora in the word, as evident in (27d).

- (27) a. $\emptyset\emptyset_{root}-\emptyset\emptyset-\emptyset \rightarrow H_{inact}L-LL-L$
 b. $LL_{root}-\emptyset\emptyset-\emptyset \rightarrow LL-H_{inact}L-L$
 c. $HH_{root}-\emptyset\emptyset-\emptyset \rightarrow HH-LL-L$
 d. $\emptyset\emptyset_{root}-\emptyset\emptyset_{root}-\emptyset\emptyset-\emptyset \rightarrow H_{inact}L-LL-LL-L$

Turning to the distribution of inactive L, we note that it surfaces in HL roots, Class III suffixes, and in non-initial roots of serial verbs that surface as HL when not serialized, and, as we discuss below, word-finally in certain circumstances. These are precisely the environments which lack active H or L, and to which inactive H is not assigned, indicating inactive L is assigned to any moras which have been left tonally unspecified by the processes of tone spreading and inactive H assignment.

We thus derive surface HL roots from underlying $\emptyset\emptyset$ as follows: an inactive H is assigned to the leftmost $\emptyset$ mora, and since the H in question is inactive, it does not spread, resulting

in an H $\emptyset$ root. L is then assigned to the remaining $\emptyset$ mora, resulting in the attested HL surface pattern.

Note that if we treat inactive L as the default tone assigned to tonally unspecified moras, and if we further assume that surface HH and LL roots are underlyingly specified as H $\emptyset$ and L $\emptyset$, we are led to conclude that lexical tone spreading occurs prior to assignment of inactive H or inactive L, since otherwise either: 1) unattested LH roots would result (where the second H is an inactive H); or 2) HH or LL roots would result, in which the second tone is inactive H or inactive L, respectively.

The analysis of root tonal patterns just presented contains an implicit explanation for a number of facts related to Máhĩkì verb roots, including: 1) the attested root tonal pattern inventory (HH, HL, and LL), including the absence of LH roots; 2) the fact that the surface H and L of HL roots are inactive, respectively; and 3) the fact there are no surface HH or LL roots where the rightmost tone is inactive.

The preceding analysis also allows us to clarify the underlying tonal representation of Class I, Class II, and Class III suffixes. The H Class I suffixes *-má* ‘NEG’ and *-hó* ‘TELIC’ always surface as H and spread their tone to immediately following Class II suffixes, making their tonal behavior indistinguishable from H-bearing roots, while the LL Class I suffix *-hěă* ‘TELIC.PLURACT’ always surfaces as LL, making its tonal behavior indistinguishable from an LL root. We infer that Class I suffixes bear underlying tones: H in the case of the former pair, LL in the case of the latter suffix. Class III suffixes, on the other hand, behave like $\emptyset(\emptyset)$ roots, surfacing as L(L), except when immediately following an LL root, leading us to infer that they are underlyingly toneless. We reach the same conclusion for Class II roots (recall that these are the obligatory inflectional suffixes, but that unlike Class III suffixes, they accept spreading tone from adjacent H tones on roots or Class I suffixes. Class IV suffixes behave in a slightly more complicated fashion: following HH roots they surface as LL, and following LL roots they surface as HL, thereby exhibiting the behavior of an $\emptyset\emptyset$ morpheme. Following an HL root or HL morpheme, however, they surface as HH, exhibiting

the behavior of an H $\emptyset$ morpheme. We interpret these facts as evidence of allomorphy: that is, Class IV suffixes exhibit an H $\emptyset$ allomorph when it follows an $\emptyset\emptyset$ root or suffix, and an $\emptyset\emptyset$ allomorph otherwise.

We now return to the provisional generalization regarding the distribution of inactive H, noting an exception to the generalization as previously stated: when the leftmost $\emptyset$ mora in a word is word-final, it surfaces as L, as exemplified in (28a), rather than receiving inactive H, as the provisional generalization predicts, as in (28b).

- (28) a. b̩b̩y̩i
 b̩b̩ -yi
 run -1sg.PRESENT
 ‘I am running.’
 b. *b̩b̩y̩i

Avoiding the assignment of word-final inactive H requires an additional stipulation, such that the generalization regarding the distribution of inactive H tone is now subject to two relatively arbitrary restrictions: 1) that it never occurs following an HH root; and 2) that it cannot appear in word-final position.¹⁶ It is possible to develop a more perspicacious generalization if we note that: 1) all instances of assignment of inactive H result in an HL sequence (i.e. either via the formation of an HL root, or via the assignment of a H to the first mora of a Class III suffix following an LL root); and 2) in the cases where an inactive H fails to be assigned, the assignment of the inactive H would either: a) fail to create an HL sequence, as in the unattested case of word-final inactive H assignment; or b) be entirely redundant for purposes of creating an HL sequence, as in the case of a verb beginning with an HH root.

¹⁶One might argue that what (28) shows is not suppression of the expect inactive H, but rather that L has exceptionally spread to the inflectional suffix. Evidence against such an analysis available from nouns. When an LL root (e.g. *màsò*, ‘green acouchy’, *Myoprocta pratti*) takes a single suffix, such as the plural suffix, the resulting word is LLL (i.e. *màsò-nà* ‘green acouchys’), but when the tonal domain is expanded by, for example, the predicativizer *-hã*, the erstwhile low-tone suffix now surfaces as high (i.e. *màsò-ná-hã* ‘they are green acouchys’). This shows that the L on the plural suffix in the form *màsònà* is not due to it receiving an (otherwise unattested) spreading L, but rather to the suppression of L in word-final position.

There is further evidence that suggests that inactive H assignment is not only motivated by a requirement that Máǎhǎkì verbs exhibit an HL contour, but that the HL contour be aligned as closely as possible with the left edge of the word. Consider, for example, words with underlying tonal specification $\emptyset\emptyset$ -H- $\emptyset$ - $\emptyset$, as in (29). Were default L tones to be assigned to all $\emptyset$ -toned moras in words of this type, an LLHLL word would result, which indeed exhibits an HL contour. The attested surface form, however, is HLHLL, indicating that an inactive H is assigned to the first mora of the word in order to align an HL contour more closely to the left of the word.

(29) yùàmádàbì.

yua *-ma* *-da* *-bi*
sweep -NEG -FRUS -1sg.PAST
‘I was not planning to sweep (but ended up doing so).’

The analysis just developed is schematized for $\emptyset\emptyset$, $L\emptyset$, and $H\emptyset$ roots in Table 4, where for purposes of exemplification, each root is followed by a bimoraic Class III suffix, followed by a monomoraic Class II suffix. Examples corresponding to the schemas are given in (A.1.3, (3)). As indicated above, lexical (i.e. active) L and H first spread within roots, followed by the spreading of H to Class II suffixes, followed by the assignment of H to $\emptyset$ moras to create left-aligned HL contours, with the assignment of L to all moras which still lack tone completing the tone assignment process.

Table 4: Tonal derivations

Underlying Form	→ Tone spreading	→ inactive H	→ Default L
$\emptyset\emptyset_R$ - $\emptyset\emptyset_{III}$ - $\emptyset_{II}$	$\emptyset\emptyset$ - $\emptyset\emptyset$ - $\emptyset$	$H\emptyset$ - $\emptyset\emptyset$ - $\emptyset$	HL-LL-L
$L\emptyset_R$ - $\emptyset\emptyset_{III}$ - $\emptyset_{II}$	LL- $\emptyset\emptyset$ - $\emptyset$	LL- $H\emptyset$ - $\emptyset$	LL-HL-L
$H\emptyset_R$ - $\emptyset\emptyset_{III}$ - $\emptyset_{II}$	HH- $\emptyset\emptyset$ - $\emptyset$	HH- $\emptyset\emptyset$ - $\emptyset$	HH-LL-L

Note, incidentally, that the current analysis has essentially disposed of the distinction between ‘active’ and ‘inactive’ tones. In the derivational terms of the preceding analysis, the

differences between these tones reduces to the point in the derivation that they are assigned to a mora. ‘Inactive’ tones are simply those that have been assigned after spreading has taken place.

4.2 Analysis of nominal tone

We now present an analysis of the nominal tone system, which applies to nouns, nominalized and subordinated verbs, and to finite verbs inflected with suffixes that were historically nominalizers. The description given in §3.2 shows that the nominal tone system is very similar to the verbal one, with the crucial exception that only the leftmost morpheme retains its underlying tonal specification. All morphemes to the right of the leftmost morpheme behave like Class III suffixes, which we have analyzed above as having no underlying tonal specification (i.e. $\emptyset$ tonal specification). Even morphemes that exhibit underlying H or L tone in other contexts experience tonal erasure in post-root environments under the nominal tone assignment processes. Note that tonal erasure must prior to inactive H assignment, in order to guarantee that H is assigned to the morpheme immediately to the right of LL roots.

It is worth noting that nominal tone erasure ensures HL contour culminativity. All three possible root shapes in (30) involve one and only one HL sequence (see also examples in A.2), rendering this target a plausible one, especially since this target does play a role in inactive H assignment in verbs.

- (30) a. HH-LL...
 b. HL-LL...
 c. LL-HL...

In closing our analysis of the nominal tone system, we return to the issue of tone erasure in nominalized serial verbs, alluded to in §3.2. Somewhat unexpectedly, the second verb in nominalized serial verbs retains the tone it has prior to nominalization, as evident in (31) (compare (12a)). This behavior suggests that the multiple roots of a serial verb construction

constitute a single element – and crucially, the rightmost element – for purposes of tone erasure in Máíhîkî.

(31) dérótíyógì

déró -tíyó -gì
 bend -break -2sg.INTERROG.PAST
 ‘did you bend and break (it)?’

4.3 Summary of tone analysis

Máíhîkî exhibits three underlying tones: H, L, and $\emptyset$. Only the first mora of any given morpheme is specified for tone, yielding the following underlying tonal inventory for bimoraic morphemes: H $\emptyset$, $\emptyset\emptyset$, and L $\emptyset$; the underlying tonal inventory for monomoraic morphemes is H, L, and $\emptyset$.

Non-root morphemes are of four kinds in terms of their underlying tone and tonal behavior: 1) those that exhibit underlying tone (Class I morphemes, in the description above); 2) $\emptyset$ or $\emptyset\emptyset$ morphemes that do not accept H from immediately adjacent morphemes (Class III); 3) $\emptyset$ morphemes which take (Class II); and 4) Class IV suffixes, which exhibit both $\emptyset\emptyset$ and HH allomorphs (see §xxx).

The verbal and nominal tone systems differ in that words falling under the scope of the nominal system exhibit tonal erasure, whereby the underlying tones of all morphemes but the leftmost morpheme is eliminated prior to the application of tone assignment rules.

With the preceding considerations in mind, the surface tonal patterns of Máíhîkî words can be derived by applying the following set of ordered rules:

1. H and L spread from the leftmost mora of each morpheme to the second mora (if bimoraic).
2. H spreads to adjacent Class II suffixes.

3. H is assigned to the leftmost $\emptyset$ mora of the word, if doing so would result in an HL contour more closely aligned with the left edge of the word than were this H tone not assigned.
4. L is assigned to all remaining $\emptyset$ syllables.

5 Máíhǎ̀kì tone in comparative Tukanoan perspective

In this section we compare Máíhǎ̀kì tonal phenomena to that of other Tukanoan languages in two ways: first in relatively pre-analytical terms, and then in terms of how the tonal systems of these languages have been analyzed. In this section we mainly restrict our attention to Koreguaje, the sole Western Tukanoan language that has been described as tonal, and Barasana, Kubeo, and Wanano, three Eastern Tukanoan languages with well-described tonal systems.

Root inventories Comparing the Máíhǎ̀kì tonal system to that described by Gralow (1985) for Koreguaje we find that whereas Máíhǎ̀kì lacks LH roots, Koreguaje exhibits all four possible combinations of H and L in bimoraic roots (ibid.: 4). However, Koreguaje exhibits no LH CVV roots (ibid.: 5), and in that respect partially mirrors the Máíhǎ̀kì restriction against LH roots.

Turning to the Eastern Tukanoan languages, we find that Barasana exhibits HH, HL, LH, and LH(L), where the parenthetical tone is realized on the first syllable of the morpheme following the root (Gomez-Imbert 2001: 372). Stenzel (2004: 88) gives the same inventory for Wanano. Chacon (2012: 137-143), although availing himself of a ‘non-phonological’ mid-tone (M) in his description, appears to describe the same inventory for Desano, with the qualification that he considers the syllable, and not the mora, to be the TBU in this language, so that CVV roots are assigned the same tone, resulting in LL(H) roots.

The Western and Eastern Tukanoan examined here thus differ in two ways: first, Western

languages exhibit basic LL roots, while Eastern ones do not; and second, LH roots are restricted in Western Tukanoan languages, and are completely absent in Máíhìkì itself.

‘Pitch accent’, stress, and tonotactic constraints In a passage that subsequently attracted much attention from fellow Tukanoanists, Barnes (1999: 212) observed that “...Tukano languages have accent, or pitch-accent systems in which there is high pitch vs. low pitch ... High pitch is usually associated with accent.” Although Tukanoanists such as Ramirez (1997: 92) also previously entertained the suitability of a pitch-accent analysis, Barnes’ characterization was explicitly criticized by Gomez-Imbert (2001: 369) and by Franchetto and Gomez-Imbert (2003),¹⁷ and recent descriptions of the prosodic systems of Tukanoan languages treat most of them as tonal languages. Analyses of Eastern Tukanoan languages in particular identify two ways in which they are, loosely speaking, ‘accentual’: first, some have been analyzed as exhibiting tonal obligatoriness and culminativity, such that there is strong tendency for words to exhibit a single pitch peak; and second, these languages have been analyzed as exhibiting mixed stress-tone systems, where the position of primary stress plays a role in the placement of H tones. In this section we discuss the how Máíhìkì compares to these Eastern Tukanoan languages and to Koreguaje.

Both Kubeo (Chacon 2012) and Wanano (Stenzel 2004) are explicitly analyzed as mixed stress-tone systems,¹⁸ and in the Kubeo case, stress plays a role in determining a word’s tonal pattern: the underlying H associated with a given tone contour is assigned to the position of primary stress. Gomez-Imbert and Kenstowicz (2000) do not analyze Barasana as a mixed stress-tone system as such, in that they do not claim that there is surface realization of stress in the language, but they do explain the tonal patterns of words in much the same manner that Chacon (2012) subsequently did by making explicit reference to stress: lexical H is assigned to the metrically prominent syllables. Among the Western Tukanoan languages,

¹⁷From a typological perspective, Hyman (2006, 2009) has raised serious doubts about whether pitch-accent systems even constitute a well-defined category of prosodic system, regardless of the the Tukanoan-specific facts.

¹⁸Desano has been analyzed along similar lines (Wilson 2012).

Siona and Sekoya, are both described as exhibiting stress systems, but not tone (Orville and Peeke 1962: 84-85; Wheeler 1985: 90-91). Koreguaje is described as tonal, and the existence of a stress system is alluded to by Gralow (1985: 4), but no details are provided. We have found no evidence of stress in Máíhǎ̀kì.¹⁹ On the basis of this evidence, then, Máíhǎ̀kì appears to be unusual among Tukanoan languages (though not unprecedented, given Barasana) in not exhibiting a stress system, and wholly different from Eastern Tukanoan languages in there being no obvious metrical basis to tone assignment.

Barasana obligatorily exhibits at least one H per word (Gomez-Imbert and Kenstowicz 2000; Hyman 2009: 220), as does Wanano (Stenzel 2004), but not Desano (Chacon 2012: 150-155). Turning to Western Tukanoan languages, we find Koreguaje requires that every verb exhibit at least one H and one L (Gralow 1985: 6). Máíhǎ̀kì does not exhibit H obligatoriness, since it permits LL and LLL words (see A.1.1 (1c), A.2.2 (1b), and A.2.2 (1c)), but all Máíhǎ̀kì words of four moras or more have at least one H.²⁰ We discuss the relationship of the Máíhǎ̀kì HL target contour to H obligatoriness in other Tukanoan languages after comparing other tonotactic restrictions among Tukanoan languages.

Tonal culminativity in the strict sense does not hold for either Barasana, Kubeo, or Wanano, although a weaker sense of culminativity can be said to hold, in that the languages exhibit a single peak per word (Gomez-Imbert and Kenstowicz 2000: 428, 453; Stenzel 2004: 92), or in the case of Kubeo, a single peak per two-iamb window (Chacon 2012: 138).²¹ Culminativity, even in this weaker sense, does not hold for either of the tonal Western Tukanoan languages, with sufficiently long words in both Koreguaje and Máíhǎ̀kì being capable of exhibiting word-internal ...HL...H...sequences. It is worth noting, however,

¹⁹Velie (1975: 12-13) and Velie et al. (1976: 11-12) make reference to ‘accent’ in Máíhǎ̀kì, but the brief discussions in these works suggest that their ‘accent’ does not correspond to the modern understanding of stress.

²⁰To see why consider the possible root shapes: HH, HL, and LL; if the word uses either of the first two root types, it automatically has an H. If it uses an LL root, at least one suffix intervenes between the root and the inflectional suffix. If it is a Class I suffix, the suffix will surface with its underlying H tone; if it is a Class III suffix, it will surface with an H tone due to default H insertion, because it immediately follows an LL root.

²¹According to Gomez-Imbert (2001: 408), Tuyuka is the sole Eastern Tukanoan language to exhibit strict culminativity.

that Máíhǎ̀kì nominal tonal erasure assures culminativity (in the weaker sense in which can be said to hold in Barasana, for example) among those words falling under the scope of the nominal tonal system, since only H tones on roots may surface.

We now turn to tonal restrictions at the right edge of words. Recall that Máíhǎ̀kì prohibits LH# sequences, a constraint that also surfaces in a weakened form in Koreguaje: the language forbids them except when they are the only way to satisfy the H obligatoriness requirement discussed above (Gralow 1985: 7). The Koreguaje word-final tonotactic requirement thus reduces to the Máíhǎ̀kì one if H-obligatoriness is deemed less important than the constraint against LH#.

This latter observation allows us, incidentally, to see a way in which the H-obligatoriness requirements found in several Eastern Tucanoan languages and Koreguaje could be related to the violable HL contour target in Máíhǎ̀kì. If Máíhǎ̀kì lacked the LH# constraint, all trimoraic words in the language would have at least one H, since LL roots would trigger a surface final H (i.e. surface as LLH), and it would be possible to recast the from HL contour requirement as a simple requirement that words exhibit H, which would be violated only by words consisting solely of an L(L) root. In this respect it is useful to observe that many Máíhǎ̀kì L(L) roots are cognate with forms in other Tukanoan languages that exhibit at least one high tone and a glottal stop (e.g. Máíhǎ̀kì *yòò* ‘do’, Koreguaje *yóʔò*). On the basis of such data, Farmer (2012) concludes that loss of glottal stop was a source of L tonogenesis in Máíhǎ̀kì. It is thus possible to see how a H-obligatoriness came to become a violable HL-contour target in Máíhǎ̀kì by virtue of L tonogenesis and the emergence of constraint against word-final LH sequences.

The final phenomenon we consider is the process by which the first syllable of a post-root suffix (or group of suffixes) exhibits a high tone in Koreguaje (ibid.: 6), a pattern attested with LL roots in Máíhǎ̀kì. There does not appear to be a counterpart in Eastern Tukanoan languages to the root-suffix boundary tone found in Máíhǎ̀kì and Koreguaje. Perhaps the closest phenomenon is the ‘post-accentuation’ phenomenon in Barasana, where certain head-

modifying specifier prefixes condition a high tone on the first syllable of the noun to which they are prefixed (e.g. (Gomez-Imbert and Kenstowicz 2000: 436-437).

Tonal erasure The phenomenon of tonal erasure characteristic of the Máíhǎ̀kì nominal tone system is found in a number of forms in other Tukanoan languages. In Wanano, for example, all morphemes but the leftmost experience tonal erasure, regardless of word class (Stenzel 2004: 87-92). In Barasana, the leftmost element of a compound eliminates the tone of the element to its right (Gomez-Imbert and Kenstowicz 2000: 432-436; Gomez-Imbert 2001: 378-380), but the leftmost morphemes of words do not generally eliminate the underlying tone of all elements to their right. Desano presents a somewhat different picture from Barasana: the second element of compound experiences tonal erasure, but only if both parts of the compound fall into a single window of two iambs.

6 Evaluating a contour tone analysis of Máíhǎ̀kì tone

A significant analytical difference between the analysis of Máíhǎ̀kì presented in this paper and modern analyses of Eastern Tukanoan languages such as Barasana (Gomez-Imbert 2001) and Wanano (Stenzel 2004) lies in the fact that the latter languages posit both simple tones such (e.g. H) and contour tones (e.g. HL), whereas we posit only simple tones. In this section we show that it is possible to develop a contour tone analysis of Máíhǎ̀kì, but that it has less explanatory power than the simple tone analysis, and that it requires a greater number of ad hoc assumptions to account for the empirical generalization regarding tone, rendering it less parsimonious.

A contour tone analysis of Máíhǎ̀kì requires that we posit three tones: H, HL, and LH. The first two morphemes dock to the first mora of the canonical bimoraic root, while the third tone docks to the second mora. The H tone spreads to the right edge of the root, producing an HH root, while the HL root exhibits no spreading, producing an HL root. The L of right-aligned LH tone associates with the second mora of the root, while the H associates

with the first mora of the following morpheme, while the tonally unspecified initial mora of root receives a default L, resulting in an LL root immediately followed by an H.

One inconvenient feature of the contour tone analysis is that there is no obvious mechanism for distinguishing ‘active’ H, which spreads to Class II suffixes, and ‘inactive’ H, which does not. Recall that in the analysis we present in this paper, we derive the difference between so-called active and inactive H by assigning inactive H after spreading has taken place. In the contour analysis, however, both active and inactive H tones stem from underlying H tones: active H from the left-aligned H tone, and inactive H from the right-aligned LH tone. It thus become necessary to stipulate that underlying H of LH tones does not spread to Class II suffixes, despite the fact that the single underlying H tone does. While this analysis does succeed in reproducing the surface tonal patterns, it requires positing two types of underlying H tones (a ‘spreading’ H and a ‘non-spreading’ H), which we suggest is less parsimonious than the analysis presented in this paper, which does not require a stipulation of this sort.

A second difficulty for the contour analysis is posed by serial verbs composed of two roots, in which the first root is either HH or HL, and the second root surfaces as HL in non-serial verbs. As discussed in §3.1, serial verbs composed of roots of this type do not surface as HH-HL and HL-HL, respectively, but rather as HH-LL and HL-LL, a fact we account for in our analysis by the principles of H insertion discussed in §4. Specifically, we argue that H insertion occurs only when doing so would result in an HL contour more closely aligned with the left edge of the word than would otherwise occur. If one accounts for HL roots by assuming that they arise from a left-aligned HL contour, however, then one would incorrectly predict that the roots in question would surface as HL whether or not they form part of a serial verb, so that the serial verb types in question would surface as HH-HL and HL-HL, respectively.

One might suppose that this problem could be resolved by recourse to tonal erasure of the second root (and only the second root, since Class I suffixes to its right are not affected), with default L subsequently being assigned to the resulting root, producing HH-LL and

HL-LL stems. Even setting aside the irregular manner in which tonal erasure would have to apply (i.e. only targeting the immediately following morpheme), a greater obstacle for this tonal erasure analysis is posed by the fact that tonal erasure does not take place for other serial verb types (i.e. HH-HH, HH-LL, LL-HH, or LL-LL).²² It is of course possible to stipulate that tonal erasure only affects HL tones, which will accurately reproduce the attested surface tonal patterns, but this constitutes yet another stipulation that reduces the parsimoniousness of the contour analysis.

Finally, we might wonder if the way in which it is necessary to characterize LH tone reflects a deeper inelegance in the contour tone approach. For example, in our analysis we are able to generate the tonal inventory of roots – and indeed all morphemes – by assigning each of the tones in the tonal inventory of the language (H, L, and $\emptyset$) to the leftmost mora of the canonical bimoraic morpheme. Regular principles of tone-spreading and default tone assignment then generate the attested surface shapes (H(H), H(L), and L(L)), and no other. In the contour tone analysis, in contrast, H and HL are assigned to the first mora of the canonical bimoraic morpheme, while the HL tone is assigned to the second. Gomez-Imbert (2001: 373) implements this right-edge docking by stipulating that the first syllable of roots bearing an HL tone are extratonal (i.e. ‘extrametrical’ for purposes of tone assignment). This seems like a rather ad hoc solution for Máíhîkî case, at least, since *only* roots bearing this tone would exhibit initial-mora extrametricality, requiring that extratonicity be lexically specified. While this solution produces the attested surface pattern, such a move seems to violate the spirit of extrametricality, from which the notion of extratonicity derives, namely, that a prosodic sub-constituent (a mora in this case) at one edge of a larger prosodic constituent is generally excluded from processes of prosodic structure-building. Relativizing the exclusion of syllables to lexically-specified roots violates the notion that extrametricality/tonality applies to prosodic constituents of a given class.

²²Note that it is impossible to determine whether tonal erasure of the sort being considered here has taken place in surface LL-HL serial verbs, since erasure of an HL contour in the second verb would be masked by the assignment of the H of the LH contour tone of the first root to the first syllable of the second root, with subsequent assignment of a default L to the second syllable of the second root.

To put the same point in slightly different terms, it is unclear why extrametricality would be associated exclusively with the HL tone.

In short, while the contour analysis can be made to reproduce the surface tonal patterns attested in Máíhǎ̀kì, doing so requires a greater number of stipulations to account for the difference between spreading and non-spreading H, and for the behavior of putative HL roots in serial verbs. In addition, the analysis we advance is capable of deriving the root and suffix tone inventory (HH, HL, and LL) from a tone inventory based on surface tone contrasts and the assumption that moras may be underlyingly underspecified for tone (i.e. H, L, and $\emptyset$), whereas the contour analysis must specify each of the possible contour tones. Finally, although most, if not all, Tukanoo languages, exhibit either high-tone obligatoriness or a target tone contour (as in the case of Máíhǎ̀kì), in contour analyses this fact is an accidental outcome of the tone inventory and spreading rules, while our analysis explains post-spreading H insertion by directly appealing to the left-aligned HL tonal contour target.

7 Conclusion

Máíhǎ̀kì exhibits a relatively low-density tone system in which the leftmost morpheme – typically a root – plays a major role in determining the surface tone of words. The Máíhǎ̀kì tonal system exhibits two sub-systems, a ‘verbal’ system that applies to regular declarative present and past tense verbs, and a ‘nominal’ system that applies to all other words, including finite verbs whose inflections are historically related to nominalizers.

Under the analysis we develop in this paper, the TBU in Máíhǎ̀kì is the mora, which can be underlyingly specified as H or L, or be left underlyingly unspecified for tone, i.e. $\emptyset$. Morphemes are canonically bimoraic, with only the leftmost mora being underlyingly specified for tone, yielding the following morpheme inventory: $H\emptyset$, $L\emptyset$, $\emptyset\emptyset$. Underlying tones spread to the right within morphemes, yielding HH and LL for those morphemes bearing an underlying tonal specification. Principles of default tone assignment operate so that $\emptyset\emptyset$ roots generally

surface as HL, although this depends in part on the tonal characteristics of any morphemes to their left.

Most non-root morphemes (and some roots) in Máíhǎ̀kì are not underlyingly specified for tone, but all syllables bear a surface tone. These surface tones arise via two processes. The first process involves the assignment of at most a single H to an underlying $\emptyset$ mora to reach, if possible, a tonal target that Máíhǎ̀kì words exhibit an HL tonal sequence aligned as close as possible to the left edge of the word. Finally, L is assigned to all remaining tonally unspecified moras.

The nominal subsystem differs from the verbal one in exhibiting a process of tonal erasure by which the underlying tones of all morphemes to the right of the leftmost morpheme are eliminated, so that the tone of words falling under the scope of this tonal subsystem can be entirely predicted by the tonal specification of the leftmost morpheme. Tonal erasure also has the effect of guaranteeing HL contour culminativity.

Unlike Eastern Tukanoan languages such as Desano (Silva 2012), Kubeo (Chacon 2012) and Wanano (Stenzel 2004), Máíhǎ̀kì does not exhibit a mixed stress-tone system, nor does metrical structure – despite a lack of stress *per se* – play a role in tonal assignment, as it does in Barasana (Gomez-Imbert and Kenstowicz 2000). In other respects, however, the Máíhǎ̀kì tonal system resembles that of Tukanoan languages. The left-aligned HL tonal target, for example, resembles the H obligatoriness requirements in several Eastern Tukanoan languages and Koreguaje, the only other Western Tukanoan language other than Máíhǎ̀kì that has been analyzed as exhibiting tone. Similarly, the tonal erasure process found in the nominal tonal system Máíhǎ̀kì resembles tonal erasure processes found in Barasana nominal compounds (Gomez-Imbert 2001) and in words of all classes in Wanano (Stenzel 2012).

Although the Máíhǎ̀kì tone system resembles those of Eastern Tukanoan languages in a number of ways, it is sufficiently different from them that we have been able to develop an analysis that dispenses with contour tones and relies only on level tones and a process of H-insertion motivated by a left-aligned target HL tonal contour. We have argued that in the

Máíhǎ̀kì case, this analysis has a number of advantages over a contour analysis, including being able to derive the tonal inventory of morphemes in the language, rather than having to stipulate them, and providing more parsimonious explanations for the tonal behavior of serial verb constructions. Whether an analysis of this basic type could be applied to the tonal systems of Eastern Tukanoan languages is not immediately clear, however, and poses an interesting question for future research.

8 Acknowledgements

Our greatest thanks go to the speakers of the Western dialect of Máíhǎ̀kì who have worked with us to understand the tonal system of their language: Alberto Mosoline Mojica, Liberato Mosoline Mojica, Jesusa Mosoline Mojica, Neida Mosoline Mojica, and Luciano Navarro Tamayo. We also thank the other members of Máíhǎ̀kì Project for their contributions to the analysis we present in this paper: Christine Beier, Gregory Finley, John Sylak, Amalia Skilton, Kelsey Neely, and Grace Neveu. The Máíhǎ̀kì Project is supported by the National Science Foundation (BCS #1065621).

A Possible tone patterns

This appendix provides possible tone patterns for words generated by the verbal and nominal tone sub-systems. In the sections devoted to each subsystem, the examples are organized in terms of size and then their composition in terms of the suffix classes of their constituent morphemes, since class membership plays a significant role in the resulting tone pattern. For each section devoted to a particular morphological composition, two examples are provided for roots of each surface pattern (HH, HL, LL).

A.1 Verbs

For purposes of exemplification we rely on the negation suffix *-má* for the single monosyllabic H Class III suffix in the relevant examples, adding the telic suffix *hǎ* in those examples requiring two monosyllabic Class I suffixes. There is only a single disyllabic Class I suffix, the LL pluractional telic suffix *-hěă*. We employ the frustrative of intent *-da* for our monosyllabic Class III suffix, and the verbal universal quantifier *-sao* for our disyllabic one.

A.1.1 3μ

1. $R_{2\mu}-II_{1\mu}$

- (a) $\acute{\mu}\acute{\mu}-\acute{\mu}$: *kírí-yí* ‘I am painting (it)’; *óté-gó* ‘she danced’
- (b) $\acute{\mu}\acute{\mu}-\acute{\mu}$: *nákì-yì* ‘I am chewing’; *bíò-hǎ* ‘it is barking’
- (c) $\grave{\mu}\grave{\mu}-\acute{\mu}$: *sèbè-yì* ‘I am peeling (it)’; *tětò-gí* ‘he carved (it)’

A.1.2 4μ

1. $R_{2\mu}-I_{1\mu}-II_{1\mu}$

- (a) $\acute{\mu}\acute{\mu}-\acute{\mu}-\acute{\mu}$: *kírí-má-yí* ‘I am not painting (it)’; *óté-má-gó* ‘she did not dance’
- (b) $\acute{\mu}\acute{\mu}-\acute{\mu}-\acute{\mu}$: *nákì-má-yí* ‘I am not chewing’; *bíò-má-hǎ* ‘it is not barking’
- (c) $\grave{\mu}\grave{\mu}-\acute{\mu}-\acute{\mu}$: *sèbè-má-yí* ‘I am not peeling (it)’; *tětò-má-gí* ‘he did not carve (it)’

2. $R_{2\mu}-III_{1\mu}-II_{1\mu}$

- (a) $\acute{\mu}\acute{\mu}-\acute{\mu}-\acute{\mu}$: *kírí-dà-bì* ‘I was going to paint (it)’; *óté-dà-gò* ‘she was going to dance’
- (b) $\acute{\mu}\acute{\mu}-\acute{\mu}-\acute{\mu}$: *nákì-dà-bì* ‘I was going to chew’; *bíò-dà-gí* ‘it was going to bark’
- (c) $\grave{\mu}\grave{\mu}-\acute{\mu}-\acute{\mu}$: *sèbè-dá-bì* ‘I was going to peel (it)’; *tětò-dá-gí* ‘he was going carve (it).’

A.1.3 5μ

1. $R_{2\mu}-I_{1\mu}-III_{1\mu}-II_{1\mu}$

- (a) $\acute{\mu}\acute{\mu}-\acute{\mu}-\grave{\mu}-\grave{\mu}$: *kírí-má-dà-bì* ‘I was not going to paint (it)’; *óté-má-dà-gò* ‘she was not going to dance’
- (b) $\acute{\mu}\grave{\mu}-\acute{\mu}-\grave{\mu}-\grave{\mu}$: *nákì-má-dà-bì* ‘I was not going to chew’; *bíò-má-dà-gì* ‘it was not going to bark’
- (c) $\grave{\mu}\grave{\mu}-\acute{\mu}-\grave{\mu}-\grave{\mu}$: *sèbè-má-dà-bì* ‘I was not going to peel (it)’; *tètò-má-dà-gì* ‘he was not going carve (it).’

2. $R_{2\mu}-I_{1\mu}-I_{1\mu}-II_{1\mu}$

- (a) $\acute{\mu}\acute{\mu}-\acute{\mu}-\acute{\mu}-\acute{\mu}$: *híyó-hǒ-má-bí* ‘I did not break (it)’; *tíyó-hǒ-má-bí* ‘I did not cut (it)’
- (b) $\acute{\mu}\grave{\mu}-\acute{\mu}-\acute{\mu}-\acute{\mu}$: *háòǒ-má-bí* ‘I did not fry (it)’; *híòǒ-má-bí* ‘I did not peel (it)’
- (c) $\grave{\mu}\grave{\mu}-\acute{\mu}-\acute{\mu}-\acute{\mu}$: *bùrà-hǒ-má-bí* ‘I did not pulverize (it)’; *hìy’e-hǒ-má-bí* ‘I did not snap (it)’

3. $R_{2\mu}-I_{2\mu}-II_{1\mu}$

- (a) $\acute{\mu}\acute{\mu}-\acute{\mu}\grave{\mu}-\acute{\mu}$: *híyó-hěǎ-bì* ‘I broke (them)’; *tíyó-hěǎ-bì* ‘I cut (them)’
- (b) $\acute{\mu}\grave{\mu}-\acute{\mu}\grave{\mu}-\acute{\mu}$: *háò-hěǎ-bì* ‘I fried (them)’; *híò-hěǎ-bì* ‘I peeled (them)’
- (c) $\grave{\mu}\grave{\mu}-\acute{\mu}\grave{\mu}-\acute{\mu}$: *bùrà-hěǎ-bì* ‘I pulverized (them)’; *hìy’e-hěǎ-bì* ‘I snapped (them)’

4. $R_{2\mu}-III_{2\mu}-II_{1\mu}$

- (a) $\acute{\mu}\acute{\mu}-\acute{\mu}\grave{\mu}-\acute{\mu}$: *kírí-sàò-yì* ‘they are all painting (it)’; *óté-sàò-bì* ‘they all danced’
- (b) $\acute{\mu}\grave{\mu}-\acute{\mu}\grave{\mu}-\acute{\mu}$: *nákì-sàò-yì* ‘we are all chewing’; *bíò-sàò-yì* ‘they are all barking’
- (c) $\grave{\mu}\grave{\mu}-\acute{\mu}\grave{\mu}-\acute{\mu}$: *sèbè-sàò-yì* ‘we are all peeling (it)’; *tètò-sàò-bì* ‘they all carved (it)’

A.1.4 6μ

1. $R_{2\mu}$ -III $_{2\mu}$ -I $_{1\mu}$ -II $_{1\mu}$:

- (a) $\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\text{-}\acute{\mu}$: *kírí-sàò-má-yí* ‘we are not all painting (it)’; *óté-sàò-má-bí* ‘they did not all dance’
- (b) $\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\text{-}\acute{\mu}$: *nákì-sàò-má-yí* ‘we are not all chewing’; *bíò-sàò-má-yí* ‘they are not all barking’
- (c) $\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\text{-}\acute{\mu}$: *sèbè-sáò-má-yí* ‘we are not all peeling (it)’; *tètò-sáò-má-bí* ‘they did not all carve (it)’

2. $R_{2\mu}$ -I $_{1\mu}$ -III $_{2\mu}$ -II $_{1\mu}$

- (a) $\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\text{-}\acute{\mu}\acute{\mu}\text{-}\acute{\mu}$: *kírí-má-sàò-yí* ‘none of us are painting (it)’; *óté-má-sàò-bí* ‘none of them danced’
- (b) $\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\text{-}\acute{\mu}\acute{\mu}\text{-}\acute{\mu}$: *nákì-má-sàò-yí* ‘none of us are chewing’; *bíò-má-sàò-yí* ‘none of them are barking’
- (c) $\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\text{-}\acute{\mu}\acute{\mu}\text{-}\acute{\mu}$: *sèbè-má-sàò-yí* ‘none of us are peeling (it)’; *tètò-má-sàò-bí* ‘none of them carved (it)’

3. $R_{2\mu}$ -I $_{2\mu}$ -III $_{1\mu}$ -II $_{1\mu}$

- (a) $\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\text{-}\acute{\mu}$: *híyó-hěǎ--dá-bí* ‘I was going to break (them)’; *tíyó-hěǎ--dá-bí* ‘I was going to cut (them)’
- (b) $\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\text{-}\acute{\mu}$: *háò-hěǎ--dá-bí* ‘I was going to fry (them)’; *híò-hěǎ--dá-bí* ‘I was going to peel (them)’
- (c) $\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\acute{\mu}\text{-}\acute{\mu}\text{-}\acute{\mu}$: *bùrà-hěǎ--dá-bí* ‘I was going to pulverize (them)’; *hàyè-hěǎ--dá-bí* ‘I was going to snap (them)’

4. $R_{2\mu}$ -I $_{2\mu}$ -I $_{1\mu}$ -II $_{1\mu}$

- (a) $\acute{\mu}\acute{\mu}-\grave{\mu}\grave{\mu}-\acute{\mu}-\acute{\mu}$: *híyó-hěě--má-bí* ‘I did not break (them)’; *tíyó-hěě--má-bí* ‘I did not cut (them)’
- (b) $\acute{\mu}\grave{\mu}-\acute{\mu}\grave{\mu}-\acute{\mu}-\acute{\mu}$:
- (c) $\acute{\mu}\grave{\mu}-\acute{\mu}\grave{\mu}-\acute{\mu}$: *háò-hěě--má-bí* ‘I did not fry (them)’; *híò-hěě--má-bí* ‘I did not peel (them)’
- (d) $\grave{\mu}\grave{\mu}-\acute{\mu}\grave{\mu}-\acute{\mu}-\acute{\mu}$: *bùrà-hěě--má-bí* ‘I did not pulverize (them)’; *hìyè-hěě--má-bí* ‘I did not snap (them)’

A.2 Nouns

Since nouns are not subject to the bimoraic minimum root requirement characteristic of verbs, and needn’t bear inflectional morphology, we exemplify nouns starting at one mora size. We do not, however, provide example beyond four moras, since nominal tonal erasure guarantees the tone patterns larger nouns consist of simply adding additional L tones to the right edge of the four mora forms of the corresponding root shape.

A.2.1 1μ

1. $R_{1\mu}$

- (a) $\acute{\mu}$: *tó* ‘clothing’; *gá* ‘water snail’
- (b) $\grave{\mu}$: *ĩ* ‘caterpillar’; *mà* ‘path’

A.2.2 2μ

1. $R_{2\mu}$

- (a) $\acute{\mu}\acute{\mu}$: *bírí* ‘peccary’; *táké* ‘monkey’
- (b) $\acute{\mu}\grave{\mu}$: *yíò* ‘garden’; *pámà* ‘deer’
- (c) $\grave{\mu}\grave{\mu}$: *dòrù* ‘basket’; *nàsù* ‘river shrimp’

2. $R_{1\mu}$ -III $_{1\mu}$

(a) $\acute{\mu}$ - $\grave{\mu}$: *tó-mà* ‘pieces of clothing’; *gá-nà* ‘water snails’

(b) $\grave{\mu}$ - $\tilde{\mu}$: *ĩ-nà* ‘caterpillars’; *mà-mà* ‘paths’

A.2.3 3μ

1. $R_{2\mu}$ -III $_{1\mu}$

(a) $\acute{\mu}\acute{\mu}$ - $\grave{\mu}$: *bírí-nà* ‘peccaries’; *tǎké-nà* ‘monkeys’

(b) $\acute{\mu}\grave{\mu}$ - $\tilde{\mu}$: *yíò-mà* ‘gardens’; *pámà-nà* ‘deer’

(c) $\grave{\mu}\tilde{\mu}$ - $\tilde{\mu}$: *dòrù-mà* ‘basket’; *nàsù-nà* ‘river shrimp’

2. $R_{1\mu}$ -III $_{2\mu}$

(a) $\acute{\mu}$ - $\grave{\mu}\grave{\mu}$: *ó-hàò* ‘plantain leaf’

(b) $\grave{\mu}$ - $\acute{\mu}\grave{\mu}$: *bè-háò* ‘*huito* leaf’

A.2.4 4μ

1. $R_{2\mu}$ -III $_{2\mu}$

(a) $\acute{\mu}\acute{\mu}$ - $\grave{\mu}\grave{\mu}$: *másó-tòtò* ‘*ojé* plank’; *géré-tòtò* ‘*uvilla* plank’

(b) $\acute{\mu}\grave{\mu}$ - $\tilde{\mu}\tilde{\mu}$: *gáhě-tòtò* ‘*pashaca* plank’; *bísù-tòtò* ‘*guarioba* plank’

(c) $\tilde{\mu}\tilde{\mu}$ - $\acute{\mu}\tilde{\mu}$: *nàsò-tótò* ‘*apacharama* plank’; *èrò-tótò* ‘*tigre caspi* plank’

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