Upper-lower tone mapping in Copala Triqui

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Overview

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2. Background of tone in Copala Triqui
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Introduction

- Isolation tones lower to different tone in specific morpho-syntactic environments
- Past accounts essentially characterize this as lexical allomorphy (Hollenbach, 1984)

Our proposed analysis

- Upper-lower register mapping as a system of cophonologies tied to syntactic environment
- Mapping between upper and lower tone is not allomorphy, but rather stems from a single underlying representation in the lexicon

Language Background

- Mixtecan language of Otomanguean language family
- Originally spoken in rural San Juan Copala, Oaxaca, Mexico
- Many speakers now live in diaspora (Oaxaca City, Mexico City, east and west coasts of the U.S.)

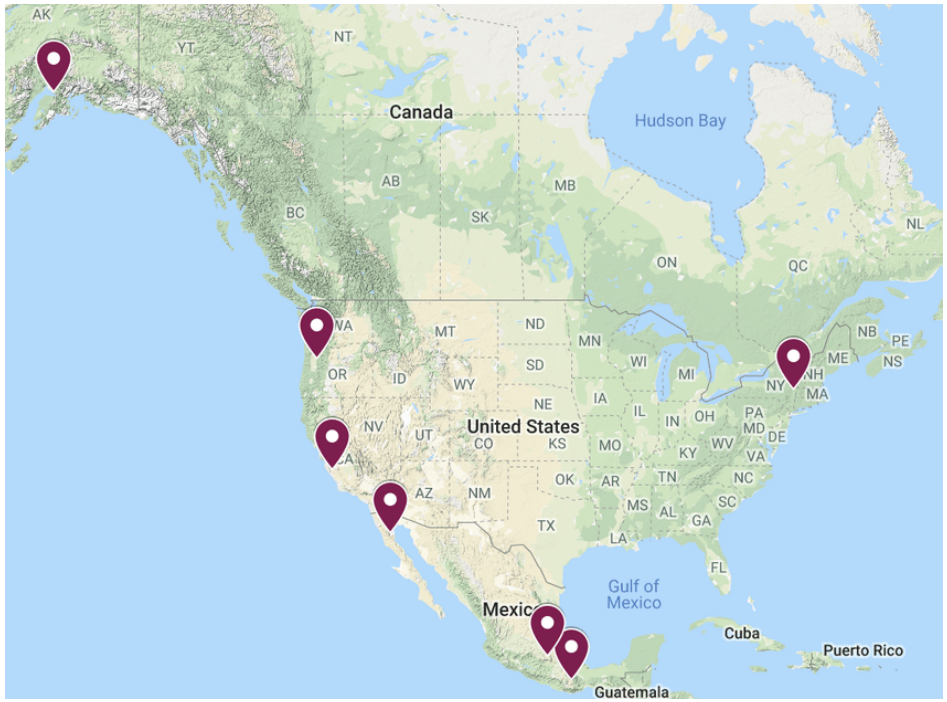


Figure: Distribution of Copala Triqui-speaking communities

Tone system of Copala Triqui

- Tonal language with five distinctive pitch levels
- Eight lexically contrastive tones
  - 5 level tones: 1, 2, 3, 4, 5 (from lowest to highest)
  - 3 contour tones: 13, 31, 32
- Two 'registers' (Hollenbach, 1984; Broadwell and Clemens, 2017):
  - Tones 3, 4, 5, 31, and 32 belong to **upper register**
  - Tones 1, 2, and 13 belong to **lower register**

Tone system of Copala Triqui

- Only final syllable tone is contrastive, tone of preceding syllables is predictable based on final syllable tone
  - If final syllable has upper register tone → preceding syllables are tone 3 (first column is orthography from Hollenbach and Merino 2009)

(1)

a.	ya'luj	[jaʔ^{3}.luh^{3}]	'fertile'
b.	necó	[ne^{3}.ko^{4}]	'oppossum'
c.	caquíí	[ka^{3}.kiː^{5}]	'earring'
d.	mare̲e̲	[ma^{3}.reː^{31}]	'green'
e.	tana	[ta^{3}.na^{32}]	'goat'

  - If final syllable has lower register tone → preceding syllables are tone 2

(2)

a.	va'ta̲n'	[βaʔ^{2}.t$\tilde{\text{a}}\text{ʔ}^{1}$]	'six'
b.	ta'a̲j	[ta^{2}.ʔah^{2}]	'half'
c.	le'e̲j	[le^{2}.ʔeh^{13}]	'small'

- Few exceptions to this rule

Tone lowering

- Lexical items, excluding functional words and adjectives, typically appear in isolation with upper register tone
- Tone on these lexical items lowers in specific syntactic contexts
- Hollenbach (1984) describes contexts in which tone lowering occurs:
  - Aspectual inflection, predicate and nominal negation, certain possessive constructions, appositives, predicate focus, and the derivation of adjectives and adverbs

Tone lowering paradigm

- Exact lowering of each isolation tone given in table below (9 "class" numbers are as found in the literature)

	Class 1	**Class 2**	**Class 3a**	**Class 3b**	**Class 3c**	**Class 4a**	**Class 4b**	**Class 5a**	**Class 5b**
Upper	31	32	3	3	3	4	4	5	5
Lower	1	2	1	2	13	1	2	1	2

- No clear default class, frequency of lexical items do not appear to be significantly different from each other across classes (Broadwell and Clemens, 2017)

Tone lowering phonology

- Lowered form consistent for lexical item across all lowering contexts and never changes
  - aga' /aɣaʔ^{3}/ 'metal' always Class 3c (3 → 13)
  - yu've' /juʔβeʔ^{3}/ 'snow' always Class 3a (3 → 1)
- Not tone sandhi (i.e. tone change not predictable given adjacent tone(s))

- rmii [ʂmiː^{32}] 'ball'

(3) manzaná rmii
[mansana^{4} ʂmiː^{2}]
apple ball
'round apple'

(4) ra'vii rmii
[raʔβiː^{32} ʂmiː^{2}]
orange ball
'round orange'

Generalizations about upper-lower mapping

1. If the upper register is a contour tone, always a fall from T1 to T2, the corresponding lower register realization is always T2.
2. If the upper register is a tone 4 or 5, then for each of these, the corresponding lower register tone can be either a tone 1 or 2.
3. If the upper register is a tone 3, then the lower register tone could be either 1, 2, or 13, the latter being the only attested rising tone in the language.

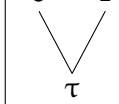
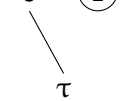
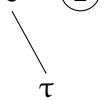
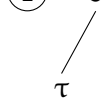
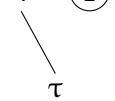
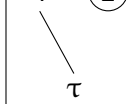
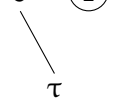
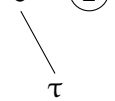
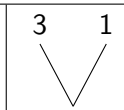
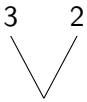
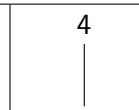
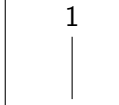
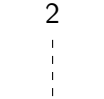
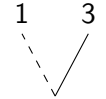
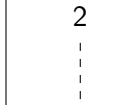
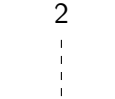
Our analysis

- **Past analysis:** both variants in lexicon as allomorphs, based on morphosyntactic contexts

- **Our proposed analysis:** each lexical morpheme has single underlying representation
- Surface tonal realization, still determined in part by morphosyntactic environment
- Optimality Theory framework using cophonologies (Orgun, 1996; Inkelas et al., 1997; Anttila, 2002; Inkelas and Zoll, 2007)
- One set of OT constraint rankings triggered in one set of morphosyntactic contexts and a different set of ranking triggered in others

Underlying representations

- We propose 9 distinct underlying tonal representations
- Class 1 and Class 2:
  - Two tones linked, exactly as realized in upper register outputs
- Classes 3-5:
  - One tone linked in UR, other tone floating
  - Usually second tone floating, sole exception of Class 3c

	Class 1	Class 2	Class 3a	Class 3b	Class 3c	Class 4a	Class 4b	Class 5a	Class 5b
Underlying representation									
Upper cophonology surface representation									
Lower cophonology surface representation									

List of crucial constraints

1. NoDelink: mora-tone associations in the input must be maintained by corresponding elements in the output
2. NoDelink-Final: mora-tone associations involving the rightmost tone in the input must be maintained by corresponding elements in the output
3. Max-T: assign a penalty for each tone in the input not present in the output
4. *Fall: assign a penalty if τ is linked to two tones where the first is higher than the second
5. *Rise: assign a penalty if τ is linked to two tones where the first is lower than the second
6. *H: assign a penalty for each 3, 4 or 5 tone realized in the output

Upper cophonology

- Prioritizes no delinking of tones and no contour tones

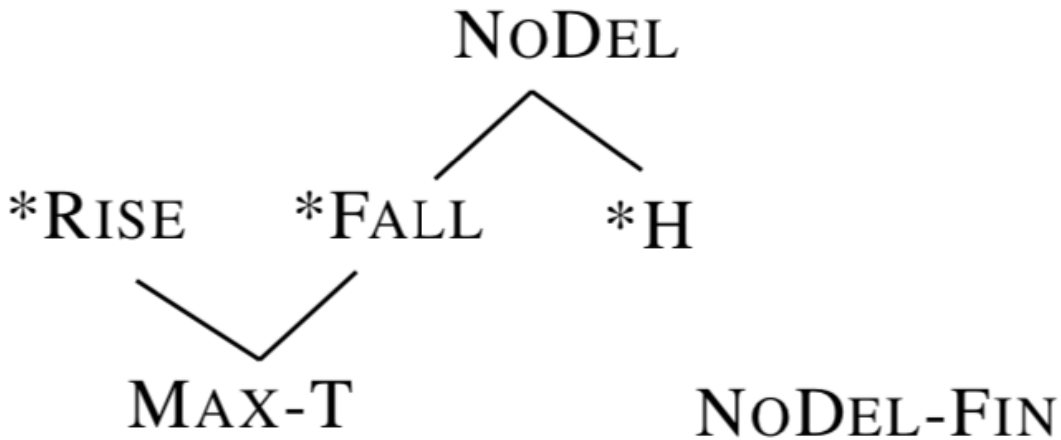


Figure: Upper cophonology constraint ranking

Lower cophonology

- Prioritizes no delinking of the final tone and no upper register tones

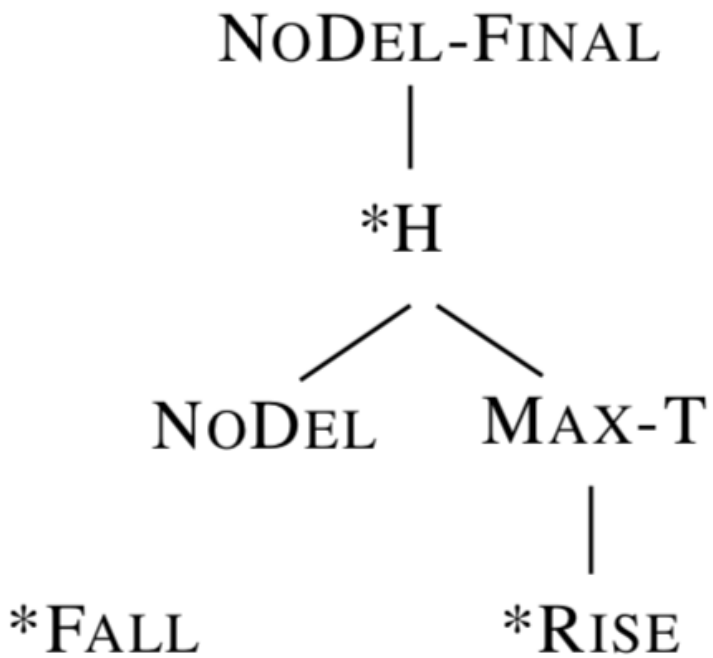


Figure: Lower cophonology constraint ranking

Example of cophonology OT analysis: Class 3a

- Upper register tableau for Class 3a

/3 (1)/ τ	NoDelink	*Fall	*Rise	Max-T	*H	NoDel-F
☞ a. 3 τ				*	*	
b. 1 τ	*!			*		
c. 3 1 τ		*!			*	

Table: Upper register output for Class 3a

Example of cophonology OT analysis: Class 3a

- Lower register tableau for Class 3a

/3 (1)/ τ	NoDel-Fin	*H	*Fall	NoDelink	Max-T	*Rise
☞ a. 1 τ				*	*	
b. 3 τ		*!			*	
c. 3 1 τ		*!	*			

Table: Lower register output for Class 3a

Conclusion

- Our analysis for Copala Triqui does not involve lexical allomorphy
- Instead maintains each morpheme has unique underlying representation
- Realization in upper and lower register environments determined through two cophonologies
- Each cophonology tied to set of morphosyntactic contexts, exhibiting different rankings of the same set of constraints

Conclusion

- Syntactically-conditioned tone lowering prevalent across all three Triqui languages
- Itunyoso Triqui: tonal processes in personal clitics "lie somewhere between these two extremes: not arbitrarily affiliated with stems within a particular paradigm, but also not easily phonologically predictable" (DiCanio, 2016)
- Chicahuaxtla Triqui: mapping between upper register tones and lower register tones not phonologically predictable (Matsukawa, 2012)

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Appendix: OT tableau for Class 1 upper register

/3 1/ τ	NoDelink	*Fall	*Rise	Max-T	*H	NoDel-F
☞ a. 3 1 τ		*			*	
b. 3 τ	*!			*	*	*
c. 1 τ	*!			*		

Table: Upper register Class 1

Appendix: OT tableau for Class 1 lower register

/3 1/ τ	NoDel-Fin	*H	*Fall	NoDelink	Max-T	*Rise
☞ a. 1 τ				*	*	
b. 3 τ	*!	*		*	*	
c. 3 1 τ		*!	*			

Table: Lower register Class 1

Appendix: OT tableau for Class 2 upper register

/3 2/ τ	NoDelink	*Fall	*Rise	Max-T	*H	NoDel-F
☞ a. 3 2 τ		*			*	
b. 3 τ	*!			*	*	*
c. 2 τ	*!			*		

Table: Upper register Class 2

Appendix: OT tableau for Class 2 lower register

/3 2/ τ	NoDel-Fin	*H	*Fall	NoDelink	Max-T	*Rise
☞ a. 2 τ				*	*	
b. 3 τ	*!	*		*	*	
c. 3 2 τ		*!	*			

Table: Lower register Class 2

Appendix: OT tableau for Class 3b upper register

/3 (2)/ → τ	NoDelink	*Fall	*Rise	Max-T	*H	NoDel-F
☞ a. 3 → τ				*	*	
b. 2 → τ	*!			*		
c. 3 2 → τ		*!			*	

Table: Upper register output for Class 3b

Appendix: OT tableau for Class 3b lower register

/3 (2)/ τ	NoDel-Fin	*H	*Fall	NoDelink	Max-T	*Rise
☞ a. 2 τ				*	*	
b. 3 τ		*!			*	
c. 3 2 τ		*!	*			

Table: Lower register output for Class 3b

Appendix: OT tableau for Class 3c upper register

/(1) 3/  τ	NoDelink	*Fall	*Rise	Max-T	Max-Fin-T
☞ a. 3 | τ				*	
b. 1 | τ	*!			*	*
c. 1 3  τ			*!		

Table: Upper register output for Class 3c

Appendix: OT tableau for Class 3c lower register

/(1) 3/ τ	NoDel-Fin	*H	*Fall	NoDelink	Max-T	*Rise
☞ a. 1 3 τ		*				*
b. 1 τ	*!			*	*	
c. 3 τ		*!			*	

Table: Lower register output for Class 3c

Appendix: OT tableau for Class 4a upper register

/4 (1)/ τ	NoDelink	*Fall	*Rise	Max-T	*H	NoDel-F
☞ a. 4 τ				*	*	
b. 1 τ	*!			*		
c. 4 1 τ		*!			*	

Table: Upper register output for Class 4a

Appendix: OT tableau for Class 4a lower register

/4 (1)/ τ	NoDel-Fin	*H	*Fall	NoDelink	Max-T	*Rise
☞ a. 1 τ				*	*	
b. 4 τ		*!			*	
c. 4 1 τ		*!	*			

Table: Lower register output for Class 4a

Appendix: OT tableau for Class 4b upper register

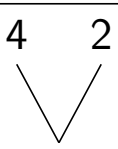
/4 (2)/ 	NoDelink	*Fall	*Rise	Max-T	*H	NoDel-F
☞ a. 				*	*	
b. 	*!			*		
c. 		*!			*	

Table: Upper register output for Class 4b

Appendix: OT tableau for Class 4b lower register

/4 (2)/ τ	NoDel-Fin	*H	*Fall	NoDelink	Max-T	*Rise
☞ a. 2 τ				*	*	
b. 4 τ		*!			*	
c. 4 2 τ		*!	*			

Table: Lower register output for Class 4b

Appendix: OT tableau for Class 5a upper register

/5 (1)/ τ	NoDelink	*Fall	*Rise	Max-T	*H	NoDel-F
☞ a. 5 τ				*	*	
b. 1 τ	*!			*		
c. 5 1 τ		*!			*	

Table: Upper register output for Class 5a

Appendix: OT tableau for Class 5a lower register

/5 (1)/ τ	NoDel-Fin	*H	*Fall	NoDelink	Max-T	*Rise
☞ a. 1 τ				*	*	
b. 5 τ		*!			*	
c. 5 1 τ		*!	*			

Table: Lower register output for Class 5a

Appendix: OT tableau for Class 5b upper register

/5 (2)/ → τ	NoDelink	*Fall	*Rise	Max-T	*H	NoDel-F
☞ a. 5 → τ				*	*	
b. 2 → τ	*!			*		
c. 5 2 → τ		*!			*	

Table: Upper register output for Class 5b

Appendix: OT tableau for Class 5b lower register

/5 (2)/ τ	NoDel-Fin	*H	*Fall	NoDelink	Max-T	*Rise
☞ a. 2 τ				*	*	
b. 5 τ		*!			*	
c. 5 2 τ		*!	*			

Table: Lower register output for Class 5b