

A Tricky Phoneme in Trique

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Conference in Honor of
Ian Maddieson

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San Martín Itunyoso Trique (Otomanguan: Mixtecan)

- A “hard to perceive” contrast
- pre-stopped nasal

word	tone	gloss
 [nã]	3	‘this (proximal demonstrative)’
 [ʔnã]	43	‘my brother’
 [nakĩh]	3-3	‘atole’
 [ʔnakĩh]	4-4	‘opossum’

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What is the place of articulation?

- While the nasal following the “?” is alveolar, the place of articulation on the preceding stop is uncertain.
- Either it is:
 - alveolar
 - velar
 - something else?
- Examination of its phonetic properties

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Background: Trique Phonology

- Fortis/Lenis consonant contrast, 8 tones that are lexically/morphologically contrastive, laryngeals/laryngealization.
- Syllable final prominence governs many of the distributional asymmetries.
 - Fortis/Lenis consonants contrast only in the onsets of final syllables.
 - Falling tones occur only in final syllables
 - Nasalized vowels occur only in final syllables
 - Laryngeal segment /h/ occurs only as a coda in final syllables.

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Consonant Inventory

	Bilabial	Alveolar	Alveopalatal	Velar	Labiodental
Stops	p	t, tt		k, kk	kw, kkw
Fricatives	β, ββ	s ~ z	ʃ ~ ʒ		
Nasals	m, mm	n, nn			
Pre-stopped Nasal		ʔn		ʔn	
Pre-nasalized Stops	mb	nd		ŋg	ŋgw
Affricates		ts	tʃ, tʃʃ tʂ, tʂʂ		
Approximants			j, ij		
Lateral		l, ll			
Trills		r			
Taps		ɾ ~ ɽ			

Complex Consonantal Inventory for nasals

1. Geminate/Singleton Nasals
2. Pre-nasalized stops
3. Pre-stopped Nasals

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Questions & Methodology

- 3 questions concern us:
 - Place of articulation of plosive
 - Timing characteristics of stop and nasal
 - Relationship to other stop types
- Fieldtrip to Livingston, CA on 4/30/06 with Ian Maddieson
- Acoustic Data to answer questions

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Data & Method

- 5 words in isolation and context recorded, 6 tokens of each word in each context.
- One male speaker, age 22.
- Examination of formant transition of preceding /i/, /a/, and /u/ vowel on following consonant types: /p/, /t/, /k/, /ʔn1/, and /ʔn2/.
- Examination of duration of stop closure, presence of burst, and duration of nasal in pre-stopped nasals.

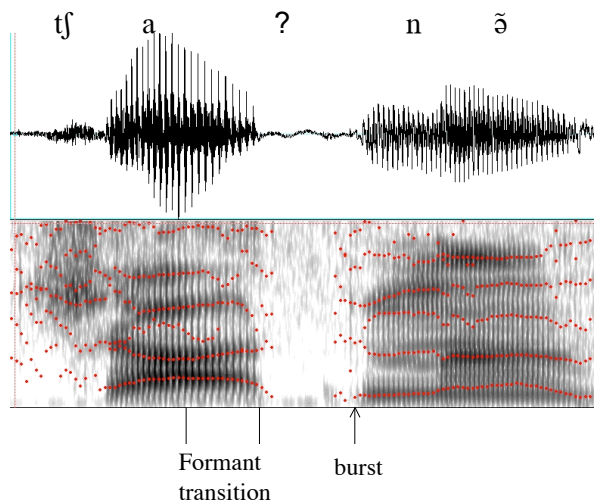
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Data & Method

- [riki pala] 'lizard's stomach' x6
3-3 2-3
stomach lizard
- [tʃa pala] 'lizard's head' x6
31 2-3
head lizard
- [siu pala] 'lizard's butt' x6
32 2-3
butt lizard
- Same paradigm used for all words in list:
[pala] 2-3 'lizard'; [toʔlo] 3-3 'rooster'; [kolo] 3-3 'turkey'
[ʔnā] 32 'my brother' (hn1/tn1);
[ʔnakih] 4-4 'opossum' (hn2/tn2)

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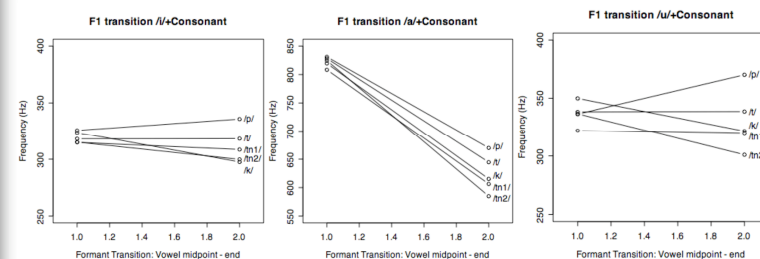
Qualitative Data:



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Data (1) Formant Transitions: F1

Small formant transition for high vowel context, large fall for low vowel context.



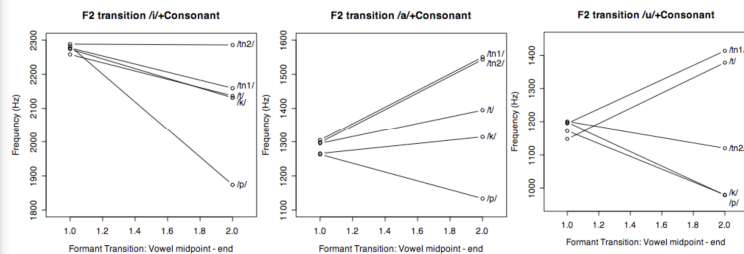
For ?n, transition from /i/ shows little F1 movement.
For ?n, transition from /a, u/ shows fall.

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Data (2) Formant Transitions: F2

Large raising of F2 from /a/ to ?n sequence.

Large raising of F2 from /u/ to ?n1 sequence, like /t/

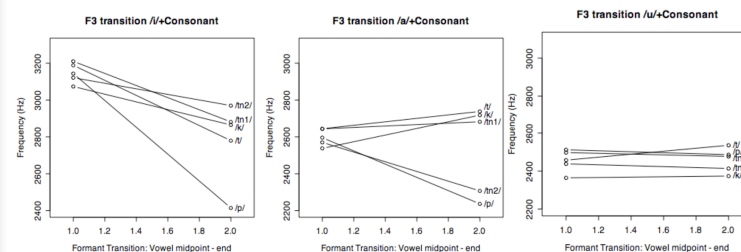


Falling of F2 from /i/ to ?n1 sequence, like /t/ or /k/.
Falling of F2 from /u/ to ?n2 sequence, like /k/.

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Data (3) Formant Transitions: F3

- Least fall of F3 for ?n sequences on /i/ compared to all stops
- In /a/ context, F3 rises before ?n1, but falls before ?n2; (but it uniformly falls for ?n2 tokens; not so for ?n1)
- Level F3 on /u/ for all VC transitions.



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Summary: Formant Transitions

- ?n1 and ?n2 have the same trajectory of F1 formant transition, showing the most F1 lowering, level in /i/ context.
- ?n1 and ?n2 have the same trajectory of F2 formant transition in /a/ (substantial raising) and in /i/ (high level), but differ for /u/ contexts.
- ?n1 and ?n2 have the same trajectory of F3 formant transition in /i/, showing the least fall compared to other stop types.

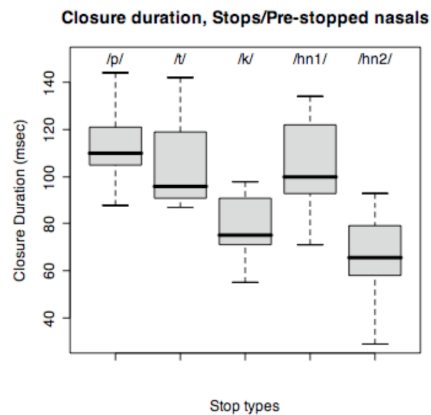
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Discussion: place of articulation

- Characteristics of “?n” VC transition
 - More lowering of F1 than other stop types.
 - Raising of F2, or level after /i/
 - Least F3 fall compared to other stop types
- The “?” is palatal or alveopalatal; /cn/.

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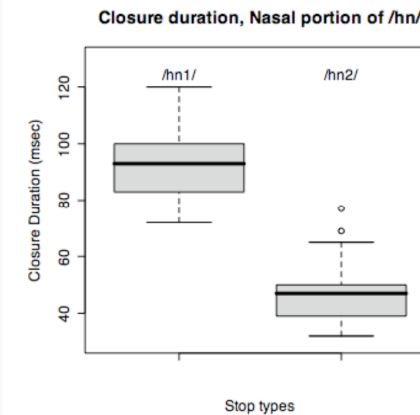
Duration Data (1): closure



1. /cn1/ tokens have longer closure duration than /cn2/ tokens
2. Recall that /cn1/ tokens are from [cnẽ] and /cn2/ tokens are from [cnakĩh]
3. Significant effect of place on duration.

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Duration Data (2): nasal portion



- Duration of nasal is also much shorter for /cn2/ than for /cn1/.

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Summary: Duration Data

- Compared to other stop types, the /cn1/ pre-stopped nasals have a closure duration comparable to the duration of word-initial /t/.
- The /cn2/ ones have the shortest closure duration of all stop types.
- Shorter duration of both the closure and nasal in the pre-stopped nasal.

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Discussion: Duration

- The differences in duration between the /cn1/ and /cn2/ tokens suggest that there is a strong positional effect on stop duration.
 - /cn1/ occurs in the onset of a monosyllable
 - /cn2/ occurs in the onset of a disyllable
- A “fortis-lenis” contrast or a positional strengthening effect.
- Recall that the onset of final syllables is the position of prosodic strengthening in Trique.

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Conclusion

- Place of articulation of the pre-stopped nasals in the language is palatal/alveopalatal.
- Duration data suggests that there is a contrast between a fortis (geminate) and a lenis (singleton) pre-stopped nasal: /ccn/ and /cn/.

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Conclusion

- Since both the closure duration of the stop portion and the nasal duration portion are correlated, their overall duration must be treated as phonologically unitary.
- The pre-stopped nasal is a phoneme, not a sequence.
- Pre-stopped nasals are rare in languages of the world. It is rarer still that a language to treat them as single units and have a fortis-lenis contrast with them.

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References

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- Beaty de Farris, Kathryn, Pablo García Sánchez, Rubén García Sánchez, Jesús Ojeda Sánchez, Augustín San Pablo García, Apolonio Santiago Jiménez, (2004) *Diccionario Básico del Mixteco de Yosondúa, Oaxaca*, SIL Mexico.
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- Hollenbach, Barbara (1984) *The Phonology and Morphology of Tone and Laryngeals in Copala Trique*, Doctoral Dissertation, Arizona.
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- Stevens, Kenneth (2000) *Acoustic Phonetics*, MIT Press.

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Appendix A: Comparative Perspective

- Present in Itunyoso Trique and possibly in Chicahuaxtla Trique, but not in Copala Trique (Good, 1978; Hollenbach, 1984).
- Chicahuaxtla cognates:

naquĩnjĩn	/3/	'atole'
jnaquĩnjĩn	/4-1/	'opossum'
dinĩ'	/4/	'brother'
- Cognate with 'brother' begins with alveolar stop, but the cognate with 'opossum' has a "jn" onset.

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Comparative Perspective (2)

- Other Mixtecan languages have what is written as "jn", notably Yosondua Mixtec (Beaty de Farris et al, 2004) and Atlatlahuca Mixtec (Alexander, 1980).
 - "La lengua está en la posición de n, pero el aire escapa por la nariz" (Alexander, p.4)
 - Suggests that this could be a voiceless nasal though.
- In Highland Mixtec languages, there are alveolar pre-stopped nasals, written as "tn" (Hollenbach, p.c.)

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Comparative Perspective (3)

- Outside of Otomanguean, pre-stopped nasals have been noted in Russian (and Polish), Diyari, Arabana, Wangganuru, Olgolo, and Arrernte (Ladefoged & Maddieson, 1996).
 - Analyzable as sequences of stop+nasal
- Occur in Yeletnye (Maddieson, p.c.) with nasal plosion.

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Appendix B: Vowel & Tone Inventory

		<i>Front</i>	<i>Central</i>	<i>Back</i>
<i>Close</i>	<i>Oral</i>	i		u
	<i>Nasal</i>	ĩ		ũ
<i>Close-Mid</i>	<i>Oral</i>	e		o
	<i>Nasal</i>		ẽ	
<i>Open</i>	<i>Oral</i>		a	

- 8 Tones: /1/, /2/, /3/, /4/, /5/, /31/, /32/, /13/ (and possibly another, /43/).
- All contrast on final syllables, but only /2/, /3/, & /4/ contrast in non-final syllables.