

Reconstructing prosodic phonological features in the Naduhup family

Patience Epps

University of Texas at Austin

pattieepps@austin.utexas.edu

1. Introduction

The phonological systems of northwest Amazonian languages present several prosodic (suprasegmental) features of typological and theoretical interest, most notably tone, vowel length, prosodic nasalization, and glottalization/laryngealization (e.g. Gomez-Imbert & Kenstowicz 2000, Kaye 1971, Stenzel 2007).

These features present significant challenges for both synchronic and diachronic analyses of these languages.

Their reconstruction is important both for our understanding of this region and its languages, and for a broader typology of the diachrony of prosodic features.

SOME MAJOR QUESTIONS:

- How have these prosodic features emerged diachronically, and how have the systems changed over time?
- How have these features been affected by processes of areal diffusion?
- What synchronic and diachronic relationships have pertained between particular distinct prosodic features?

The Naduhup language family provides an ideal context to explore these questions:

- Four languages, with evidence for two primary branches (Epps & Bolaños 2017):

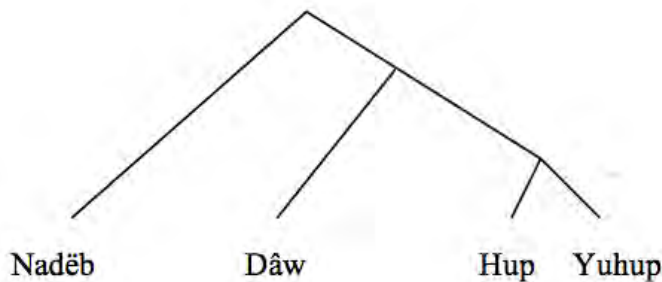
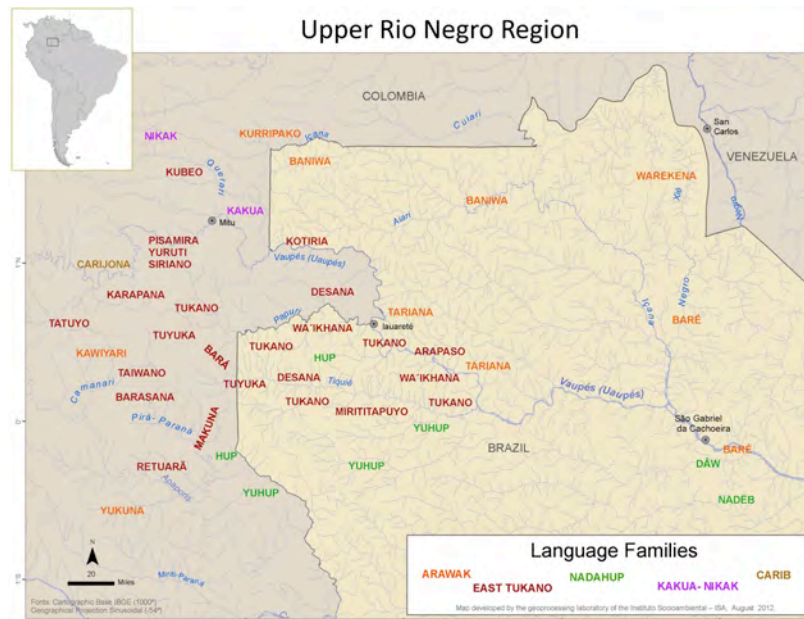


Figure 1. The Naduhup family (formerly ‘Makú’)

Data sources: Hup: Epps (2008a) and Epps fieldnotes; Yuhup: Ospina (2002), Martins (2005), Silva and Silva (2012), Epps fieldnotes; Dâw: S. Martins (2004), V. Martins (2005), Epps fieldnotes; Nadëb: Weir (1984), Martins (1999), Martins (2005); Epps preliminary fieldnotes

- Geographically ranged between East Tukanoan and North Arawakan languages, which themselves have relatively distinct prosodic profiles:



Map 1. Languages of the Upper Rio Negro region

- Evidence of considerable grammatical diffusion from neighboring languages – including in prosodic features (much more than in segmental/phonotactic features):

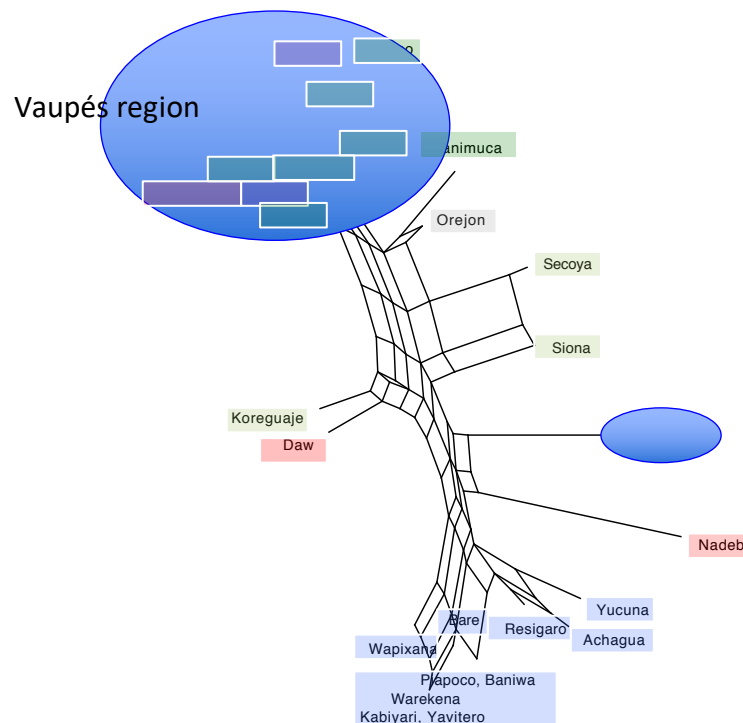


Figure 2. Splitstree similarity visualization for Upper Rio Negro languages on the basis of 13 prosodic features (tone, length, glottalization, nasalization)

GOALS OF THIS PAPER:

1) Nasalization

I argue that Proto-Naduhup had contrastive nasalization in both consonants and vowels; Hup/Yuhup underwent morpheme-level nasal spreading originating in vowels, leading to a merger of voiced oral stops and nasal consonants; likely interaction with glottalization.

2) Tone and vowel length

I argue that Proto-Naduhup had contrastive length, which gave rise to phonemic tone in Dâw, Hup, and Yuhup.

Contact with Tukanoan languages played a role in the emergence of both nasal prosody and tone.

Still tentative – more synchronic work needed, esp. for Nadëb (cf. Martins 2005).

2. Naduhup phonological inventories

HUP/YUHUP	DÂW	NADĒB
Tone	Tone & Length	Length
Prosodic ns lz.	Segmental ns lz.	Segmental nasalization
Glottalized plosives/glides	Glottalized sonorants	Glottalization limited/unclear

Phonotactics: Strong preference for CVC syllable structure and 1 syllable – 1 morpheme correspondence

a) Hup (and Yuhup, cf. variations across analyses)

Plosives: p, t, c, k, b, d, ʃ, g, ʔ (onsets/codas – oral contexts: [d/dⁿ, b/b^m, ʃⁿ, g^ŋ])

Fricatives: ɕ, h

Approximants: w, j

Glottalized:

plosives, neutralized for voicing: b', d', ʃ', g'

(onsets: laryngealized V, codas: voiceless stop)

approximates: w', j'

Vowels: i, ĩ, u, e, ə, o, æ, ɔ, a

Nasalization: morpheme-level prosody; voiced plosives and nasals are allophones

Tone: rising and high/falling (stressed syllables only; one per word)

b) Dâw

Plosives: p, t, c, k, b, d, ʃ, g, ʔ (onsets/codas: [c'/c, k'/k, d/d̰, b/b̰, ʃ̰, g̰])

Nasals: m, n, ɲ, ŋ (coda w/oral vowel: [ᵇm, ᵈn, ʲɲ, ᵑŋ])

Fricatives: ʃ, x, h

Approximants: w, j

Lateral: l

Glottalized sonorants: m', n', ɲ', ŋ', l', w', j'

Vowels: i, ĩ, ī, ī̃, u, ũ, e, æ, æ̃, ə, o, ɔ, ɔ̃, a, ã

Tone and length: rising and falling contours on long Vs; short Vs atonal

c) Nadëb

Plosives: p, t, k, b, d, ʃ, g, ʔ (onsets/codas: [d/d̥, b/b̥, c'/ʃ̥, k'/g̥])

Nasals: m, n, ɲ, ŋ (coda w/oral vowel: [ᵐm, ᵐn, ɲ̃, ŋ̃])

Fricatives: ʃ, h

Approximants: w, j

Lateral: r

Glottalized consonants: status unclear

Vowels: i, ī, ĩ, ī, u, ū, e, æ, ǣ, ə, ʌ, ʌ̃, o, ɔ, ɔ̃, a, ǣ

Tone and length: rising and falling contours on long Vs; short Vs atonal

3. Nasal phenomena in diachronic perspective

Oral vowel:

	Nadëb	Dâw	Hup	Yuhup
acarâ fish	dom [doᵐm]	dom [doᵐm]	d'ób [dôᵐbᵐ]	d'ôb [dôᵐbᵐ]
daughter	to:g [to:ḡ]	tô:g [tô:ḡ]	tôg [tôgᵐ]	tôg [tôgᵐ]
bite	gə:ʃ [k'ə:ʃ]	k'ə:ʃ [k'ə:ʃ]	g'əç- [k'əç]	g'əç- [k'əç]
stump	--	nîd [nîd̥]	dîd [dîdᵐ]	dîd [dîdᵐ]
ant sp.	--	mob [mob̥]	bobób [bobôᵐbᵐ]	bobôb [bobôᵐbᵐ]

Nasal vowel:

	Nadëb	Dâw	Hup	Yuhup
1sg	ʔih	ʔāh	~ʔáh [ʔáh]	~ʔāh [ʔāh]
lake	mō:h	mô	~bóh [móh]	~bōh [mōh]
louse	nā:m	nā̃:m	~dăb [nẵm]	~dăb [nẵm]
honey	--	nā̃:g [nẵ:g]	~dăg [nẵŋ]	~dăg [nẵŋ]

Hup and Yuhup oralized/nasalized the entire morpheme according to the oral/nasal quality of the vowel.

Contour segments:

- Nadëb and Dâw contour segments = nasal Cs, codas pre-oralized by oral vowel
- Hup and Yuhup contour segments = allophones of voiced stops/nasals in oral contexts
Contour realization has been generalized as a feature of voiced stops in oral contexts (esp as codas), relevant to their contrast with (unreleased) voiceless stops; no longer easily analyzable as a phonetic effect involving partial oralization of an underlying nasal C by an oral V (cf. Wetzels 2008)

Glottalized stops/nasals?

	Nadëb	Dâw	Hup	Yuhup
acarâ fish	dom [doᵐm]	dom [doᵐm]	d'ób [dôᵐbᵐ]	d'ôb [dôᵐbᵐ]
rain	doʃ	doʃ	d'ôʃ [dôʃᵐ]	d'ôʃ [dôʃᵐ]
fish poison	du:j	dũ:ʃ	d'ũç [dũç]	d'ũç [dũç]
horsefly	buŋ, buk	bux	b'úh [búh]	b'ũh [bũh]
traira fish	bo:j	bô:j	b'ôj [bôj]	b'ôj [bôj]
fungus	pəm [pəᵐm]	pəm'	péb' [pép]	pəb' [pəp]
throat	--	ʔǃ:ŋ'	~ʔǃg' [ʔǃŋ']	--
knead	--	n'í:w'	~d'aw' [nẵw']	~d'aw' [nẵw']
earthworm	--	m'ĩʔ	~b'ĩʔ [m'ĩʔ]	~b'ĩʔ [m'ĩʔ]

	Nadëb	Dâw	Hup	Yuhup	RECONST.	Martins 2005
Onset	p	p	p	p	*p	*p
Coda	p, b	p	p	p	*p	*p
Onset	m	m	b [m,b]	b [m,b]	*m	*b
Coda	m [m, ^b m]	m [m, ^b m]	b [m,b ^m]	b [m,b ^m]	*m	*b
Onset	b	b	b'	b'	*b	*p'
Coda	b [b [̣]]	b [b [̣]]	b [m,b ^m]	b [m,b ^m]	*b	*p'
Onset	?	m'	b' [m']	b' [m']	*m' ?	*p'
Coda	?	m',b	b' [m',p]	b' [m',p]	*m' ?	*V?

- Relatively few instances of N' or of coda C' in any of the languages – vastly outweighed by b' and d' in onsets in Hup.
- Suggests that glottalization on obstruents may be an innovation in H/Y, associated with loss of segmental oral/nasal contrast.
- Much still to work out regarding glottalization, especially wrt Nadëb!

NASAL PHENOMENA: SUMMARY

- Proto-Naduhup probably had voiceless stops, voiced stops, and nasals
- Hup/Yuhup lost the voiced stop-nasal contrast via spreading of nasality throughout the morpheme, triggered by the nasal/oral quality of the vowel
- The synchronic phonological status of contour segments in Nadëb/Dâw is distinct from that in Hup/Yuhup
- The process appears to have involved the addition of glottalized obstruents in Hup/Yuhup
- **The role of language contact:** Tukanoan languages probably motivated the development of morpheme-level nasal prosody in Hup/Yuhup, and possibly also the development/spread of glottalized consonants

4. Tone and vowel length: Synchronic distributions

(Preliminary results; measured across multiple words pronounced by one to three speakers.)

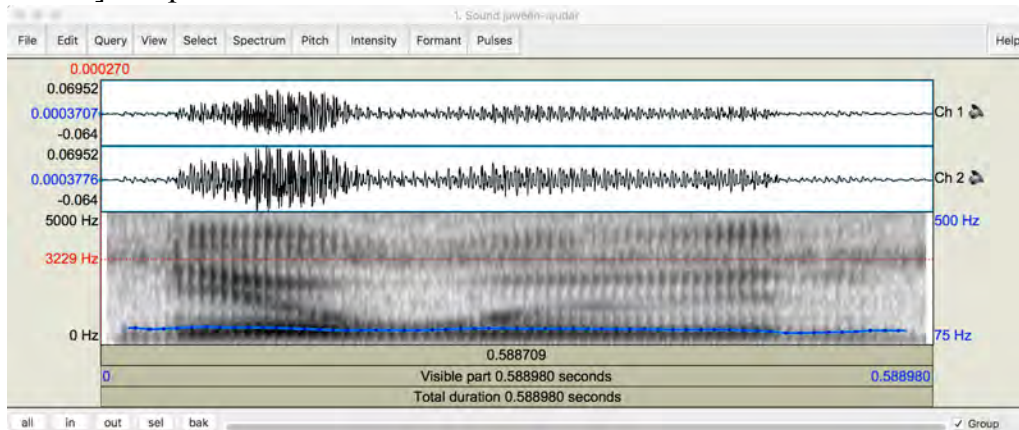
a) Nadëb (Barbosa 2005, V. Martins 2005, Epps fieldnotes)

Phonemic contrast between long and short vowels:

- (1) *wim* 'squirrel' (Barbosa 2005:50)
wi:m 'bat'

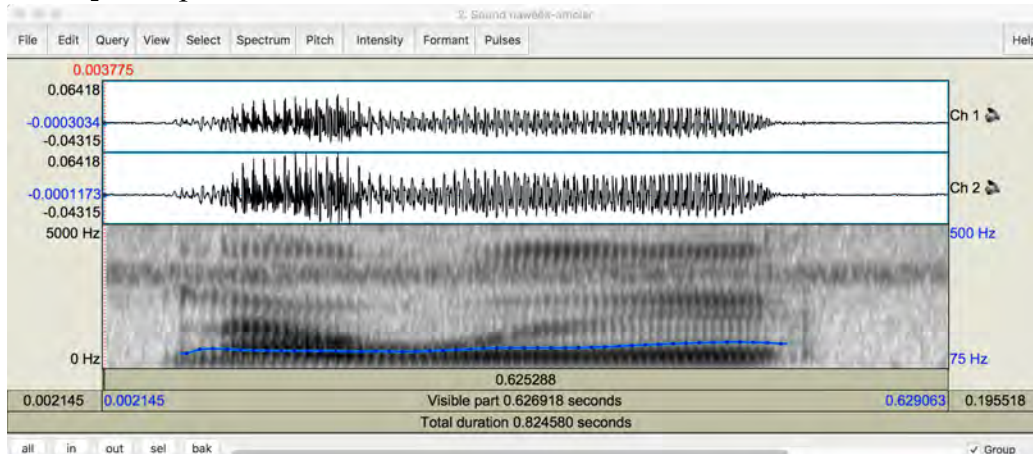
Long vowels tend to be pronounced with a falling contour when the coda consonant is voiced:

(2) *jawə:n* [jawə:dn] ‘help’



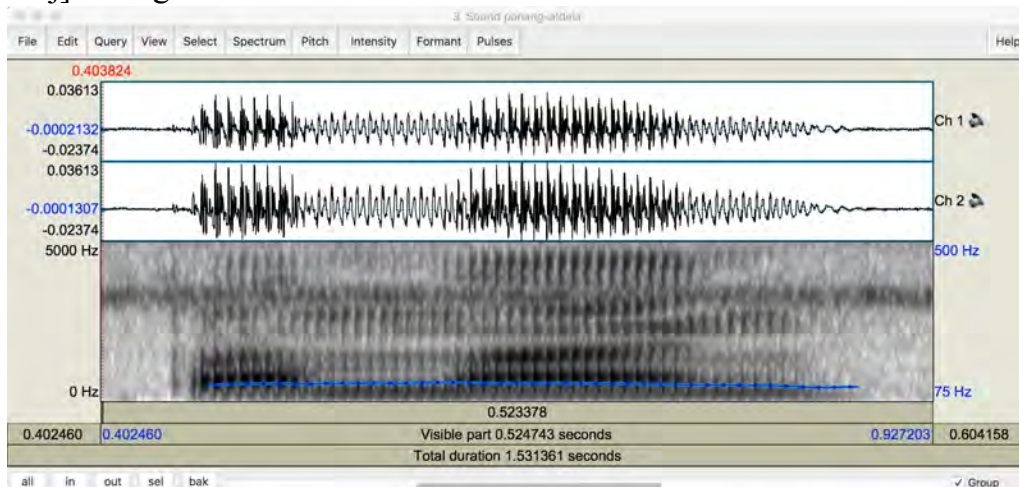
And with a rising contour when the coda consonant is voiceless:

(3) *nawə:k* [nawə:k] ‘sharpen’



While short vowels are level/high:

(4) *panaŋ* [panaŋ] ‘village’



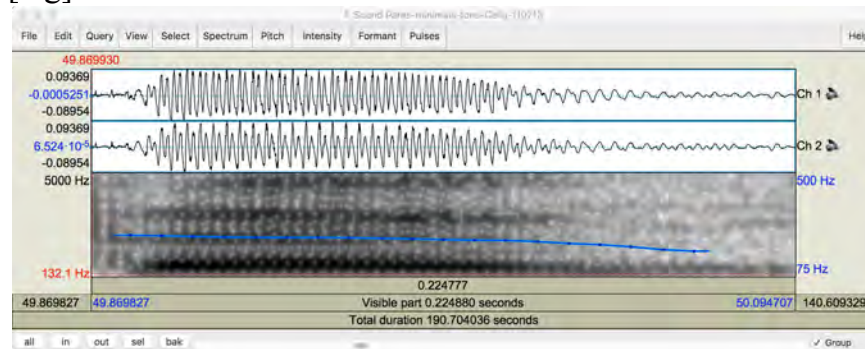
b) Dâw (S. Martins 2004, V. Martins 2005, Epps fieldnotes)

Tone contrasts occur on accented syllables: HL and LH on long vowels, no tone (phonetically H) on short vowels. Unaccented syllables are atonal and phonetically L.

- | | | | | | | | |
|-----|-------------|--------|------------------------|-----|------------|--------|------------------|
| (5) | <i>pɔj</i> | [pɔj] | ‘spirit’ | (6) | <i>təg</i> | [təg] | ‘tooth’ |
| | <i>pɔ̃j</i> | [pɔ̃j] | ‘surubim catfish’ | | <i>tâg</i> | [tâ:g] | ‘core’ |
| | <i>pôj</i> | [pôj] | ‘palm for roof thatch’ | | <i>tǎg</i> | [tǎ:g] | ‘to get used to’ |

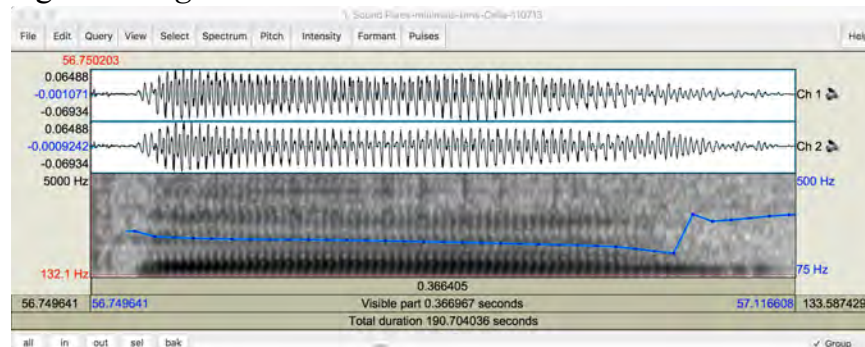
Word-final CV syllables have default long vowel and falling contour: *tû* [tû:] ‘ground’

- (7) Short vowel: *təg* [təg] ‘tooth’



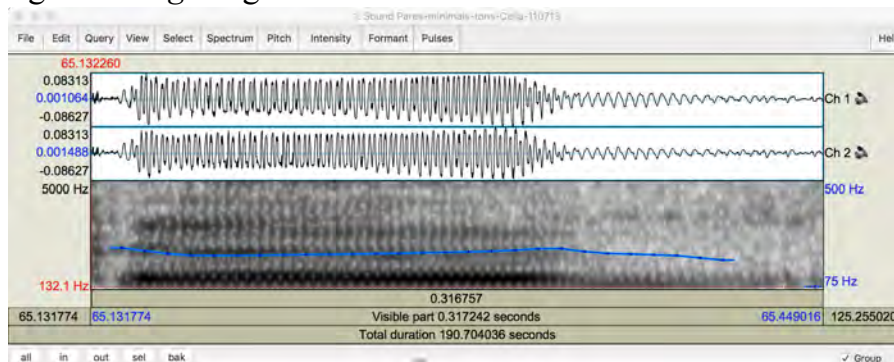
Total: 0.22 V: 0.14

- (8) Long vowel, falling tone: *tâ:g* ‘core’



Total: 0.36 V: 0.26

- (9) Long vowel, rising tone: *tǎ:g* ‘to get used to’

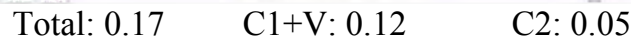


Total: 0.31 V: 0.18

Tone contrasts occur on accented syllables: LH and H (allophone HL where coda is voiced). Unaccented syllables are atonal and phonetically L. Tonal contrasts are not realized on verbs.

- Word-final CV syllables have default vowel lengthening and falling contour: *j'ó* [tʃ̥ɔ̃ː] ‘flower’

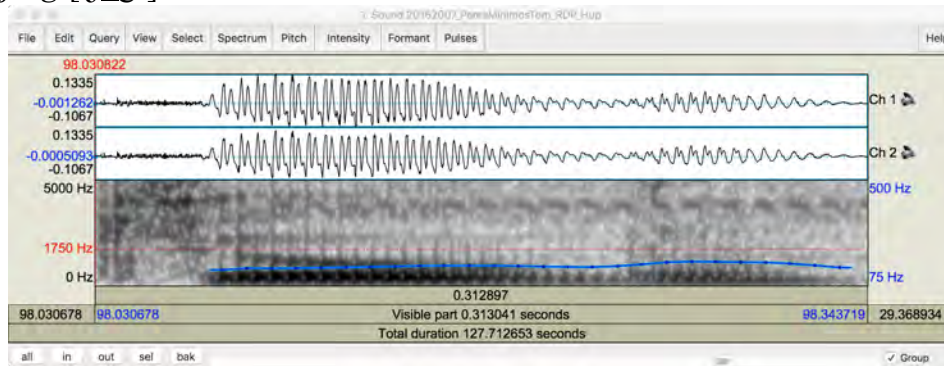
(12) High tone: $\sim tóh$ [t^hh] ‘pig’



- Total: 0.18 C1+V: 0.13 C2: 0.05

- Total: 0.43 C1: 0.16 V: 0.11 C2: 0.16

(15) Rising tone: *ʃ* 'ũg [tʃũg¹] 'forest'



Total: 0.31 C1: 0.05 V: 0.11 C2: 0.15

d) Yuhup (Brandão & Parker 1999:300, Ospina 2002:121, V. Martins 2005:94, Silva & Silva 2012:82, Epps fieldnotes, Storto fieldnotes)

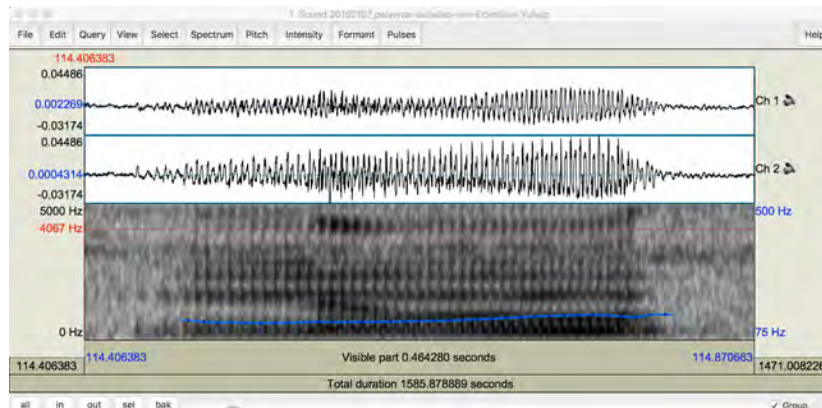
Tone contrasts occur on accented syllables: LH and HL. Unaccented syllables are atonal and phonetically L. (Some disagreement across analyses about the phonological status of high pitch.) Tonal contrasts are not realized on verbs (Ospina 2002:290).

(16) *~dũh* [nũh] 'head'
~dũh [nũh] 'tapioca'

Word-final CV syllables have default vowel lengthening and rising contour: *ʃ* 'ũ [tʃũ:] 'flower'.

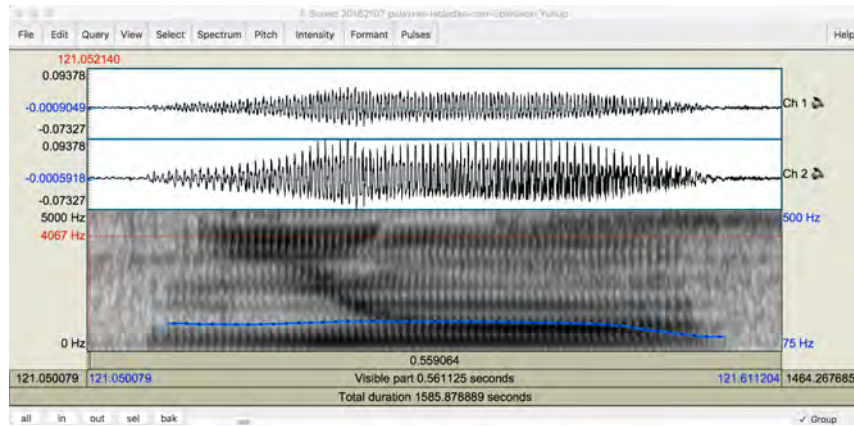
Vowels with contour tones are longer than vowels with phonetic high/low tones (Martins 2005:96).

(17) Rising tone: *~dũh* 'head'



Total: 0.37 V: 0.24

(18) Falling tone: ~jôh ‘medicine’



Total: 0.46 V: 0.28

5. Diachrony of tone and vowel length in Naduhup

Sample cognate sets showing regular correspondences among phonemic tone values and vowel length:

A. voiceless coda (DYH)	Phonemic:	<i>VV</i>	<i>LH</i>	<i>LH</i>	<i>HL</i>
	Non-contrastive:	<i>[LH]</i>	<i>[long]</i>	<i>[marginally long]</i>	<i>[marginally long]</i>
		Nadëb	Dâw	Hup	Yuhup
	tobacco	<i>hũ:t</i>	<i>hũt</i>	<i>~hũt</i>	<i>~hũt</i>
	bird	<i>tawə:d</i>	<i>təwăt</i>	<i>wět (dove sp.)</i>	<i>wět</i>
B. voiced coda (DYH)		<i>ga:d</i>	<i>kět</i>	<i>g'ăet</i>	<i>g'ăet</i>
	tapioca	<i>nũ:h</i>	<i>nũh</i>	<i>~dũh</i>	<i>~dũh</i>
		Nadëb	Dâw	Hup	Yuhup
	achiote	<i>hə:w</i>	<i>həw</i>	<i>hăw</i>	<i>hăw</i>
	louse	<i>na:m</i>	<i>nêm</i>	<i>~dăem</i>	<i>~dăem</i>
C. any coda (DYH)		<i>tə:g</i>	<i>tăg</i>	<i>tэг</i>	<i>tэг</i>
	(pubic) hair	<i>fə:n</i>	<i>fân</i>	<i>~căd</i>	<i>~căd</i>
		Nadëb	Dâw	Hup	Yuhup
	fruit	<i>ʔag</i>	<i>ʔeg</i>	<i>ʔăg</i>	<i>ʔăg</i>
	bark	<i>bəg</i>	<i>bik</i>	<i>b'ók</i>	<i>b'ók</i>
D. no coda (DYH)		<i>dab</i>	<i>dəp</i>	<i>d'áp</i>	<i>d'áp</i>
		Nadëb	Dâw	Hup	Yuhup
	flower	<i>ʔə:h</i>	<i>ʔô</i>	<i>ʔ'ô</i>	<i>ʔ'ô</i>
	wing	<i>ta]kəg</i>	<i>xê</i>	<i>kê</i>	<i>kê</i>

CHALLENGES TO RECONSTRUCTION: TONE VS. LENGTH?

- Two primary branches of the family; primary contrast is represented by length in one (Nadëb), tone in the other (Dâw-Hup-Yuhup).
- Contact motivation is plausible for both pathways: contrastive tone exists in Tukanoan neighbors, contrastive vowel length in Arawakan.
- Typological evidence that transitions from length > tone and tone > length are essentially equally likely (Lehnert-LeHouillier 2013).

PREVIOUS APPROACHES TO THE PROBLEM:

- V. Martins (2005:199ff): Reconstructs HL vs. LH tone, complex subsequent developments in daughter languages. Reconstruction is complicated by erroneous data, particularly for Hup and Yuhup.
- Barboza (2016:71-74): Reconstructs H vs. LH tone; posits development of contrastive falling contour in Dâw conditioned by voiced coda, tone reversal in Yuhup, loss of tone in Nadëb.

KEY EVIDENCE FOR A SOLUTION:

- All four languages have a rising-falling contour, but in some this is phonemic and in others allophonic.
- In Dâw (historically) and Nadëb (synchronically), this contour is conditioned by voiced codas.

A RECONSTRUCTION:

1. PROTO-NADUHUP

- Length
- Allophonic rising-falling contour conditioned by voiceless vs. voiced codas (as in Nadëb) – in keeping with cross-linguistic tendency for voiced consonants to lower f₀ on adjacent vowels (though in many other cases this relates to *onsets*, not codas; see e.g. Haudricourt 1954, Kingston 2011, Yip 2007)

2. PROTO-DÂW-HUP-YUHUP

- Emergence of contour pitch as a salient correlate of length – encouraged by contact with Tukanoan (and in keeping with cross-linguistic tendency for contour tones to pattern together with vowel length; e.g. Lehiste 1976, Gordon 2001, Yu 2010)

3. Dâw

- Phonologization of LH-HL contrast on long vowels: LH with voiceless codas, HL with voiced codas (including phonetically lengthened vowel in word-final CV syllables)
- Maintenance of length as a secondary contrast, with short vowel figuring as atonal (phonetically high) within the new tonal system

4. PROTO-HUP-YUHUP

- Increased salience of contour as length is lost – continued relevance of Tukanoan influence

5. Hup

- Phonologization of LH contour + generalization across all long vowels as length is lost – selection of LH option likely motivated by distinctive contrast with H tone on short vowels (and possibly by cross-linguistic tendency to associate a rising contour with a longer vowel length; see Yu 2010)
- Phonologization of H tone on former short vowels (and on word-final CV syllables, with falling allophone in context of voiced codas)
- Phonetic vowel lengthening in contour tone environments

6. Yuhup

- Phonologization of HL contour + generalization across all long vowels as length is lost
- Development of LH tone on former short vowels (and word-final CV syllables) – motivated by need to distinguish between these and falling tone (possibly aided by cross-linguistic tendency for higher f₀ to be heard as having a longer vowel; Yu 2010)
- Phonetic vowel lengthening in contour tone environments

STRENGTHS OF THIS ANALYSIS:

- Since both length and falling/rising tone contours are attested across both branches of the family, we are obliged to reconstruct both – we need only determine which is phonemic in Proto-Naduhup.
- If we reconstructed (phonemic) tone in Proto-Naduhup, we would need to assume the unitary phonological status of a contour tone that could be realized as either rising or falling – appears to be typologically implausible.
- Given that length plays at least a marginally contrastive role in both branches, reconstructing phonemic length is more parsimonious.
- There is no need to motivate a tone reversal in Yuhup (the falling-tone value was simply inherited and generalized).
- We have an explanation for the fact that Yuhup allows both LH and HL contours with voiceless codas, whereas Hup allows only LH and H (with HL allophone only with voiced codas) – this follows from the phonologization of short vowels > H in Hup vs. > LH in Yuhup.
- Steps in the proposed process throughout the family are phonetically motivated.

THE ROLE OF LANGUAGE CONTACT:

- As with prosodic nasalization, the length > tone change was likely motivated by contact with the tonal Tukanoan languages of the Vaupés.
- But it is also possible that Nadëb's retention of length was simultaneously reinforced by the presence of phonemic length in neighboring Arawakan languages.
- Whether contact with Arawakan might have played a role in the development of length in Proto-Naduhup is an open question.

6. Conclusion

Evidence for contrastive length in Proto-Naduhup, with subsequent tonogenesis in Dâw, Hup, and Yuhup.

Evidence that Proto-Naduhup had a contrast among voiceless stops, voiced stops, and nasals, and that nasality as a morpheme-level prosody developed in Hup/Yuhup, with additional likely interaction with glottalization.

The tonogenesis account adds support to a Dâw-Hup-Yuhup subgroup (cf. Epps & Bolaños 2017), although there is no evidence that the phonologization of tone was completed in a DHY common ancestor.

The development of prosodic phenomena within the family is consistent with a wider view of language contact in the region: Hup and Yuhup have experienced heavy contact with Tukanoan languages, and Dâw more marginal contact.

Insights into the diachrony of prosodic phenomena:

- Morpheme-level nasal prosody is relatively rare, and little is known about its emergence; vowels may play a triggering role
- Possible further clues regarding the diachronic interaction between nasalization and glottalization
- Insights into the diachrony and synchronic relevance of contour segments (as oralized nasals vs. segments in their own right)
- Much of what we know about the mechanics of tonogenesis draws on languages with limited codas; this analysis demonstrates the relevance of voicing quality in *following* consonants.

Acknowledgements

Funding from: UT-FAPESP, National Science Foundation (HSD0902114 and DDRIG-BCS0111550), American Council of Learned Societies, Fulbright-Hays, LLILAS/Mellon, and Max Planck Institute EvA. I am grateful to the Hupd'äh, Dâw, and other peoples of the Rio Negro region for their friendship and collaboration, and to the Museu Paraense Emilio Goeldi, FOIRN, and FUNAI in Brazil. Thanks to Tony Woodbury and John Kingston for thoughts about tone, and to fieldwork collaborators Danilo Paiva Ramos, Luciana Storto, Karolin Obert, Clariana Assis, Sunkulp Anathanarayan, Jessica Costa, Wallace Andrade.

References

- Barbosa, Jefferson F. 2005. Descrição fonológica da língua Nadêb. MA thesis, Universidade de Brasília.
- Barboza, Lucas Cavalini. 2016. Relatório de qualificação do projeto de pesquisa ‘Aspectos da glotalização na língua Dâw: um estudo de fonética experimental’. Qualification paper, University of São Paulo.
- Brandão Lopes, Aurise and Steve Parker. 1999. Aspects of Yuhup phonology. *International Journal of American Linguistics* 65.3:324-342.
- Epps, Patience and Katherine Bolaños. 2017. Reconsidering the ‘Makú’ family of northwest Amazonia. *International Journal of American Linguistics* 83.3:467-507.
- Gomez-Imbert, Elsa, and Michael Kenstowicz. 2000. Barasana tone and accent. *International Journal of American Linguistics* 66:419–63.
- Gordon, Matthew. 2001. A typology of contour tone restriction. *Studies in Language* 25(3):423-462.
- Haudricourt, A. G. 1954. Comment reconstruire le chinois archaïque. *Word* 10:351-369.
- Kaye, Jonathan D. 1971. Nasal harmony in Desano. *Linguistic Inquiry* 2:37–56.
- Kingston, John. 2011. Tonogenesis. *The Blackwell Companion to Phonology*, ed. by Marc van Oostendorp, Colin J. Ewen, Elizabeth Hume and Keren Rice. Blackwell.
- Lehiste, Ilse. 1976. Influence of fundamental frequency pattern on the perception of duration. *Journal of Phonetics* 4: 113–117.
- Lehnert-LeHouillier, Heike. 2013. From long to short and from short to long: Perceptual motivations for changes in vocalic length. In *Origins of Sound Change*, ed. by Alan C. Yu. Oxford: Oxford University Press.
- Martins, Silvana A. 2004. Fonologia e gramática Dâw. PhD dissertation, Vrije Universiteit, Amsterdam. Amsterdam: LOT.
- Martins, Valteir. 2005. Reconstrução fonológica do Protomaku Oriental. PhD diss., Vrije Universiteit, Amsterdam. LOT publications series.
- Ospina Bozzi, Ana María. 2002. Les structures élémentaires du Yuhup Maku, langue de l’Amazonie Colombienne: Morphologie et syntaxe. PhD dissertation, Université Paris 7 – Denis Diderot.
- Silva, Cácio and Elisângela Silva. 2012. *A língua dos Yuhupdeh: Introdução etnolinguística, dicionário yuhup–português e glossário semântico-gramatical*. São Gabriel da Cachoeira: Pró-Amazônia.
- Stenzel, Kristine. 2007. Glottalization and other suprasegmental features in Wanano. *International Journal of American Linguistics* 73: 331–66.
- Wetzels, Leo. 2008. Thoughts on the Phonological Interpretation of {Nasal, Oral} Contour Consonants in some Indigenous Languages of South-America. *Abordagens em Fonética e Fonologia. Estudos Auditivos, Acústicos e Perceptivos. Modelos de Análise Fonológica de Ontem e de Hoje. Número Especial da Revista Alfa*, 52,2. Universidade Estadual Paulista (UNESP).
- Yip, Moira. 2007. Tone. In *The Cambridge Handbook of Phonology*, ed. by Paul de Lacy, pp.195-227. Cambridge: Cambridge University Press.
- Yu, Alan C. L. 2010. Tonal effects on perceived vowel duration. In *Laboratory Phonology*, ed. by C. Fougerson, B. Kühnert, M. D’Imperio, and N. Vallée, pp.151–168. Berlin: Mouton de Gruyter.