



# LEXICAL AND MORPHOLOGICAL PRENASALIZATION IN SÀ'ÁN SÀVĪ ÑÀ ÑUÙ XNÚVÍKÓ

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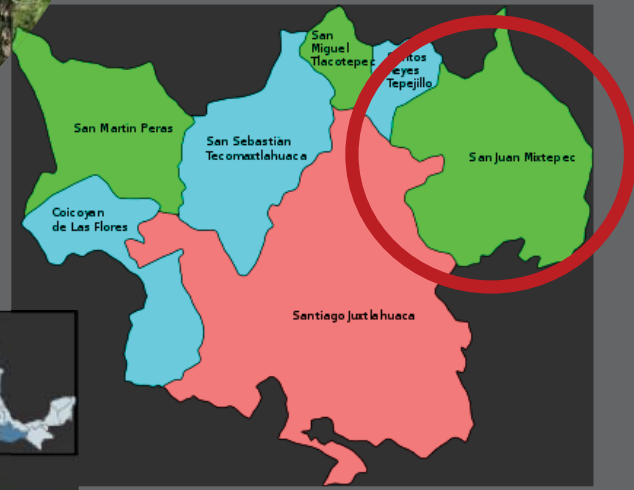


# This presentation

- The language
- Prenasalized segments in Sà'án Sávĩ ñà Ñuù Xnúvókó
- Experiment
- Discussion & Implications



# SÀ'ÁN SÀVĪ ÑÀ ÑUÙ XNÚVÍKÓ (MIXTEPEC MIXTEC)



Mixtec (Otomanguean) variety spoken in the municipality of Mixtepec (district of Juxtlahuaca, Oaxaca, Mexico)

About 9,000 speakers (Eberhard et al. 2019)

One of the main branches of Mixtec (Josserand 1983)

Little information on this variety, some on phonology (Pike & Ibach 1978; Paster & Beam de Azcona 2004)



# CONSONANTS OF MIXTEPEC MIXTEC

		Bilabial	Alveolar	Palatal	Velar	Labio-velar	Glottal
<b>Plosive</b>	<b>Plain</b>	p	t		k	k <sup>w</sup>	
	<b>Prenasalized</b>	<sup>m</sup> p	<sup>n</sup> t		<sup>ŋ</sup> k	<sup>ŋ</sup> k <sup>w</sup>	
<b>Nasal</b>		m	n	ɲ			
<b>Affricate</b>	<b>Plain</b>		<sup>̄</sup> ts	<sup>̄</sup> tʃ			
	<b>Prenasalized</b>		<sup>n̄</sup> ts	<sup>n̄</sup> tʃ			
<b>Fricative</b>			s	ʃ	x		(h)
<b>Approximant</b>		β̄		j		(w)	
<b>Tap</b>			ɾ				
<b>Trill</b>			r				
<b>Lateral approximant</b>			l				

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<b>Tap</b>			ɾ				
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<b>Lateral approximant</b>			l				

# MIXTEPEC MIXTEC HAS PRENASALIZED STOPS AND AFFRICATES

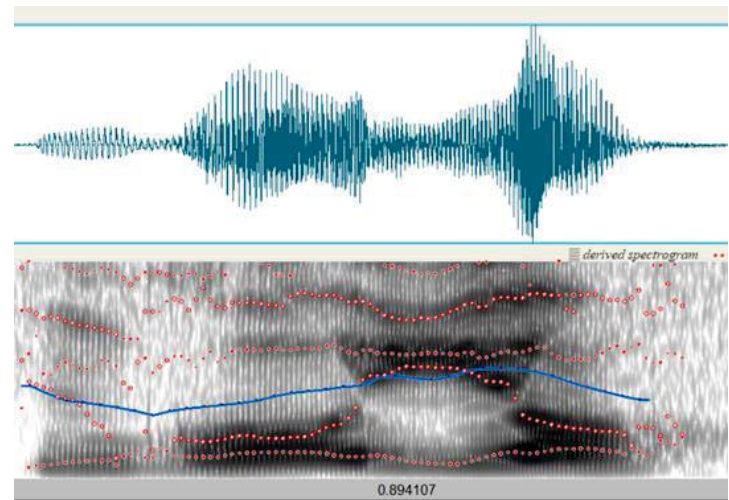
*nkuii* [ŋg<sup>wi</sup>2i<sup>3</sup>] ‘fox’

*ncho'o* [n<sup>dzo</sup>3ʔo<sup>3</sup>] ‘hummingbird’

*ntintsìtsǎ* [n<sup>di</sup>3n<sup>dzi</sup>1tsa<sup>14</sup>] ‘turtle’

*ntuchĩ* [n<sup>du</sup>3tʃi<sup>14</sup>] ‘bean’

*Nkǒyô* [ŋgo<sup>13</sup>jo<sup>41</sup>] ‘Mexico’



*Nkǒyô* [ŋgo<sup>13</sup>jo<sup>41</sup>] ‘Mexico’

The most frequent of these are <sup>n</sup>t and <sup>n</sup>tʃ

Phonetically, these are often voiced, or at least **partially voiced**

# LEXICAL VS. MORPHOLOGICAL PRENASALIZATION IN MIXTEPEC MIXTEC

- **Lexical:**
  - No synchronic evidence for morphological complexity
  - Not followed by nasal vowels
  - Mostly inherited from Proto-Mixtec (Josserand 1983): *\*nduti?* > *ntuchi* [n<sup>du</sup>3tʃi<sup>14</sup>] ‘bean’
- **Morphological:**
  - Due to likely recent processes of segmental erosion (Heine & Reh 1984) in grammaticalization: *ntivi* [n<sup>di</sup>12βi<sup>1</sup>] ‘PFV.blow’ (compare with *tivi* [ti<sup>4</sup>βi<sup>1</sup>] ‘IPFV.blow’)
  - Nasal vowels after these segments are possible: *ntaan* [n<sup>dã</sup>1ã<sup>3</sup>] ‘PFV.quake’ (compare with *tâan* [tã<sup>41</sup>ã<sup>3</sup>] ‘IPFV.quake’)

# MORPHOLOGICAL PRENASALIZATION IN MIXTEPEC MIXTEC

Perfective aspect

*cháa* [tʃa<sup>4</sup>a<sup>3</sup>] ‘IPFV.write’ vs. *ncháa* [n<sup>ɔ</sup>dʒa<sup>1</sup>a<sup>3</sup>] ‘PFV.write’

Prospective aspect

*kítsáá* [ki<sup>4</sup>tʃa<sup>4</sup>a<sup>4</sup>] ‘IPFV.start’ vs. *kú nkítsáá* [ku<sup>4</sup>ŋgi<sup>1</sup>tʃa<sup>4</sup>a<sup>4</sup>] ~ [ũ<sup>4</sup>ŋgi<sup>1</sup>tʃa<sup>4</sup>a<sup>4</sup>] ‘PROSP.start’

Negation

*katsí* [ka<sup>3</sup>tʃi<sup>4</sup>] ‘POT.eat’ vs. *nkătsí* [ŋga<sup>13</sup>tʃi<sup>4</sup>] ‘NEG.POT.eat’



## SIDE NOTE: PERFECTIVE ASPECT IN MIXTEPEC MIXTEC

IPFV	PFV	English
<i>kixì</i> [ki <sup>4</sup> ʃi <sup>1</sup> ]	<i>nìkixì</i> [ni <sup>1</sup> ki <sup>1</sup> ʃi <sup>1</sup> ]	Sleep
<i>tsíka</i> [tʃi <sup>4</sup> ka <sup>3</sup> ]	<i>ntsìka</i> [ <sup>n</sup> dʒi <sup>1</sup> ka <sup>3</sup> ]	Walk
<i>nâa</i> [na <sup>41</sup> a <sup>3</sup> ]	<i>năa</i> [na <sup>13</sup> a <sup>2</sup> ]	End

In Mixtepec Mixtec we find:  
Forms with the prefix *nì-*

Prenasalized forms (probably due to the loss of *i* in the prefix *nì-*)

Tonal changes (probably due to the loss of the prefix *nì-*)  
(see Hollenbach 2015; Uchihara & Mendoza Ruiz 2021)

# EXPERIMENTAL STUDY

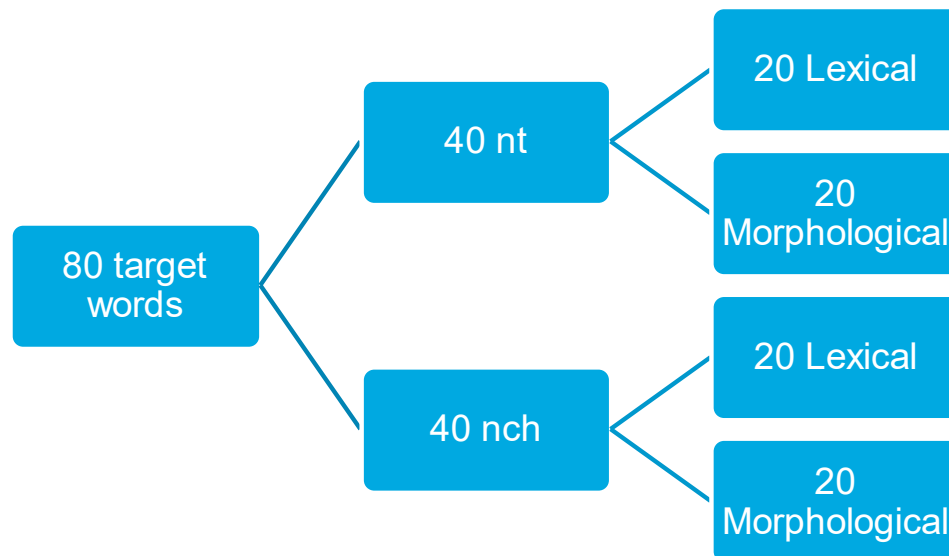
## Elicitation task

- 6 participants
- 3 male and 3 female
- ages of 20 to 60
- Self-identified as native speakers of Mixtepec Mixtec
- Due to background noise (and breathiness) data for one male speaker was dropped

(recorded using a Tascam Dr-40X and a Shure WH20XLR Dynamic Headset microphone)

# EXPERIMENTAL STUDY: Elicitation task

- Focusing on <sup>n</sup>t <nt> and <sup>n</sup>tʃ <nch> (by far the most common in lexical items)
- Similar words that present lexical and morphological prenasalization (minimal pairs, or near-minimal pairs as necessary):



Morphological: we used prenasalized PERFECTIVE forms of verbs (PROSPECTIVE varies in the realization of a preceding prefix)

# PROCEDURE

Jeremías Salazar (speaker) recorded the audio for the stimuli sentences: the 80 target words

Participants watch a video presenting the stimuli sentences and see the image (illustrating the meaning of the target words)

Participants then say the carrier sentence twice



*Yesterday he **broke** the plate*

Takuni **ntà'vĩ**-rà kò'õ



Vàtsi tù'un ká'vi-rà \_\_\_\_\_ sàťă iin líbrù  
*Appears in the words he is reading X in this book*

Audio: Claudia Salazar



# MEASUREMENTS

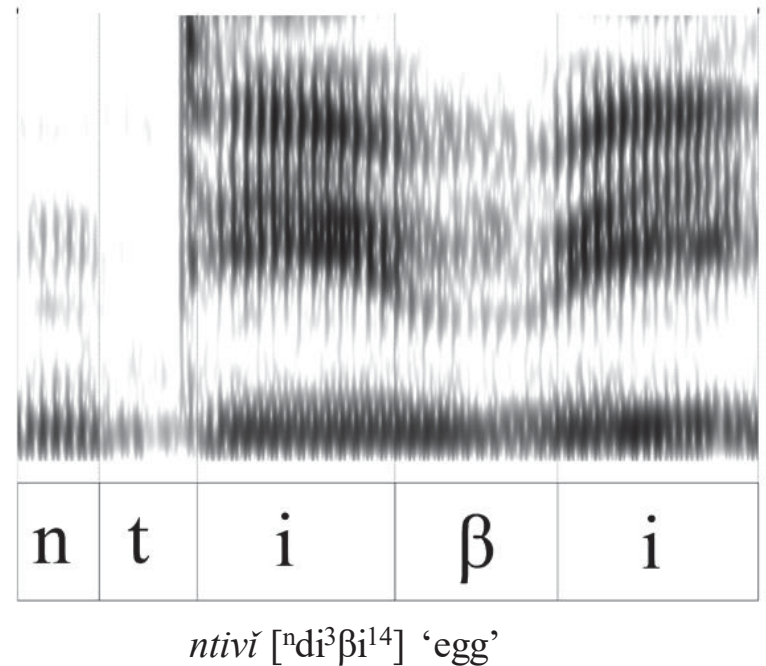
Duration of the nasal closure (%)

Duration of the oral closure (%)

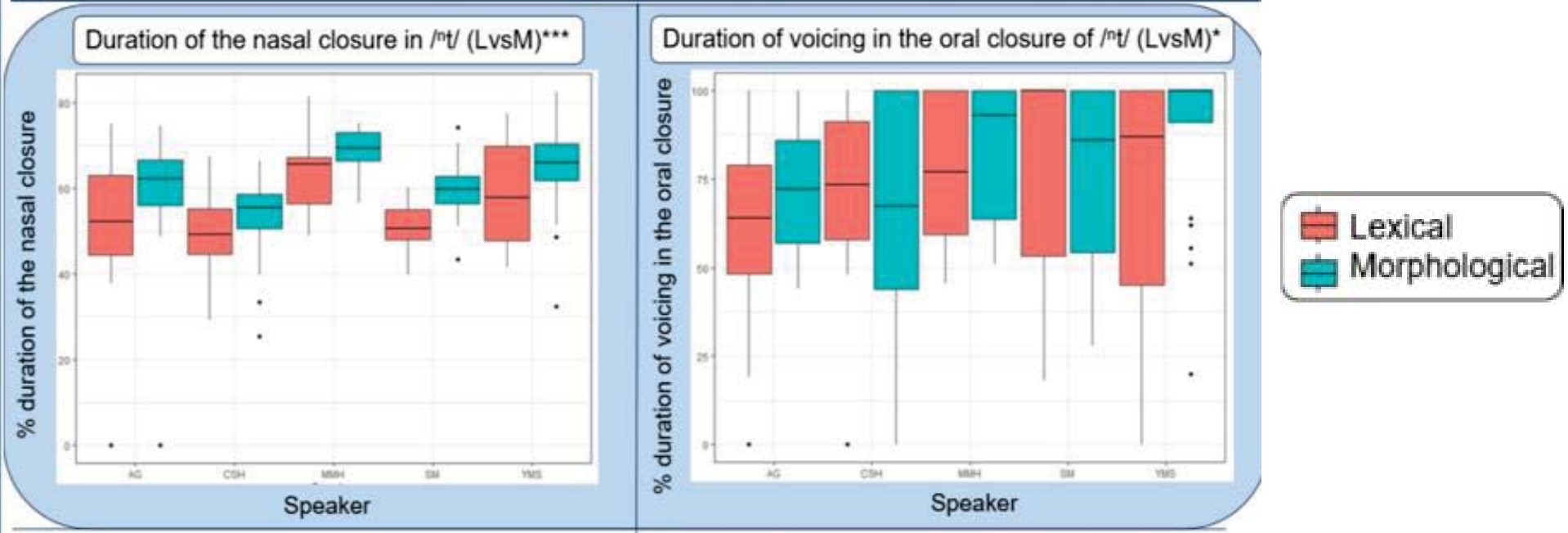
Duration of voicing in the oral closure (%)

Additional coding for:

- Speaker
- Order (first or second time uttering the carrier sentence)
- Vowel following the prenasalized segment
- Number of syllables of the Word

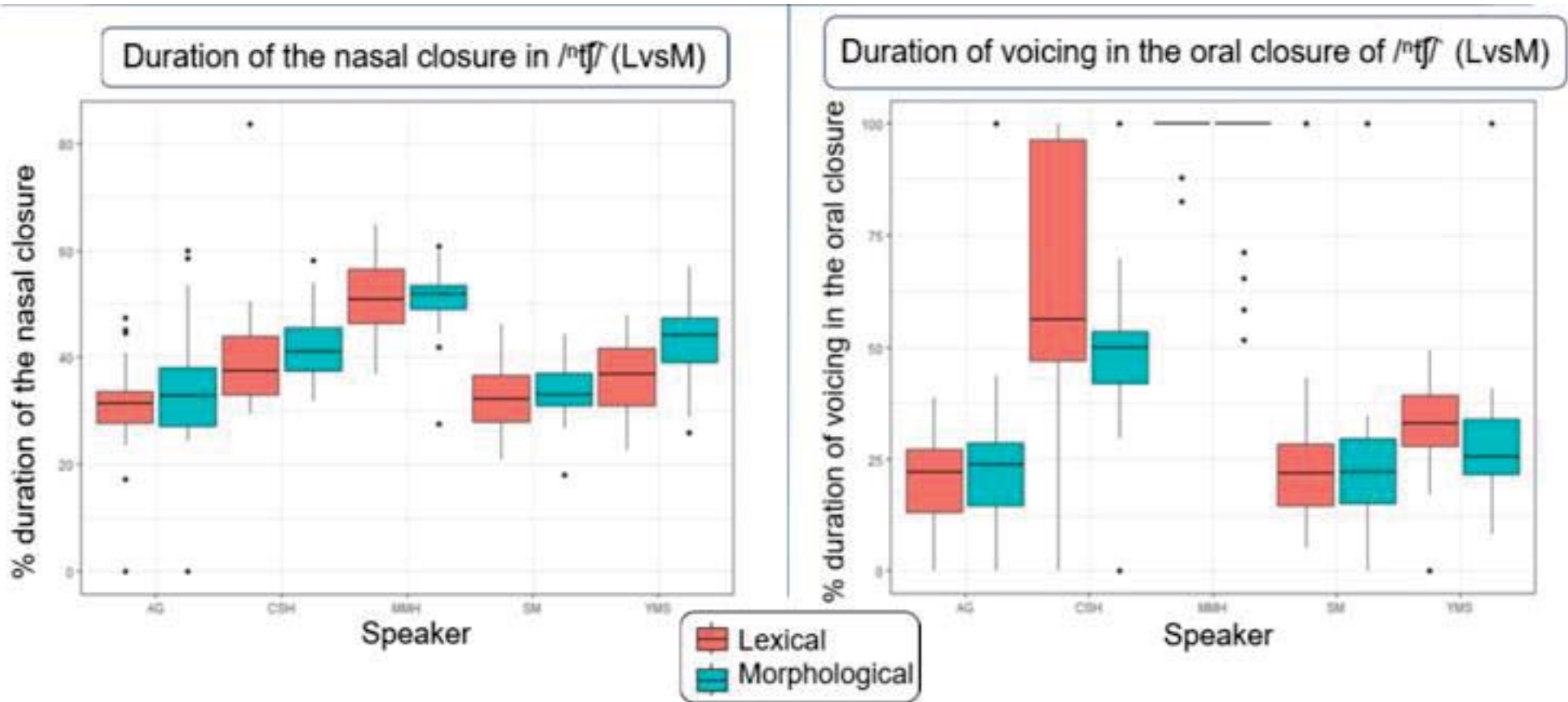


lmerTests determined that Speaker was the only random effect that was significant (and Order for voicing in /<sup>n</sup>t/) Linear models. DV: duration of the nasal closure / duration of voicing in the oral closure // IV: L\_M+Speaker



**Significant difference** in the duration of the nasal closure between lexical and morphological pre-nasalization ( $\beta = 7.65$ ,  $p < 0.001$ ), and no interaction with Speaker.

Slightly longer duration of voicing in the oral closure for morphological pre-nasalization ( $\beta = 8.78$ ,  $p < 0.05$ )



**No significant difference** in the relative duration of the nasal closure OR the duration of voicing in the oral closure as a function of L\_M, and no interaction with Speaker

Huge variability among Speakers

# DISCUSSION – LEXICAL VS. MORPHOLOGICAL?

For /<sup>n</sup>t/ the duration of the nasal closure was **significantly longer** (61.2%) for morphological pre-nasalization than for lexical pre-nasalization (54.15%).

Segmental erosion (grammaticalization process):

- from *nì* to *n+C* to *prenasalized C*?
- Compensatory lengthening
- Informativity (Cohen Priva 2008)
  - But pre-nasalization is not the only marker of aspect in these forms (tone) and the segment /<sup>n</sup>t/ is not particularly infrequent
  - *Tiin* [tĩ<sup>4</sup>ĩ<sup>4</sup>] ‘IPFV.grab’ vs. *ntiin* [n<sup>n</sup>dĩ<sup>13</sup>ĩ<sup>3</sup>] ‘PFV.grab’



# DISCUSSION – LEXICAL VS. MORPHOLOGICAL?

For /<sup>n</sup>tʃ/ there is no significant difference in the duration of the nasal closure between morphological pre-nasalization (40.05%) and lexical prenasalization (38.1%), but below 50%

- Duration of voicing: It is harder to maintain voicing through an affricate (Ohala & Solé 2008; Zygis et al. 2012)
- Duration of the nasal stop: the already complex articulation of the affricate = less time to do more things

# PRENASALIZATION IN MIXTEC (AND OTHER OTOMANGUEAN LANGUAGES)

- Prenasalized voiced segments (Longacre 1957: 9; e.g., Cortés et al. 2023)
- Allophones of nasal consonants? (Marlett 1992) = post-oralized nasal stops?
- Hypervoicing? (Iversons & Salmons 1996)
- Clusters?

# IMPLICATIONS

- If treating this prenasalization as **hypervoicing** (Iversons & Salmons 1996):
  - In our study, avg. voicing in stops >71% vs. in affricates <50%
    - This could be explained articulatorily
  - However, the nasal closure is longer than the oral closure (as in DiCanio et al. 2019 on Yoloxóchitl Mixtec) \*disfavoring an analysis as phonologically voiced simple segments.

# IMPLICATIONS

- The results for /<sup>n</sup>t/ <nt> could support a synchronic analysis of a **cluster**  $n+C$  in morphological cases only
- This is inefficient because support for this structure is non-existent for morphological instances of <sup>n</sup>tʃ <nch>
- Pointing at post-stopped nasals (DiCanio et al. 2019, on Yoloxóchitl Mixtec)
  - Same duration as other consonants

# IMPLICATIONS

- If treating these (lexical prenasalization) as **post-oralized nasal stops** (Marlett 1992):
  - Are there post-oralized nasal stops (L) & prenasalized oral stops (M)?
    - Mixtec oral vs. nasal vowels
    - Vowels after nasal stops are nasal
    - Post-oralization of the nasal stops; no nasal vowels after these segments
  - Observed in Yoloxóchitl Mixtec (DiCanio et al. 2019)
  - Also true in Mixtepec Mixtec, BUT ONLY lexical
  - Words with morphological prenasalization can be followed by nasal vowels:
    - *Nt̥in* [n̥d̥i<sup>13</sup>ĩ<sup>3</sup>] ‘PFV.grab’ (see *t̥in* [t̥i<sup>4</sup>ĩ<sup>4</sup>] ‘IPFV.grab’)

# IMPLICATIONS

Synchronically, however, these segments are not perceived as different sounds by speakers, and there seems to be no reason to overcomplicate the analysis

The practical orthography we have developed is neutral and compatible with any of the possible phonological analyses

# OUR ANALYSIS

We suggest that the best synchronic analysis for these segments in Mixtepec Mixtec is to see them as **prenasalized stops** because:

- I. they arise in morphological processes as sequences of nasal followed by plain stop
- II. speakers do not consider them separate segments/sequences from lexical prenasalized stops
- III. this analysis does not necessitate more complex phonotactics or phonological inventory
- IV. the phonetic differences in morphological vs. lexical prenasalized stops possibly reflect compensatory lengthening due to segmental erosion, for which there is evidence in the morphology of the language

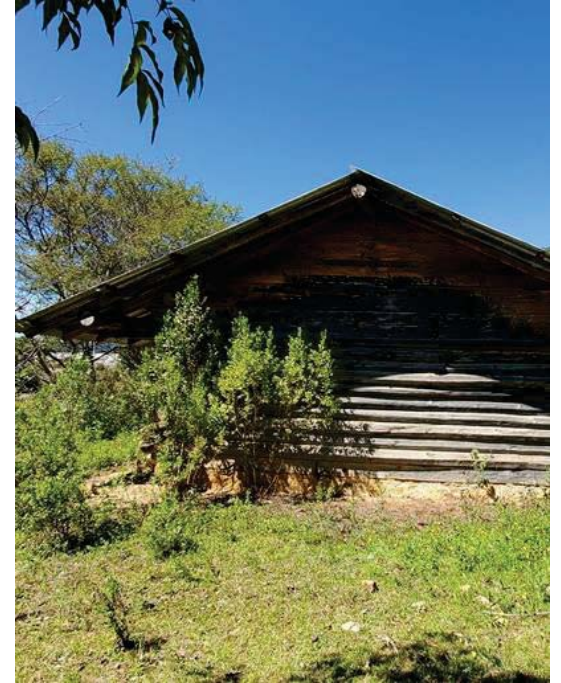
# Acknowledgements

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**¡Tá tsà'vĩ-kue-ní!**





·TÁ TSÀ'VĬ-KUE-NÍ  
ÑÀÀ CHÁA SÒ'O-NÍ!