UC San Diego

Penn
University of Pennsylvania

Tense voice and the role of non-contrastive elements in sound change

Marc Garellek, UC San Diego
Jianjing Kuang, UPenn
Osbel López-Francisco, UNAM-Iztacala
Jonathan D. Amith, Gettysburg College

Gettysburg College

Facultad de Estudios Superiores Iztacala

Sound change involving non-modal phonation types

- When non-modal phonation types undergo a sound change, what do they change *into* ? Why?

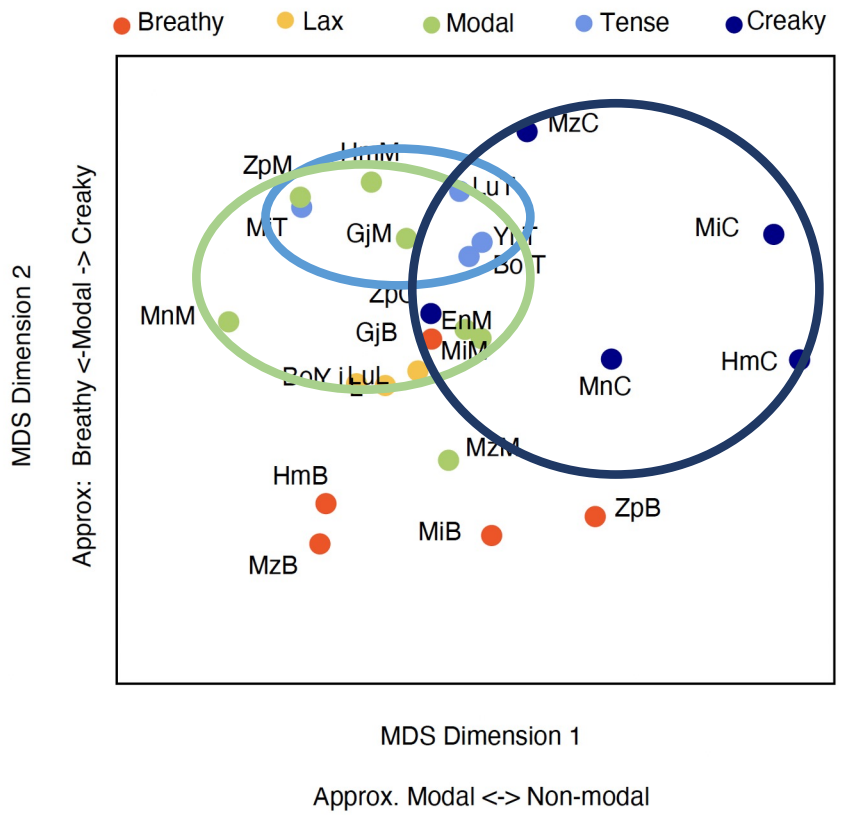
- Goal: explore the role of secondary correlates of phonation in sound change *out of* non-modal voice
  - In particular, we focus on languages with contrastive tense voice (vs. lax/modal)

Sound change via cue shifts

- Multiple co-varying cues for a phonological contrast
- Sound change occurs when the relative weighting shifts

Tense voice

- ↑ glottal constriction
- Absence of strong creak; voicing is regular



Keating et al., to appear *Lg 2023(2)*

Languages of study

	Bo	**Southern Yi (SY)**	**Zongozotla Totonac (ZT)**
Family	Sino-Tibetan	Sino-Tibetan	Tepehua-Totonac
Location	Yunnan, China	Yunnan, China	Puebla, Mexico
Speakers in sample	9	12	8
Word pairs	~40	~40	8
Phonation contrast	tense vs. lax	tense vs. lax	tense vs. modal
Tone language?	Y	Y	N

Functional aspects of contrast

	Bo	**Southern Yi (SY)**	**Zongozotla Totonac (ZT)**
Number of minimal pairs	Many	Many	Few
Phonation restrictions	?	?	Immediately word-final *V̰# > Vʔ#
Morphological function	?	?	Associated with 2P
Robustness of contrast across varieties	Strong	Strong	Weak

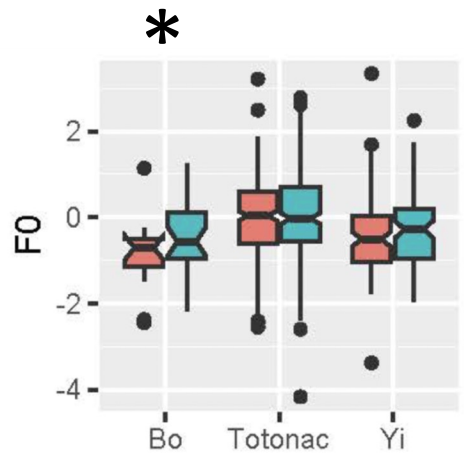
Sample pairs

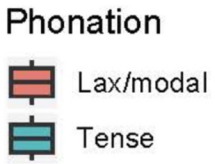
	Tense	Non-tense (lax for Bo, SY; modal for ZT)
Bo	[nạ̰ ˧˩] ‘deep, drop of oil’	[nạ̈ ˧˩] ‘black’
SY	[nạ̰ ˧˩] ‘handful’	[nạ̈ ˧˩] ‘stick’
ZT	[pạ̰qɬ] ‘s/he broke it’	[paqɬ] ‘it blossomed’

What acoustic measures distinguish tense voice from the other phonation type?

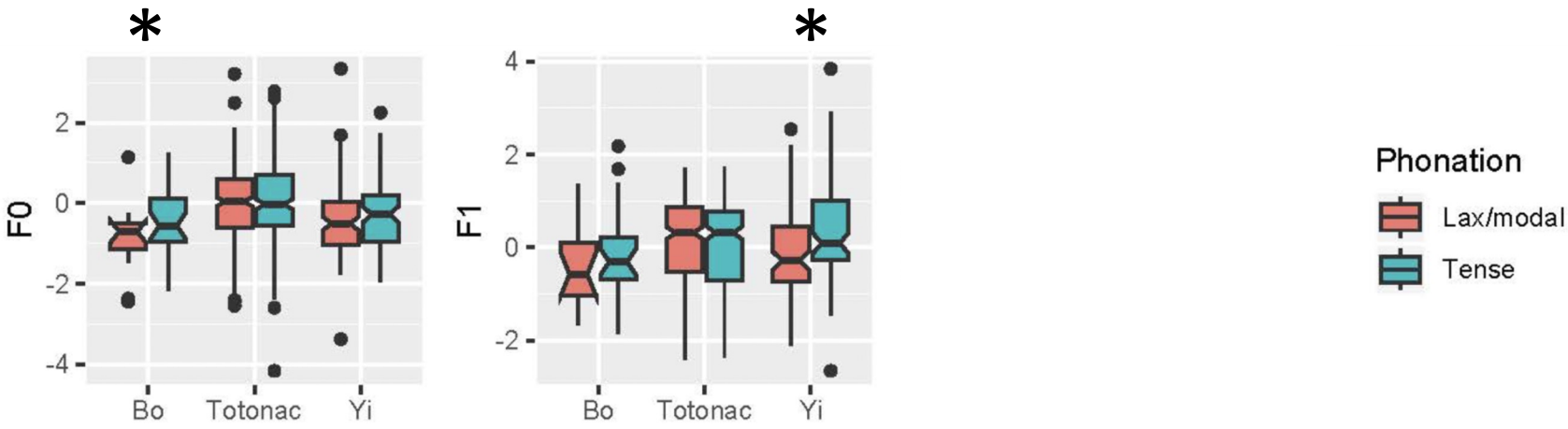
- F0, fundamental frequency (↑ with high-pitched tense voice)
    - Stiffness of the vocal folds
- F1, first formant freq (↑ with register-like tense voice)
    - Constriction of the pharynx
- H1*-H2*, spectral tilt measure (↓ with increased constriction)
    - Constriction of the glottis

Results: f0

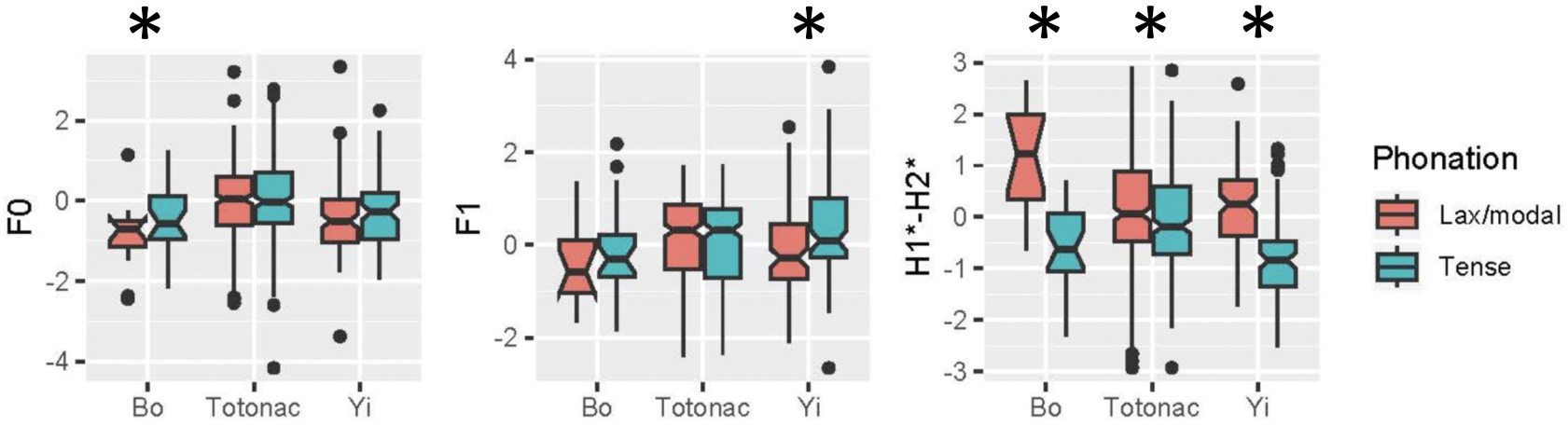




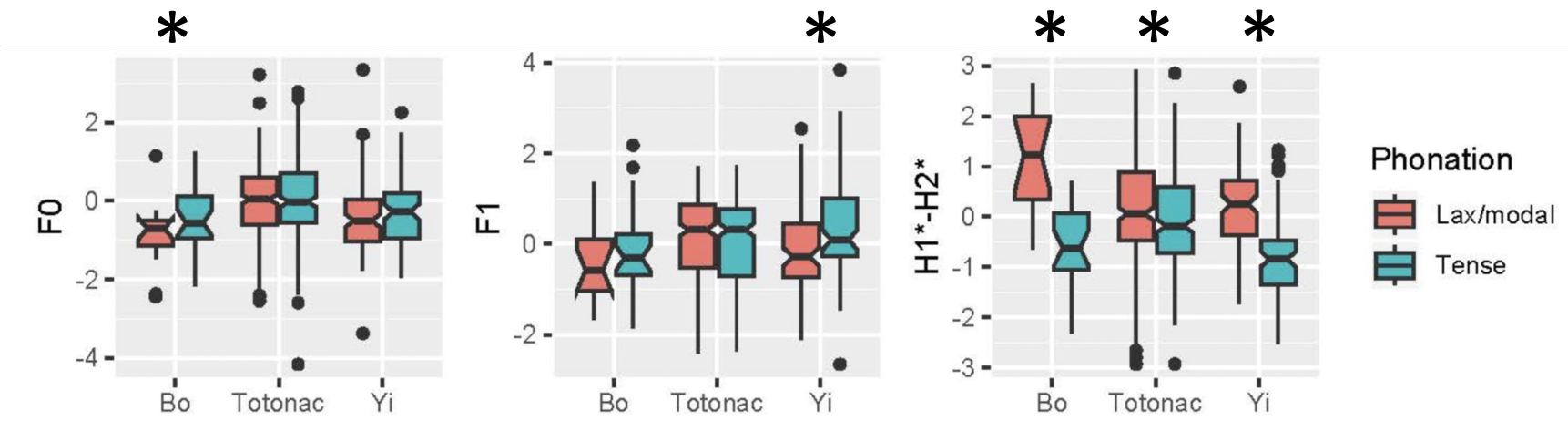
Results: F1


*
*
F0
F1
2
0
-2
-4
4
2
0
-2
Bo
Totonac
Yi
Bo
Totonac
Yi
Phonation
Lax/modal
Tense

Results: H1*-H2*



Summary of results by language



- Bo: tense shows ↑f0, ↓H1*-H2*
- SY: tense shows ↑F1, ↓H1*-H2*
- ZT: tense shows ↓H1*-H2*, quantitatively weaker effect than for Bo, SY

Implications for sound change

- What are the secondary correlates to phonation contrast?
  - Bo: just higher f0
  - SY: just higher F1
  - ZT: none (?)

- (Lack of) 2ry correlates suggest following paths of sound change:
  - *Tense > higher pitch (tone split)
  - *Tense > lower vowels (vowel shift; see Kuang & Cui 2018 for SY)
  - *Tense > ø (loss of contrast)

Coarticulatory cues for tense voice

- Constriction in the pharynx leads to retracted tongue root
- Stiffness in the vocal folds leads to a higher f0
- These lead to different paths of sound change!

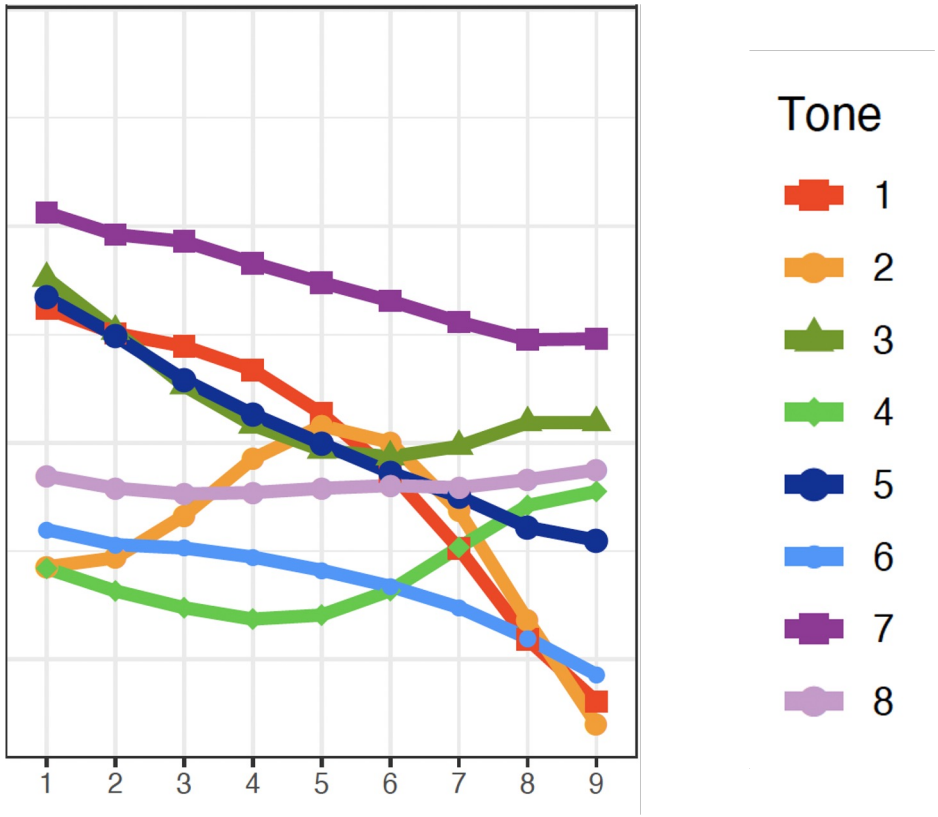
Implications for sound change

- (Lack of) 2ry correlates suggest following paths of sound change:
  - *Tense > higher pitch (tone split)
  - *Tense > lower vowels (vowel shift, ATR-like split)
  - *Tense > ø (merger with non-tense, loss of contrast)

- These sound changes are reported for phonation types (if not for tense voice specifically)

Phonation > (More complex) tone system

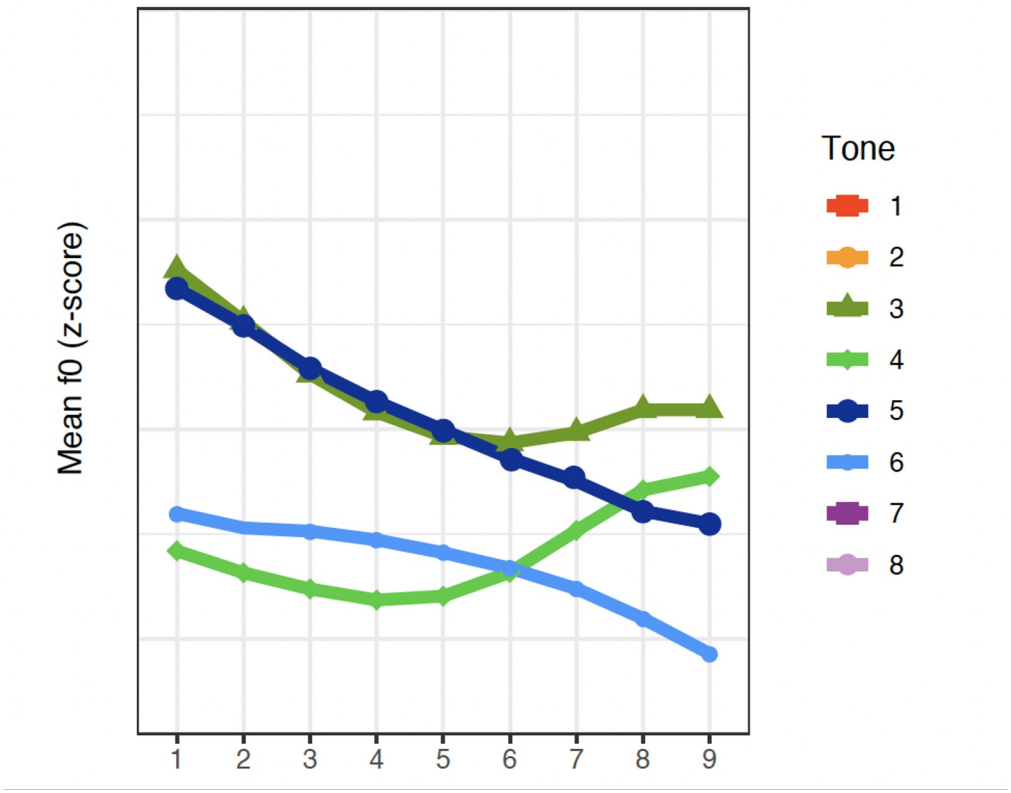
Four tone system → eight tone system in Shaoxing Wu



Kuang et al. (2018)

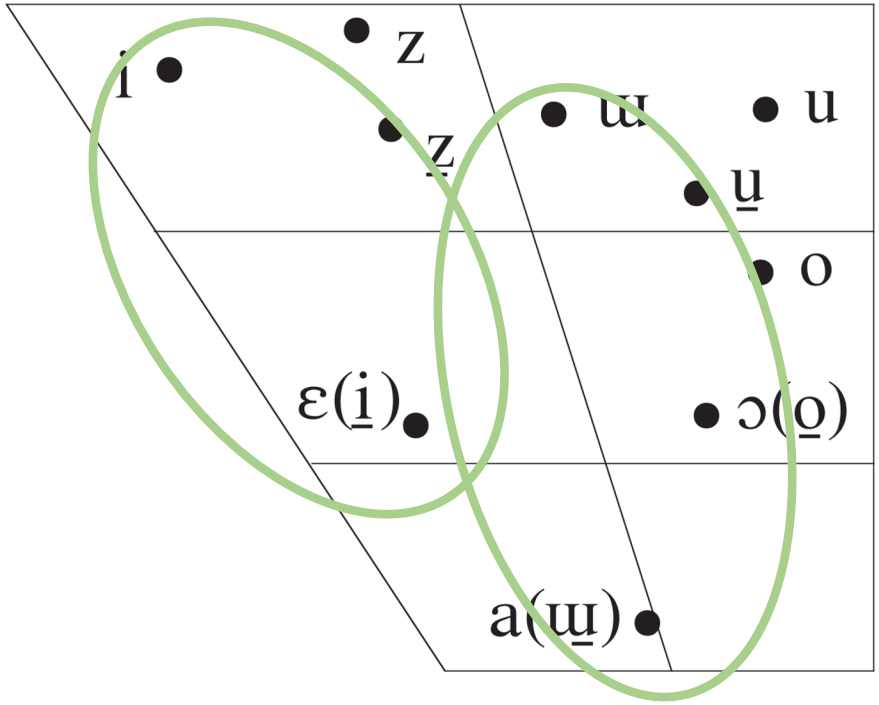
Phonation > (More complex) tone system

Four tone system → eight tone system in Shaoxing Wu



Kuang et al. (2018)

Phonation > More complex vowel system
Northern (Nuosu) Yi



Edmondson et al. (2017)
https://doi.org/10.1017/S0025100315000444

Examples from three Yi languages

	Tense register	Lax register
Phonation primary		
Phonation + vowel quality		
Vowel quality only		

Data from Kuang and Cui (2018); Kuang (2011)

Loss of contrast
Sierra Totonac (including Zongozotla)

	Zapotitlán	**Zongozotla**	**Coatepec**
‘pig’ *pa̰ʃnḭ	pa̰ʃnḭ	pa̰ʃniʔ	paʃniʔ

McQuown (1940), Aschmann (1946), MacKay & Trechsel (2018), Dawson et al. (2022)

Summary

- Tense voice = phonation type with increased constriction
  - But where the constricted quality is weaker than for prototypical creaky voice
- Distinct secondary correlates, and (apparent) lack of correlates, likely play a role in different paths of phonation loss
- Functional factors likely play a role in the loss of phonation suggested for Zongozotla Totonac vs. Bo and Southern Yi