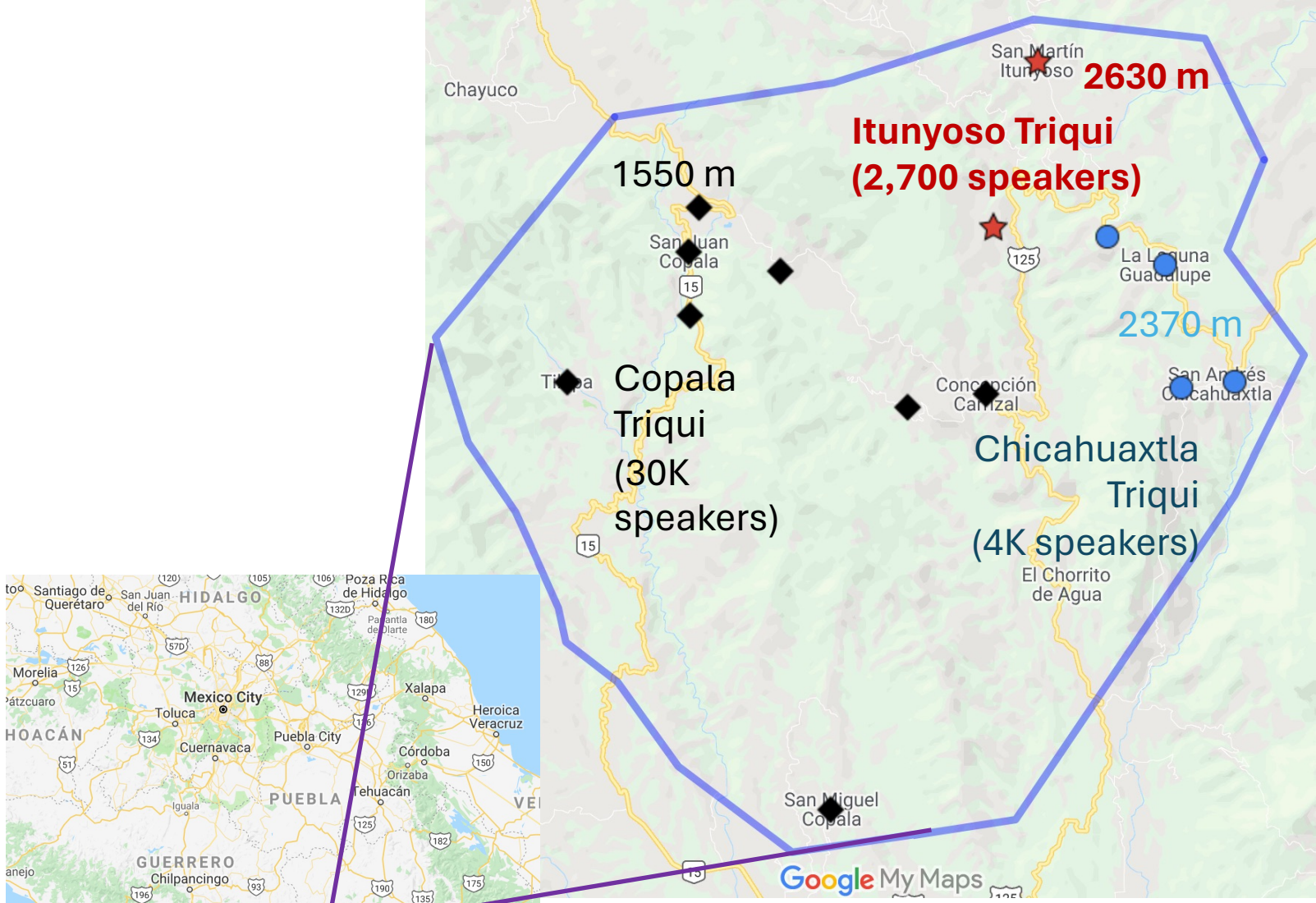
Motivating the prosodic hierarchy in Itunyoso Triqui

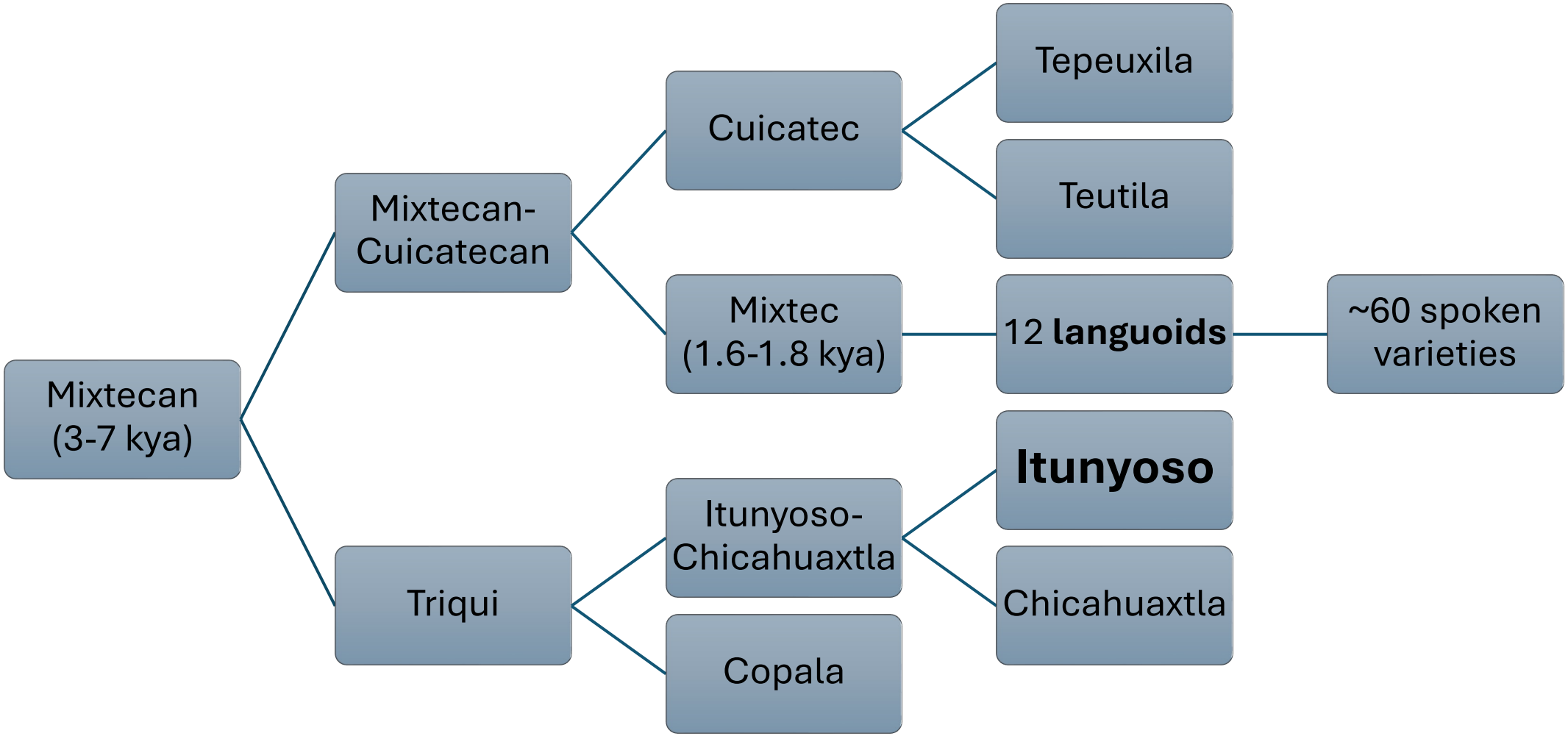
Christian DiCanio
University at Buffalo
cdicanio@buffalo.edu

Triqui languages

- 3 major language variants with limited mutual intelligibility.
- All complex tone languages within the Mixtecan family.
- Average distance between the major Triqui regions is ~5 km, but it is very mountainous terrain with large elevation differences.



Genetic affiliation (Otomanguean: Eastern)



Scientific questions

- Prosodic phrasing is often motivated by variable suprasegmental phenomena (pitch, lengthening, phonation type, etc) in different languages (Bennett and Elfner, 2019).

- Given the extremely high functional load of suprasegmental contrasts within words in Otomanguean languages, such variable phenomena are much harder to examine (DiCanio and Bennett, 2020). Though, domains within the *tonal phonology* may be revealing.

- Can we motivate *some sort of* prosodic hierarchy in Triqui?

Status of my scholarship on Itunyoso Triqui

- 2004 – 2008 Dissertation research, focus on phonetics and phonology of tone/phonation/length.
- 2009 – 2014 Post-doctoral research (France, US), focus on perception of tone, phonation; tonal coarticulation
- 2014 – 2019 NSF DLI/DEL documentation grant, focus on text collection, transcription, morphophonology, and prosody
- 2020 – 2022 Continued focus on translation and documentation; UB Humanities institute grant
- **2023 – present Focus on reference grammar; NEH fellowship grant**
- 2004 – present *The Triqui-Spanish dictionary*

Roadmap

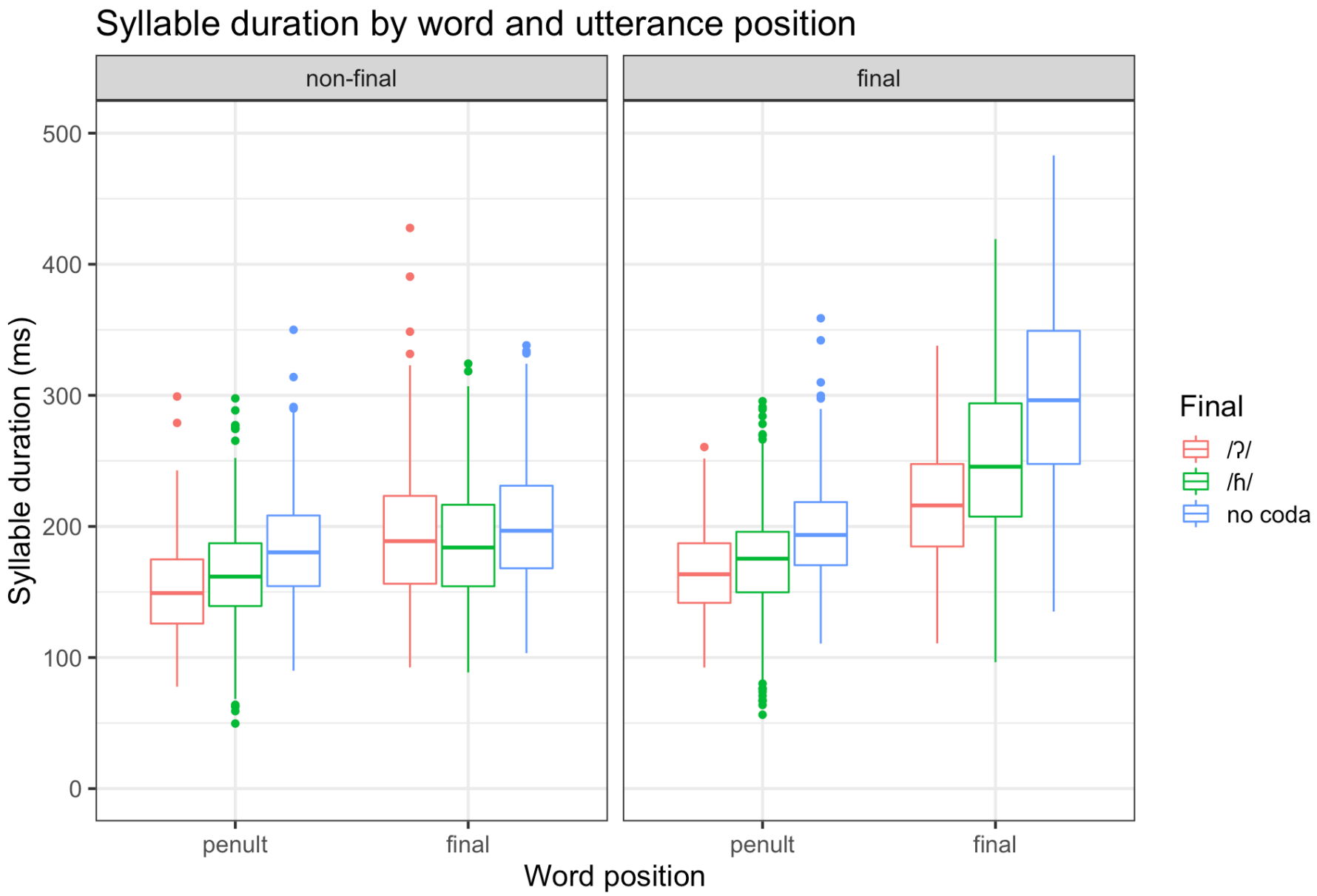
1. **Final stress and motivating the iambic foot** with evidence from distributional asymmetries and foot-level phonological processes.

2. Iambic foot with unfooted extrametrical syllables on the left edge that constitute a **prosodic word** (cf. Hernández Mendoza, 2017, in Chicahuaxtla Triqui), with evidence from tonal distribution, tonal morphophonology, and speech reduction.

3. Prosodic word compounds as a domain for the phonological phrase?

Phonetic possibilities are functionally limited

- 9 lexical tones (5 levels, 4 contours) that are also heavily used in the morphology. There is **little space for shifting F0.**
- Half of Triqui morphemes end with open syllables and half end with coda glottal consonants. These are often realized with non-modal phonation. There is **little space for shifting voice quality.**
- Duration is the main cue used by speakers and listeners in distinguishing CV: and CVʔ/CVh syllables (DiCanio, 2012, 2014). There is **little space for shifting duration.**
- There is *stem*-final and utterance-final lengthening, but **no noticeable change to tones in different prosodic positions** and **no declination** (DiCanio and Hatcher, 2018).



II. Final stress

Final syllable lengthening and utterance-final lengthening

(DiCanio and Hatcher 2018)

Tone in monosyllables and disyllables

ββeh$^{(3)5}$	‘straw mat / petate’	tʃi^{3ʔ}joh^{5}	‘swamp / ciénaga’
ββe^{4}	‘hair / pelo’	ka^{3}to^{4}	‘shirt / camisa’
nne^{3}	‘plough / arado’	na^{3}ɾa^{3}	‘refill / rellenar’
nne^{2}	‘to lie / mentir’	a^{2}mə̃^{2}	‘when / cuando’
nne^{1}	‘naked / desnudo’	na^{1}ka^{1}	‘new / nuevo’
nne^{32}	‘water / agua’	a^{3}βi^{32}	‘leave / salir’
nne^{31}	‘meat / carne’	a^{3}nĩ^{1}	‘explode / estallar’
tʃe^{43}	‘my father / mi padre’	a^{4}ne^{43}	‘chew / masticar’
ᵑga^{13}	‘when (SUBORD) / cuando’	kə̃^{1}ʔə̃^{3}	‘four (N) / cuatro'

Morphological load of tone

- Sole exponent for **verbal aspect**
- Exponent for **1s, 1p clitics**
- Exponent of **topical** and **emphatic/optative marking**

tʃa^{43}	tʃa^{2}
PERF.eat	POT.eat
tʃah^{4}	tʃah^{1}
PERF.eat.1s	POT.eat.1s
tʃoʔ^{4}	tʃoʔ^{2}
PERF.eat.1p	POT.eat.1p
tʃah^{3}	tʃah^{23}
PERF.eat.TOP	POT.eat.TOP
tʃaʔ^{4}	tʃaʔ^{24}
PERF.eat.EMPH	POT.eat.OPT

Tonal contrasts by final syllable type

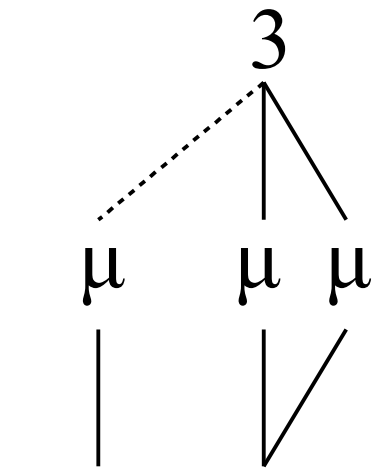
Table 5: Tonal patterns on disyllabic words

	Open σ		Coda /ɦ/		Coda /ʔ/	
4.4			tʃa^{4}tʃiɦ^{4}	`tarantula'	a^{4}tʃĩʔ^{4}	`we pass'
4.43	a^{4}tʃĩː^{43}	`to pass'				
3.45			a^{3}tʃĩɦ^{45}	`to ask for'		
3.4	ti^{3}tĩː^{4}	`to roast'	ti^{3}kiɦ^{4}	`to shove in'	a^{3}tʃĩʔ^{4}	`we ask'
3.3	a^{3}tʃĩː^{3}	`to lack'	a^{3}tʃiɦ^{3}	`to grow'	a^{3}tʃĩʔ^{3}	`to bury'
3.2	ta^{3}ʔŋgoː^{2}	`each'	tʃa^{3}tʃiɦ^{2}	`sheep'		
3.1	ka^{3}tĩː^{1}	`hip'	k^{w}e^{3}ʔniɦ^{1}	`Wednesday'	si^{3}siʔ^{1}	`sweet (N)'
3.43	ka^{3}stiː^{43}	`oil'				
3.32	ti^{3}niː^{32}	`nopal cactus'				
2.3	nu^{2}mĩː^{3}	`tied'	ru^{2}mĩɦ^{3}	`bored'	ta^{2}kaʔ^{3}	`bent'
2.2	ku^{2}ɾãː^{2}	`clear'	tʃi^{2}koɦ^{2}	`jealous'	ka^{2}ɾaʔ^{2}	`wide'
2.32	ma^{2}ɾeː^{32}	`green'				
1.3	ja^{1}koː^{3}	`poor'	nu^{1}k^{w}aɦ^{3}	`hard, strong'		
1.1	ka^{1}siː^{1}	`white'	ni^{1}tʃiɦ^{1}	`fried'	ni^{1}tʃũʔ^{1}	`near'

DiCanio et al 2020

Moraic structure and leftward tonal association

- Final syllables are bimoraic.
- In most morphemes, the penultimate syllable tone is predictable based on **the final tone**. Tones *associate* to penultimate syllables.
- This is argued for *all* Triqui languages (DiCanio 2008, DiCanio et al 2020, Hernández Mendoza 2017, Hollenbach 1984).

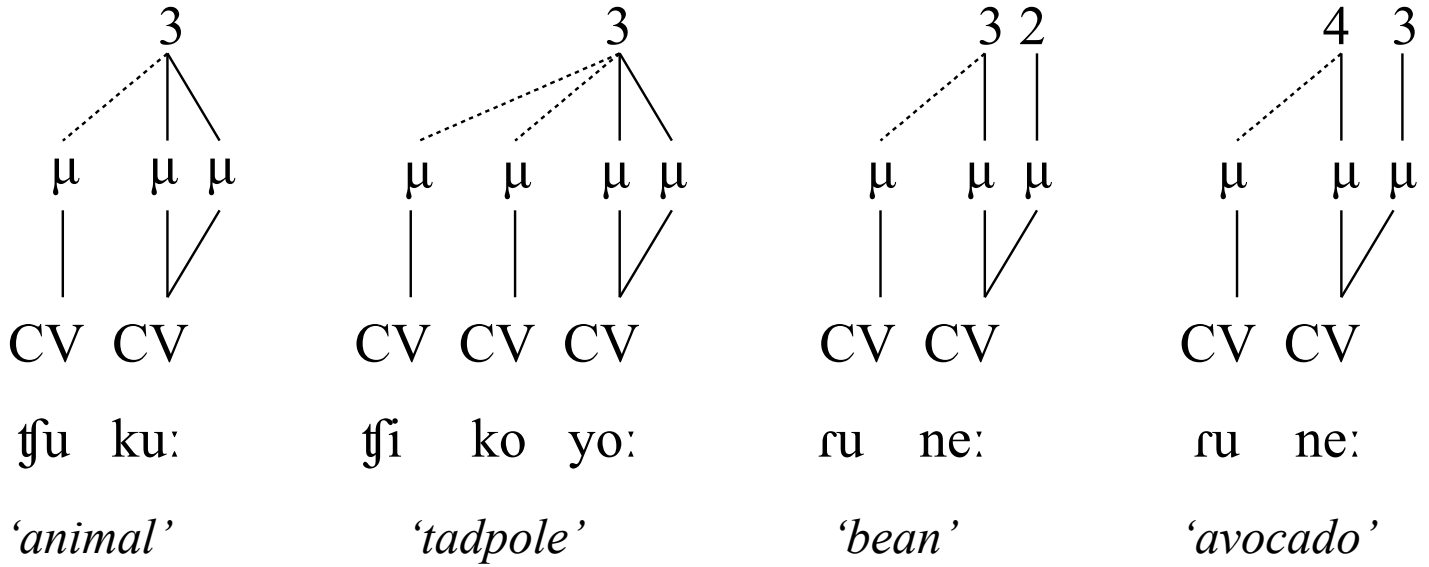


'animal'

Leftward association convention:

Assign a tone or tone contour, right to left, starting on the rightmost mora (tone-bearing unit) of the word and then associate the leftmost tone in the word to all preceding moras within the word.

(DiCanio et al 2020)



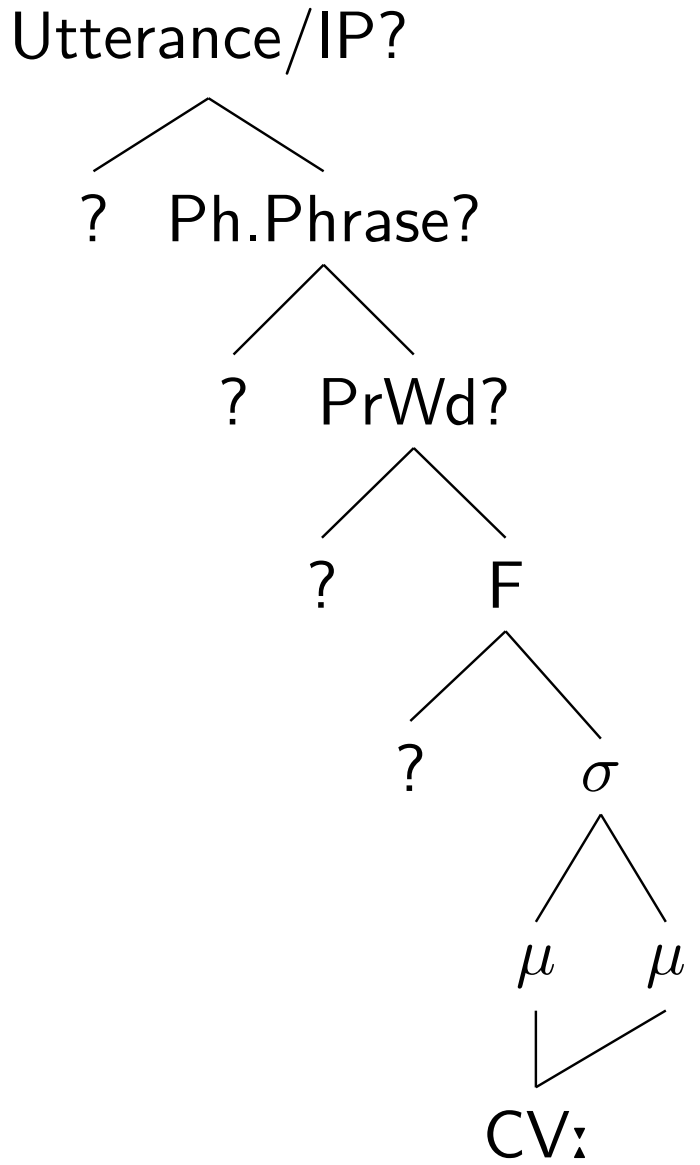
Final stress – lots of evidence (but not just phonetic)

- **Phonetic evidence**: stem-final syllables are longer than preceding syllables within the morpheme (DiCanio 2010, DiCanio and Hatcher 2018).

- **Phonological evidence:**
  1. Nasal vowels only occur in final syllables.
  2. Glottal consonants only occur in final syllables.
  3. Prenasalized stops only occur in final syllables.
  4. **Full tonal contrasts (all 9 tones) only occur in final syllables.**
  5. **Final syllables license contrasts in pre-final (non-final) syllables.**

- Virtually identical properties are found throughout Triqui languages (DiCanio, 2008, 2010, 2016; DiCanio et al., 2020; Elliott et al., 2016; Hollenbach, 1984; Hernández Mendoza, 2017).

What about other units?



III. Foot structure

- What type of foot parsing might be possible?

- Evidence comes from three sources:
  a) high tone /4/ is restricted to the foot
  b) Spanish loanword adaptation
  c) variable deletion or shortening of extrametrical vowels

- Possible analyses:

	1σ	2σ	3σ	4σ
1) No feet	$\sigma_{\mu\mu}$	$\sigma_{\mu}\sigma_{\mu\mu}$	$\sigma_{\mu}\sigma_{\mu}\sigma_{\mu\mu}$	$\sigma_{\mu}\sigma_{\mu}\sigma_{\mu}\sigma_{\mu\mu}$
2) Iterative Iambic feet	$(\sigma_{\mu\mu})$	$(\sigma_{\mu}\sigma_{\mu\mu})$	$(\sigma_{\mu})(\sigma_{\mu}\sigma_{\mu\mu})$	$(\sigma_{\mu}\sigma_{\mu})(\sigma_{\mu}\sigma_{\mu\mu})$
3) Non-iterative iambic feet	$(\sigma_{\mu\mu})$	$(\sigma_{\mu}\sigma_{\mu\mu})$	$\sigma_{\mu}(\sigma_{\mu}\sigma_{\mu\mu})$	$\sigma_{\mu}\sigma_{\mu}(\sigma_{\mu}\sigma_{\mu\mu})$

(a) The distribution of high tones is limited to the foot

- Tones on most pre-tonic syllables *mostly* result from leftward association from the final stressed syllable.
- This predicts high tone /4/ will spread leftward across the word, but it **does not**. Instead, we get tone /3/ as a default here.

Table: Absence of tone /4/ on antepenults

Underlying tone	Surface tonal melody	Predicted tonal melody	Gloss
atʃini^{43}	a^{3}tʃi^{4}ni^{43}	*a^{4}tʃi^{4}ni^{43}	'to get drunk'
tʃukuti^{43}	tʃu^{3}ku^{4}ti^{43}	*tʃu^{4}ku^{4}ti^{43}	'basket (canasta)'
tuk^{w}ãʔãh^{4}	tu^{3}k^{w}ã^{4}ʔãh^{4}	*tu^{4}k^{w}ã^{4}ʔãh^{4}	'pitchfork'
kːoh^{32} tukutah^{4}	kːoh^{32} tu^{3}ku^{4}tah^{4}	*kːoh^{32} tu^{4}ku^{4}tah^{4}	'fern' (plant + fern)
kasiti^{43}	ka^{3}si^{4}ti^{43}	*ka^{4}si^{4}ti^{43}	'oil' < Sp. *aceite*
skaleta^{43}	ska^{3}le^{4}ta^{43}	*ska^{4}le^{4}ta^{43}	'bicycle' < Sp. *bicicleta*

(b) Spanish loanwords

- Words from Spanish with penultimate stress are almost always borrowed with tone /43/ on the final syllable and tone /4/ on the penult.

Spanish		Triqui	
pera	[ˈpeɾa]	$pe^{4}ɾa^{43}$	‘pear’
queso	[ˈkeso]	$ke^{4}su^{43}$	‘cheese’

- Words from Spanish with *final* stress are borrowed with tone /43/ on the final syllable but tone /3/ on the penult.

Spanish		Triqui	
cartón	[kaɾˈton]	$ka^{3}ɾtũ^{43}$	‘cardboard’
camión	[kaˈmjon]	$ka^{3}mjũ^{43}$	‘truck’

- But there is a strong preference for loanwords to be disyllabic.

What about words with more than 2 syllables?

Spanish name	Triqui loanword	Gloss
[feɾˈnando]	na^{4}ndoː^{43}	Fernando
[floˈɾensja]	le^{4}ntʃaː^{43}	Florencia
[teˈɾesa]	ɾe^{4}saː^{43}	Teresa
[apoˈlonjo]	lo^{4}niː^{43}	Apolonio
[marˈtin]	βa^{3}tiː^{43}	Martín
[isaˈβel]	sa^{3}βeː^{43}	Isabél
[natiβiˈðad]	ti^{3}taː^{43}	Natividad

- Longer words are shortened to a two syllable-sized unit.

What about words with one syllable?

Table: Spanish loanwords with final epenthesis or lengthening

Spanish word	Triqui loanword	Gloss
par [paɾ]	$\mathrm{pa}^{3}\mathrm{ɾi}\text{ː}^{1}$	‘pair’
dios [djos]	$\mathrm{tjo}^{3}\mathrm{si}\text{ː}^{1}\sim\mathrm{tjo}^{4}\mathrm{si}\text{ː}^{43}$	‘god, deity’
arroz [aˈros]	$\mathrm{ro}^{3}\mathrm{si}\text{ː}^{1}$	‘rice’
rey [rej]	$\mathrm{ɾe}^{4}.\mathrm{i}\text{ː}^{43}$	‘king’

- Shorter words are **lengthened** to two syllables.

An iambic template for loanwords

- There is a strong tendency for loanwords to satisfy a 2 syllable, iambic template.

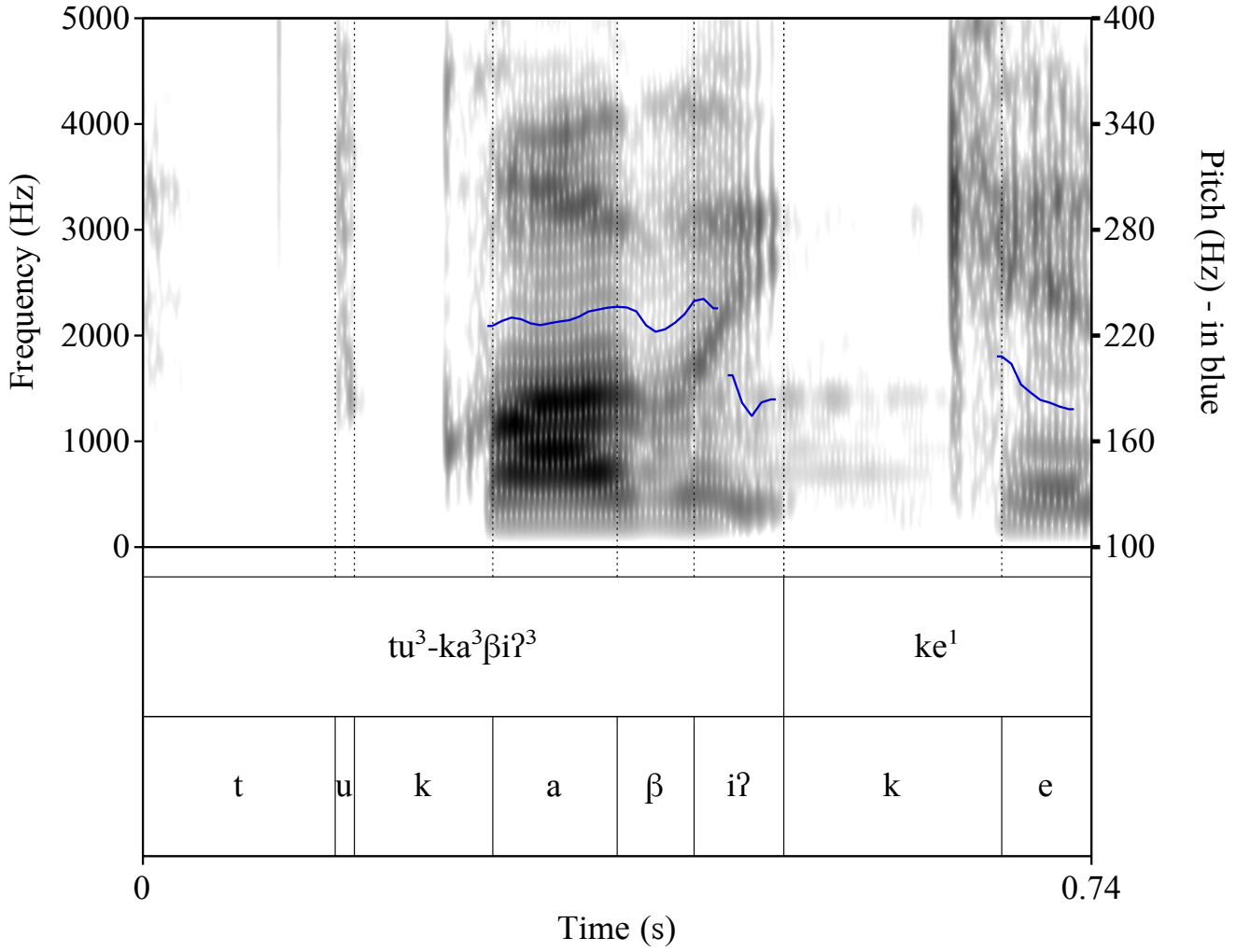
- Similar templatic structure is suggestive of foot-based units in languages like Japanese (Poser 1990).

(c) Variable deletion and reduction of extrametrical (pre-penultimate) vowels

- In many Triqui varieties, there is a general pattern whereby pre-tonic vowels are lost.

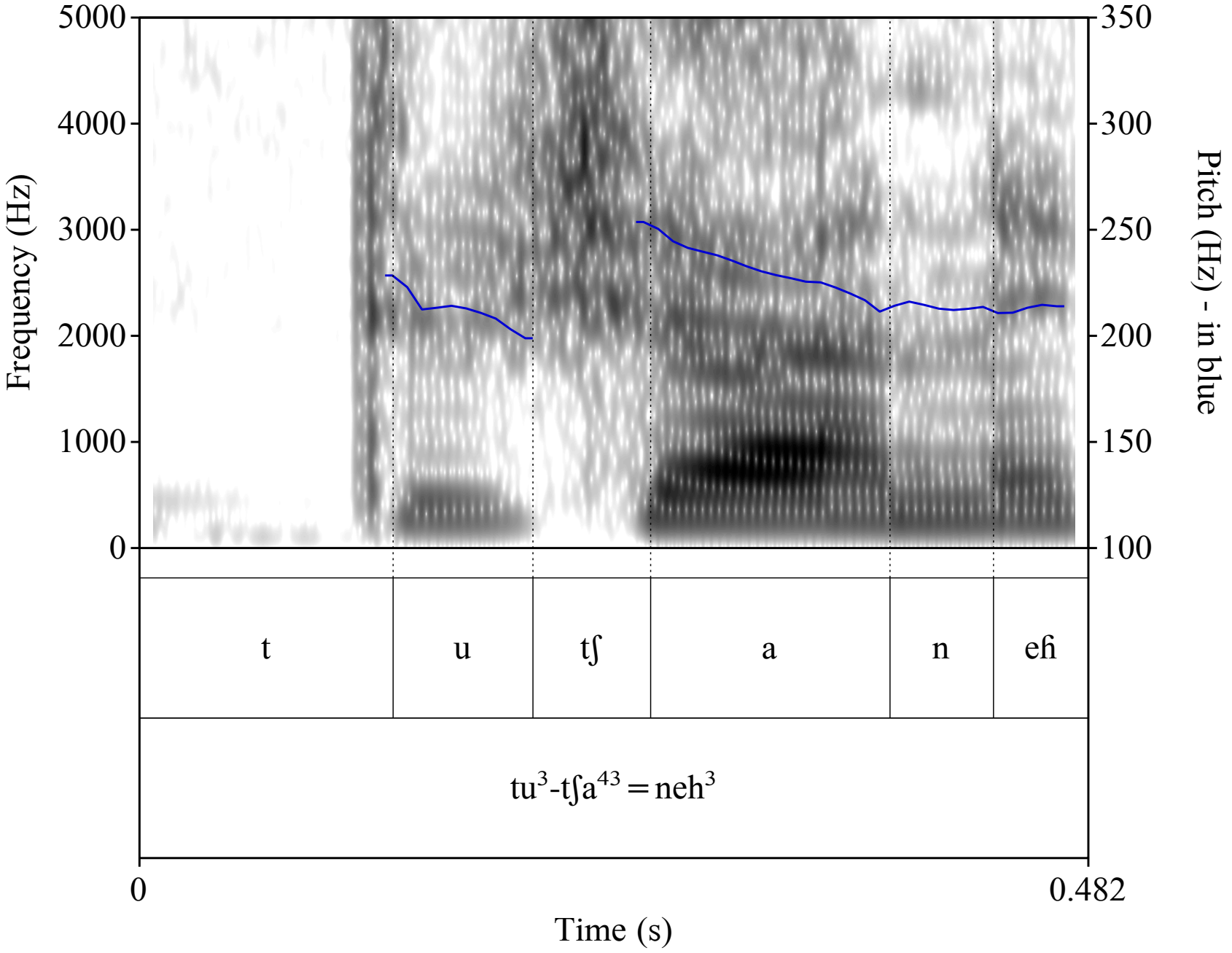
Itunyoso	Chicahuaxtla	Copala	Gloss
$\text{tʃu}^{3}\text{k}^{\text{w}}\text{ah}^{5}$	$\text{ʃu}^{3}\text{k}^{\text{w}}\text{a}^{53}$	$\text{ʃk}^{\text{w}}\text{a}^{5}$	‘snake’
$\text{tʃa}^{3}.\tilde{\text{i}}\text{ː}^{3}$	$\text{ʃa}^{3}.\tilde{\text{i}}\text{ː}^{3}$	$\text{ʃ}\tilde{\text{i}}\text{ː}^{3}$	‘mosquito’
$\text{ɾu}^{1}\text{m}\tilde{\text{i}}\text{ː}^{1}$	$\text{ɾu}^{1}\text{m}\tilde{\text{i}}\text{ː}^{3}$	$\text{ɾm}\tilde{\text{i}}\text{ː}^{1}$	‘lazy’
$\beta\text{ːeh}^{5}$	wːe^{53}	$\text{ju}^{3}\beta\text{e}^{5}$	‘petate’
tːuh^{5}	tu^{53}	$\text{i}^{3}\text{tu}^{5}$	‘knot’
$^{\text{ʔ}}\beta\text{i}^{1}$	$^{\text{ʔ}}\text{wi}^{32}$	$\text{ju}^{3\text{ʔ}}\beta\text{e}^{1}$	‘raw’

Causative prefix /tu^3-/ in an antepenult before /k-a^{3}βiʔ^3/ ‘to die.’



Extrametrical vowels (in antepenults) are variably deleted and reduced more than penults are.

The vowel in /tu^3-/ is almost gone here.



The same prefix is not reduced in

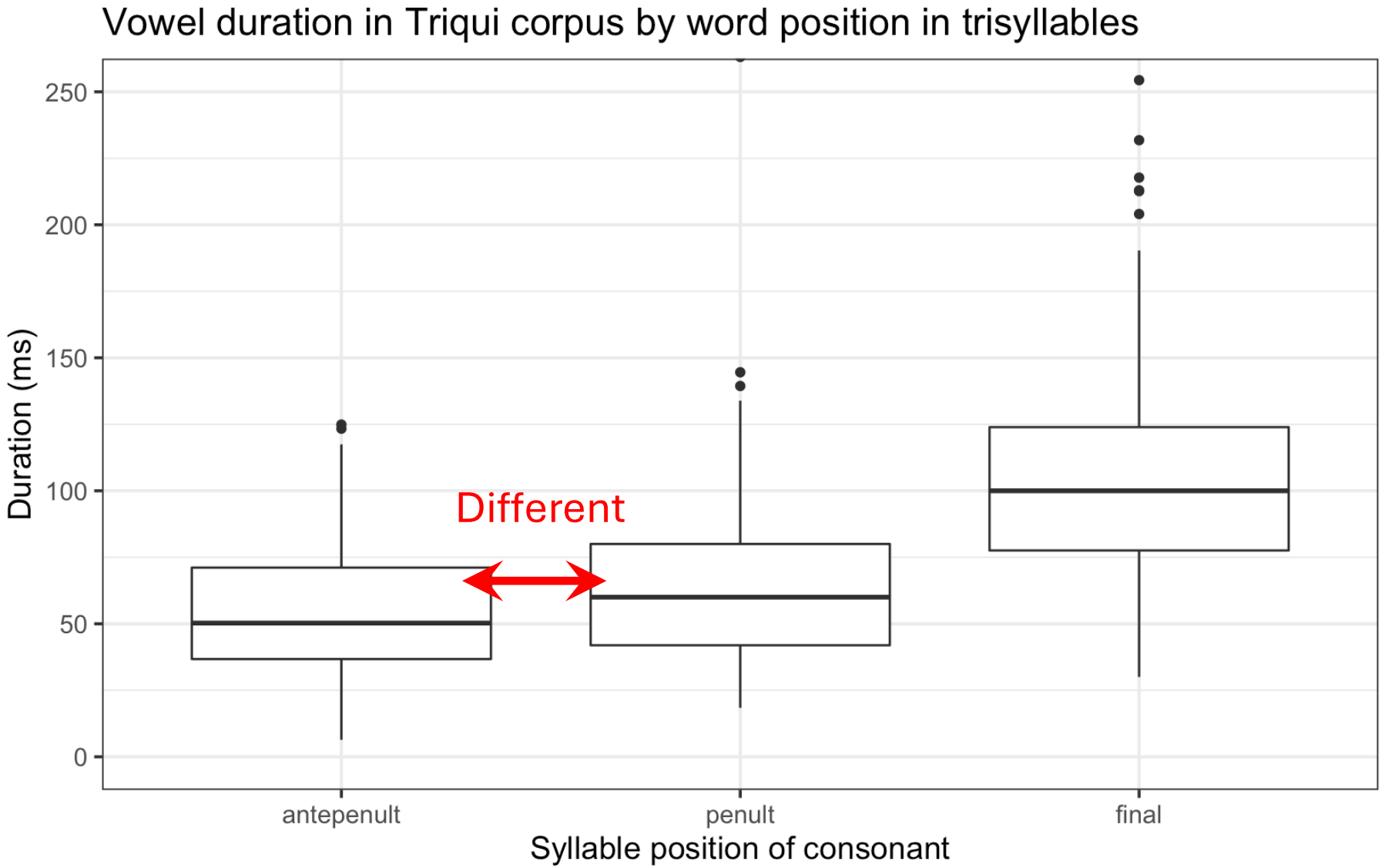
/tu³-tʃa⁴³=neh³/

CAUS-eat=3P

'They made (her) eat...'

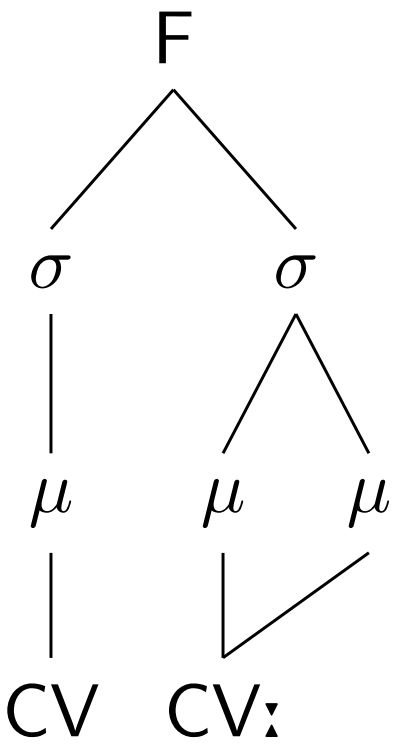
This is now a disyllabic stem.

Antepenults are shorter than penults in 1 hr spontaneous speech (just about 200 trisyllabic words) ($p < .05$).



Phonetic shortening of antepenults

All these pieces of evidence converge



- The evidence here converges on a two syllable unit being important in Triqui prosody
  - An iambic foot is the domain of high tone /4/
  - Spanish loanwords are preferably borrowed as single iambic feet.
  - Antepenults are reduced or deleted more than penults are.
- In addition to suggesting that Triqui words are mostly iambic feet, it seems like antepenults are *extrametrical*.

IV. Evidence for the prosodic word

- Prefixation can generate words with up to four syllables in Itunyoso Triqui. How are such syllables parsed on the left edge of the foot?

- The prosodic word is the domain of three types of tonal processes related to Triqui morphology.
  a) The prosodic word is the domain of possessed stems and **two** stem-level tonal changes associated with *nominal stem formation*.
  b) The prosodic word is the domain of aspect-marked verbs and tonal changes associated with *aspectual prefixation*.

a. Nominal possession

(4) si^{3}-ka^{3}to^{5}
POSS'D-shirt.1S

'my shirt.'

(5) si^{3}-ka^{3}to^{4}=ũh^{3}
POSS'D-shirt=3F

'her shirt.'

(6) si^{3}-ka^{3}to^{4} sĩʔ^{3}
POSS'D-shirt child

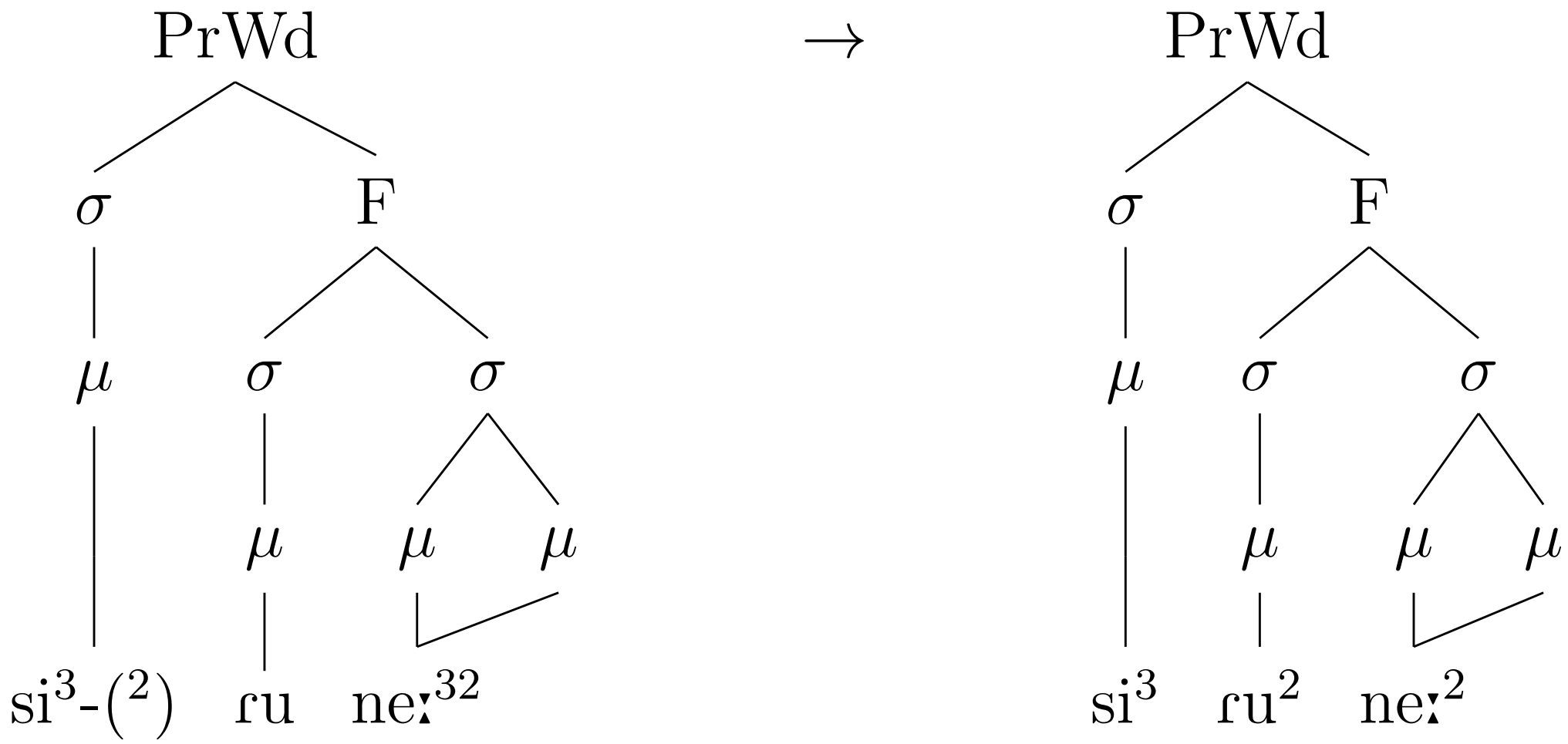
'the child's shirt.'

- **Alienably-possessed** nouns require a possessed prefix /si^{3}-/.
- This prefix is required regardless of whether the possessor is an *endoclitic* (4), an *enclitic* (5), or a separate noun phrase (6).

Prefix-conditioned tone changes

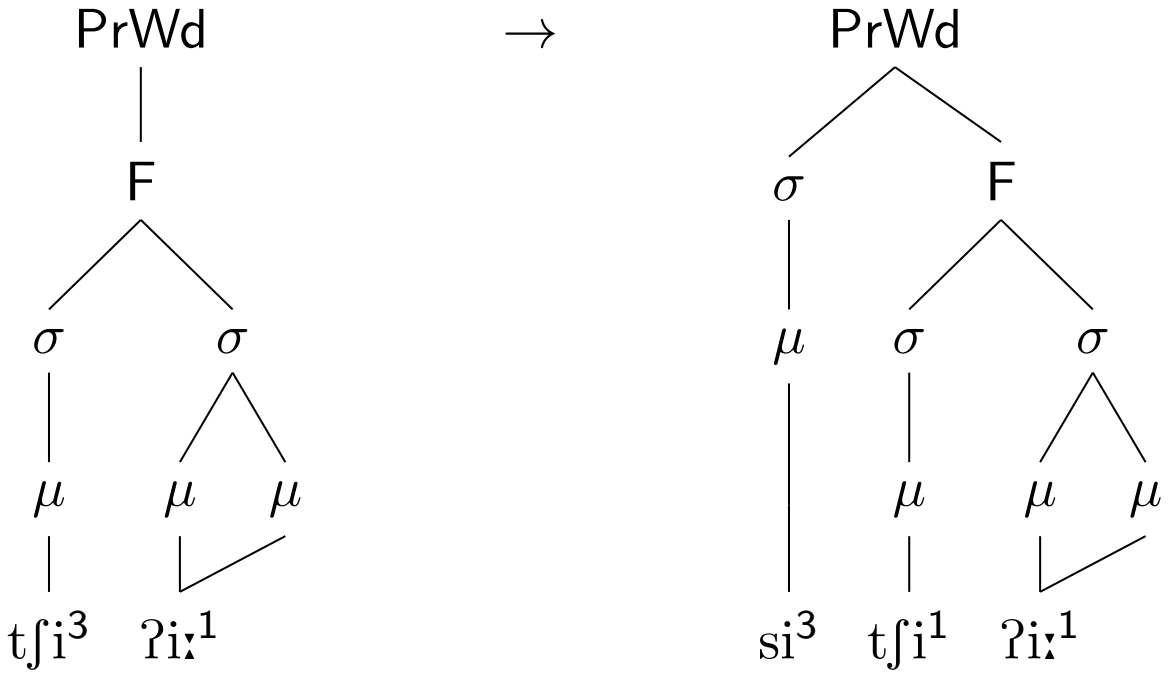
Root	Possessed stem	Gloss
$ka^{3}si\text{ʔ}^{3}$	si^{3}-$ka^{2}si\text{ʔ}^{3}$	‘honey’
$ku^{3}ɾuh^{3}$	si^{3}-$ku^{2}ɾuh^{3}$	‘large pot’
$na^{3}s\tilde{i}^{3}$	si^{3}-$na^{2}s\tilde{i}^{3}$	‘tomato’
$ɾ\tilde{a}^{3}\text{ʔ}\tilde{a}^{3}$	si^{3}-$ɾ\tilde{a}^{2}\text{ʔ}\tilde{a}^{3}$	‘mushroom’
$tʃo^{32}$	si^{3}-$tʃo^{2}$	‘comal/griddle’
$kk^{w}eh^{32}$	si^{3}-$k^{w}eh^{2}$	‘quelite/edible green’
$ti^{3}ni^{32}$	si^{3}-$ti^{2}ni^{2}$	‘nopal/edible cactus’
$ɾu^{3}ne^{32}$	si^{3}-$ɾu^{2}ne^{2}$	‘beans’
$se^{3}\text{ʔ}eh^{2}$	si^{3}-$se^{2}\text{ʔ}eh^{2}$	‘ring’

- This prefix conditions tone changes on roots with tone /3/ or /32/.
- Tone /3/ > 2.3
- Tone /32/ > 2



Representation of possessed stems as prosodic words with stem tonal alternations. The underlying roots do not show the output of the leftward tonal association rule. Thus, non-final syllables in roots are tonally-unspecified.

Prefixed stems as the domain of low tone spreading



‘illness’

‘illness of...’

Low tone spreading applies across not just morphemes, but prefixed nouns where tone /3/ is absorbed (DiCanio, 2008; DiCanio et al., 2020).

What is the domain here?

- It could be the *nominal stem*, but that's a morphological domain and not strictly-speaking a phonological one.

- It could also be a phonological domain like the **prosodic word**.

b. Verbal aspect marking as a prosodic domain

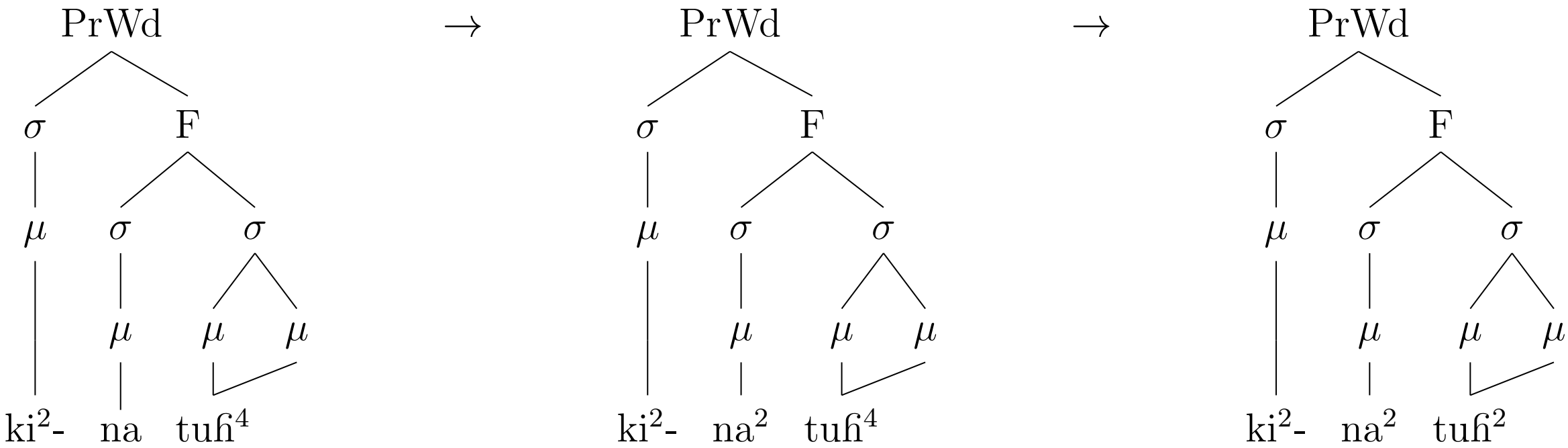
- Vowel-initial verbs take a /k-/ prefix for aspect marking and consonant-initial verbs take a /kV-/ prefix. Note the **potential aspect tone**.

Class	Root	Gloss	Potential form	Perfective form
V-initial	a^3ni^3	'*to expel*'	ka^2ni^3	ka^3ni^3
V-initial	$a^3tʃi^3$	'*to peel*'	$ka^2tʃi^3$	$ka^3tʃi^3$
V-initial	$u^3tã^3$	'*to suck*'	$ku^2tã^3$	$ku^3tã^3$
C-initial	$tʃi^3ʔi^4$	'*to defecate*'	ka^2-$tʃi^3ʔi^4$	ka^3-$tʃi^3ʔi^4$
C-initial	ni^3kah^2	'*to carry*'	ki^2-ni^3kah^2	ki^3-ni^3kah^2
C-initial	$ta^3βi^{32}$	'*to ascend*'	ki^2-$ta^3βi^{32}$	ki^3-$ta^3βi^{32}$

Overwrite with the potential aspect tone

Certain verbs undergo *complete tonal overwrite* with potential aspect tone /2/ (DiCanio 2023)

Root	Gloss	Potential form	Perfective form
$a^3tʃih^3$	'*to grow*'	$ka^2tʃih^2$	$ka^3tʃih^3$
$a^4tʃĩ^{43}$	'*to pass by*'	$ka^2tʃĩ^2$	$ka^4tʃĩ^{43}$
$u^4tʃũh^4$	'*to smell*'	$ku^2tʃũh^2$	$ku^4tʃũh^4$
$tʃu^4mã^{43}$	'*to help*'	ku^2-$tʃu^2mã^2$	ku^3-$tʃu^4mã^{43}$
$na^3ɾi^3yũ^3$	'*to measure*'	ki^2-$na^2ɾi^2yũ^2$	ki^3-$na^3ɾi^3yũ3$
$ʔnaʔ^3$	'*to come*'	ka^2-$ʔnaʔ^2$	ka^3-$ʔnaʔ^3$
$nãh^5$	'*to wash*'	ki^2-$nãh^2$	ki^3-$nãh^5$



Prosodic representation of /na^{4}tuh^4/ ‘to fall’ with potential aspect prefixation. Note that there is no underlying tone on the penult of the verb stem here, as the penult receives its tonal assignment via leftward tonal association when no potential prefix is present.

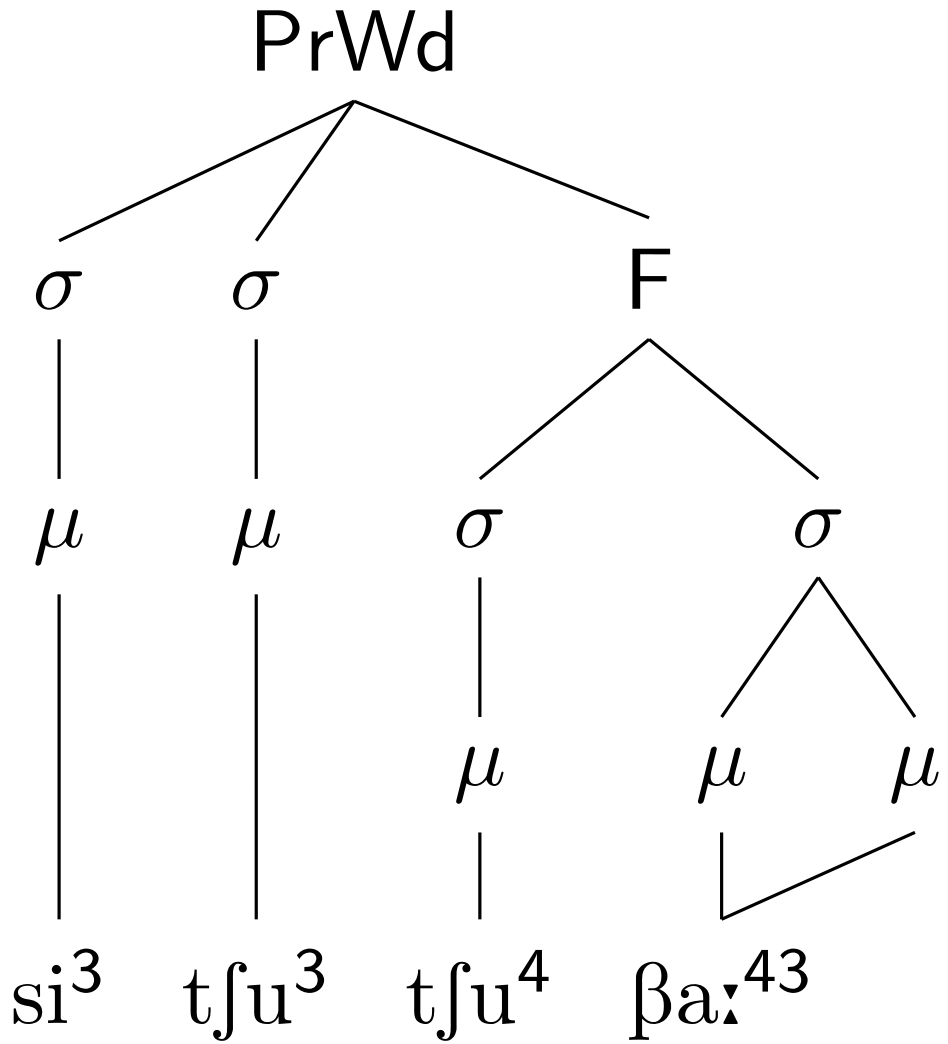
Parallelism across prefixed words

- Note the parallelism here between (a) nominal prefixation and tonal changes on stems and (b) verbal prefixation and tonal changes on stems.

- Both involves processes which overwrite roots with a low tone.

- The domain here could be disyllabic, trisyllabic, or quadrisyllabic.

- This appears to be a prosodic domain like the **prosodic word.**



In a trisyllabic root like /tʃu^{3}tʃu^{4}βa^{43}/ ‘peanut’, there would be two extrametrical syllables.

Summary of evidence for prosodic structure

	Phonetics	**Segmental phonology**	**Tonal phonology**	**Structural**
Stress	Lengthening	Maximal contrast	Maximal contrast and tonal licensing	
Iambic foot	No reduction	Minimal contrast	Tone /4/ licensed	Frequent template
Prosodic word	Extrametrical reduction	Minimal contrast	Domain of prefixal morphophonology	

Returning to our hypotheses

- Possible analyses:

	1σ	2σ	3σ	4σ
1) No feet	$\sigma_{\mu\mu}$	$\sigma_{\mu}\sigma_{\mu\mu}$	$\sigma_{\mu}\sigma_{\mu}\sigma_{\mu\mu}$	$\sigma_{\mu}\sigma_{\mu}\sigma_{\mu}\sigma_{\mu\mu}$
2) Iterative Iambic feet	$(\sigma_{\mu\mu})$	$(\sigma_{\mu}\sigma_{\mu\mu})$	$(\sigma_{\mu})(\sigma_{\mu}\sigma_{\mu\mu})$	$(\sigma_{\mu}\sigma_{\mu})(\sigma_{\mu}\sigma_{\mu\mu})$
3) Non-iterative iambic feet	$\mathbf{(\sigma_{\mu\mu})}$	$\mathbf{(\sigma_{\mu}\sigma_{\mu\mu})}$	$\mathbf{\sigma_{\mu}(\sigma_{\mu}\sigma_{\mu\mu})}$	$\mathbf{\sigma_{\mu}\sigma_{\mu}(\sigma_{\mu}\sigma_{\mu\mu})}$

- Itunyoso Triqui has final iambic feet, but **stem formation processes** occur on prosodic words which may be longer.

V. Discussion

- What about phonological words? Are there higher levels still?
  - Yes, “compounds” fall into this group, but they have a quirk in Triqui/Mixtecan – they must be two prosodic words.

- What about pronominal clitics?
  - Endoclitics fall within the domain of the prosodic word, but enclitics may comprise an intermediate domain higher than the prosodic word.

Aside from these categories, there does not seem to be much phonological or phonetic evidence for higher level prosodic parsing.

The cliticized word

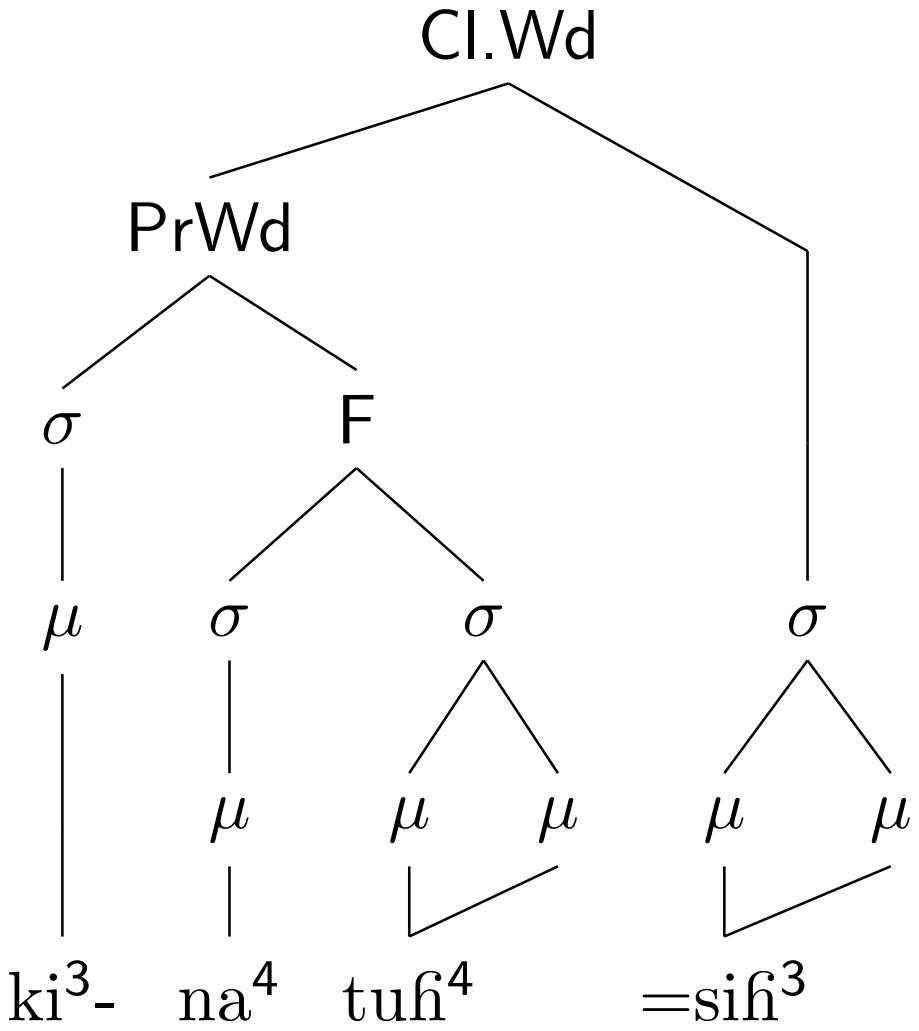
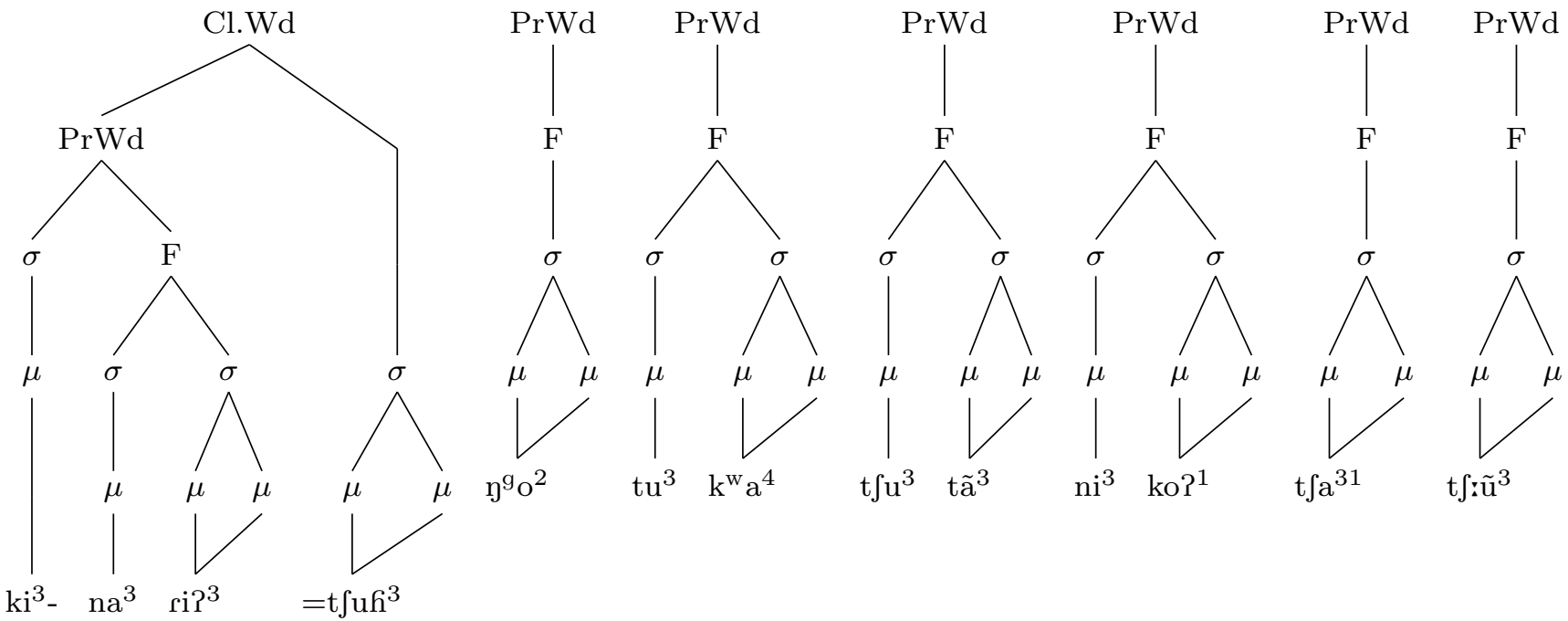


Figure: The cliticized word in Itunyoso Triqui. Example is /ki^3-na^{4}tuh^4=sih^3/ PERF-fall=3M 'he fell.'



(7) ki^{3}-na^{3}ɾiʔ^{3}=tʃuh^{3} ŋgo^{2} tu^{3}kʷa^{4} tʃu^{3}tã^{3} ni^{3}koʔ^{1} tʃa^{31} tʃːũ^{3}

PERF-look.for=ANIM one house.of bee hang head tree

'The animal looked for a beehive hanging from the tree branch.'

Conclusions

- Most arguments for a prosodic hierarchy lean heavily on variable processes found in non-tonal languages, e.g. relative prominence. That's just not available in complex tone languages.

- The hierarchy here is not modulated by variable processes involving pitch given its high functional load in the language.

- The prosodic hierarchy in Itunyoso Triqui is best motivated by examining the locus of phonological contrast (cf. Harris, 1997), phonetic domains of reduction, and the relation between phonological and morphophonological processes related to tone.

Acknowledgements

- Basileo Martínez Cruz and Benigno Cruz Martínez

- Funding support from the National Endowment for the Humanities Grant FN-291125-23 *A reference grammar of Itunyoso Triqui [ISO 639-3 trq]*.

NATIONAL ENDOWMENT FOR THE HUMANITIES

ku²ru⁴a⁴³ a³ni²ʔĩh⁵reʔ¹!

References

Bennett, R. and Elfner, E. (2019). The syntax-prosody interface. *Annual Review of Linguistics*, 5:151–171.

DiCanio, C. (2008). *The Phonetics and Phonology of San Martín Itunyoso Trique*. PhD thesis, University of California, Berkeley, Berkeley.

DiCanio, C. (2010). Illustrations of the IPA: San Martín Itunyoso Trique. *Journal of the International Phonetic Association*, 40(2):227–238.

DiCanio, C. (2012). Coarticulation between tone and glottal consonants in Itunyoso Trique. *Journal of Phonetics*, 40(1):162–176.

DiCanio, C. (2014). Cue weight in the perception of Trique glottal consonants. *Journal of the Acoustical Society of America*, 135(2):884–895.

DiCanio, C. (2016). Abstract and concrete tonal classes in Itunyoso Trique person morphology. In Palancar, E. and Léonard, J.-L., editors, *Tone and Inflection: New Facts and New Perspectives*, pages 225–266. Berlin: De Gruyter Mouton.

DiCanio, C. (2023). Aspecto verbal en triqui de Itunyoso. In San Giacomo Trinidad, M., Hernández Mendoza, F., and Swanton, M., editors, *Estudios sobre lenguas mixtecanas*, chapter 9, pages 321–344. Universidad Nacional Aut ´onoma de México. Ciudad Universitaria, Coyoacán, Ciudad de México, 04510.

DiCanio, C. and Bennett, R. (2020). Mesoamerica. In Gussenhoven, C. and Chen, A., editors, *The Oxford Handbook of Language Prosody*, chapter 28, pages 408–427. Oxford University Press.

DiCanio, C. and Hatcher, R. (2018). On the non-universality of intonation: Evidence from Triqui. *Journal of the Acoustical Society of America*, 144:1941.

DiCanio, C., Martínez Cruz, B., Cruz Martínez, B., and Martínez Cruz, W. (2020). Glottal toggling in Itunyoso Triqui. *Phonological Data & Analysis*, 2(4):1–28.

Elliott, A. R., Edmondson, J. A., and Sandoval Cruz, F. (2016). Illustrations of the IPA: Chicahuaxtla Triqui. *Journal of the International Phonetic Association*, 46(3):351–365.

Harris, J. (1997). Licensing inheritance: an integrated theory of neutralisation. *Phonology*, 14:315–370.

Hernández Mendoza, F. (2017). *Tono y fonología segmental en el triqui de Chicahuaxtla*. PhD thesis, Universidad Nacional Autónoma de México, Mexico City.

Hollenbach, B. E. (1984). *The Phonology and Morphology of Tone and Laryngeals in Copala Trique*. PhD thesis, University of Arizona, Tucson.

Poser, W. (1990). Evidence for foot structure in Japanese. *Language*, pages 78–105.

Appendix 1: How big can words get?

- Most roots (~65%) are disyllabic in the language. About 8-10% are trisyllabic.

- Up to two prefixes (each a CV syllable) may occur on verbs – an aspect marker preceding the verb root; and an iterative or causative prefix before this.

- Only one prefix may precede nouns – that marking POSSESSED status.

- With enclitics, words can be up to 6 syllables, but this is rare in actual speech.

(1) ku^{3}-tu^{3}-tʃu^{3ʔ}βiʔ^{3} = sih^{3} = ũh^{3}

PERF-CAUS-be.afraid = 3M = 3F

‘He scared her.’

(2) na^{3}-ɾu^{3}nũ^{4} = ũh^{3} βeʔ^{3}

ITER-paint = 3F house

‘She repainted the house.’

(3) (ki^{2})-na^{2}-ɾu^{3}nũ^{4} = ũh^{3} βeʔ^{3}

(POT)-ITER-paint = 3F house

‘She will repaint the house.’

Appendix 2: Compounds as two prosodic words

Compounds involve two prosodic words. They are always head-initial and often the modifier undergoes tonal replacement to tone /2/.

Compound	Gloss	Tone-changing compound	Gloss
$\mathrm{tʃa}^{31}\ \mathrm{ti}^{3}\mathrm{si}^{3}$	'nipple'	$\mathrm{tʃa}^{3}\mathrm{kaɦ}^{5}\ \mathrm{kːih}^{2}$	'wild boar'
$\mathrm{tʃa}^{31} + \mathrm{ti}^{3}\mathrm{si}^{3}$		$\mathrm{tʃa}^{3}\mathrm{kaɦ}^{5} + \mathrm{kːih}^{3}$	
'head/point' + 'breast'		'pig' + 'mountainside'	
$\mathrm{tʃu}^{3}\mathrm{k}^{\mathrm{w}}\mathrm{aɦ}^{5}\ \mathrm{stu}^{3}\mathrm{ku}^{32}$	'coral snake'	$\mathrm{tʃu}^{3}\mathrm{k}^{\mathrm{w}}\mathrm{aɦ}^{5}\ \mathrm{tʃi}^{2}\mathrm{ɾiʔ}^{2}$	'gray beetle'
$\mathrm{tʃu}^{3}\mathrm{k}^{\mathrm{w}}\mathrm{aɦ}^{5} + \mathrm{stu}^{3}\mathrm{ku}^{32}$		$\mathrm{tʃu}^{3}\mathrm{k}^{\mathrm{w}}\mathrm{aɦ}^{5} + \mathrm{tʃi}^{3}\mathrm{ɾiʔ}^{3}$	w/red stripes'
'snake/critter' + 'jewelry'		'snake/critter' + 'intestines'	

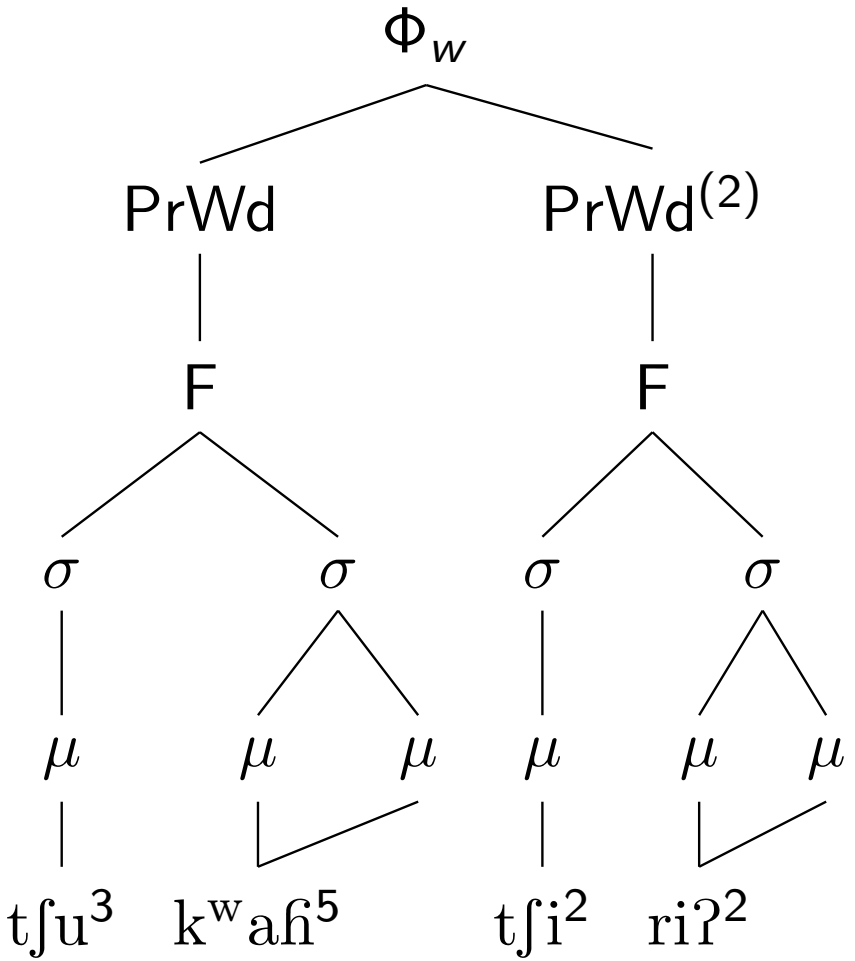


Figure: A nominal syntactic compound with tone lowering (to /2/) in Itunyoso Triqui – an example of a phonological word. Here, the word /$\mathrm{t}\int\mathrm{u}^3\mathrm{k}^{\mathrm{w}}\mathrm{a}\hbar^5$ $\mathrm{t}\int\mathrm{i}^2\mathrm{ri}\mathrm{Ɂ}^2$/ 'gray beetle w/red stripes' is given.