Ixpantepec Nieves Mixtec Word Prosody

Lucien Carroll
<lscarroll@ucsd.edu>
UC San Diego



Acknowledgments

- Mixtec tutors:

  Florencia Camacena, Moises Ortiz, Otilio Osorio, Matilde Castillo, Felicita Osorio

- Familia Indígena Unida
- Other Mixtec learners/researchers
- Advisors and dissertation committee
- UC MEXUS

Objective

Describe and analyze key aspects of the phonology and acoustics of word prosody in Mixtec of Ixpantepec Nieves (MIN)

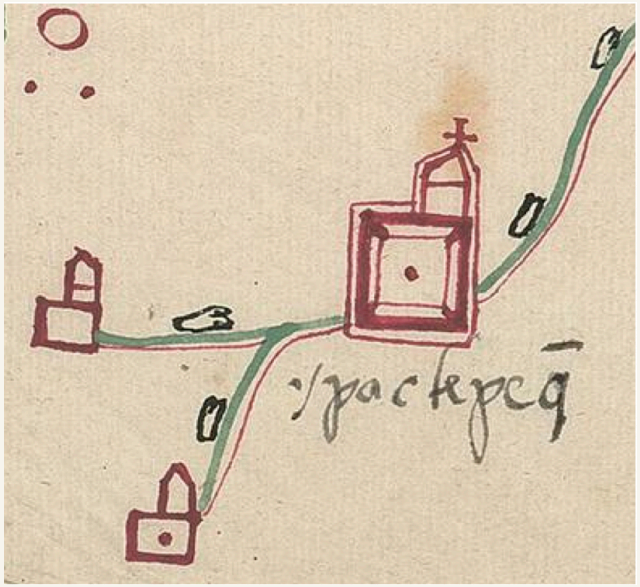
- Mixtec languages have
  - complex lexical tone systems
  - word-level stress accent
  - phonemic laryngeal features
- Mixtec languages have closely aligned
  - prosodic structure
  - morphological structure

Research on typology of stress-tone interactions is just beginning

Roadmap

1. Background
   Typological issues and language overview
2. Stress Phonology
   MIN has default stress aligned to the root
3. Stress Acoustics
   MIN stress adds duration, intensity, periodicity
4. Tone Phonology
   Up to 1 T (H/∅/L) per mora plus 1 (+H/+L)
5. Tone Acoustics
   Tonal coarticulation echos phonology

"El pueblo de Ycpatepec esta dos leguas de Çilacaioapa, ... es tierra fragosa y lengua misteca."
(The town of Ixpantepec is two leagues from Silacayoapan, ... the terrain is rough and the language is Mixtec.)
–*Relaciones geográficas de la Diócesis de Tlaxcala*
(Aznar c. 1580/1905:238)



Background

Ixpantepec Nieves

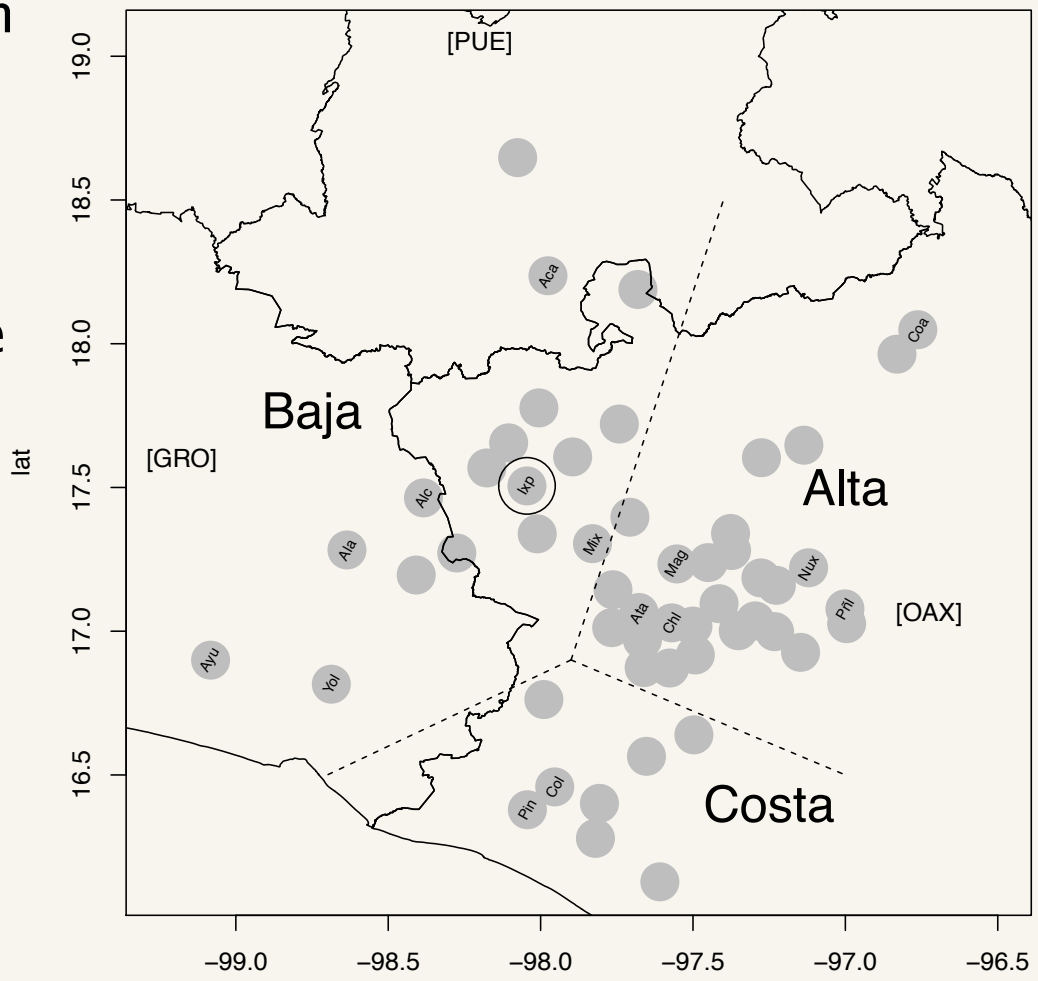
- Previous work on MIN describes discourse (Villas-Boas 2010) and syntax (Caponigro et al 2012)
- First systematic phonological description
- This data collected with five native speakers living in or visiting San Diego, California



Ixpantepec Nieves within Mixtec language area (green) and surrounding indigenous language groups
(adapted from wikimedia images from user: yavidaxiu)

Mixtec Geography

- Language continuum in southern Mexico, split into Baja, Alta and Costa regions
- Ixpantepec Nieves (IXP in map): in NW corner of Oaxaca state, on the northern edge of Josserand's (1983) Southern Mixteca Baja dialect group.
- For the tonal phonology, major distinction is central varieties vs. some peripheral ones



Mixtec Studies

Much literature about Mixtec tone phonology, but less about stress or acoustics

- Little evidence about phonological diagnostics of stress
- Lack of acoustic data leaves stress claims open to interpretation
- Many tone descriptions are ambiguous about phonetic levels and processes

MIN Phonology

- Bimoraic roots
  (plain: CVː, CVCV; glottalized: CVʔV, CVʔCV)
- Monomoraic affixes and clitics (plain: CV)
- Nasality at morphemic level in native lexicon

- Voiced C: Prenasalized, Nasal, Continuant
- Voiceless C: Stops, Fricatives
- Vowels: Oral, Nasal

MIN Segments

Oral vowels: /i, e, a, o, u/ +long
Nasal vowels: /ĩ, ã, ũ/, /ĩː, ẽː, ãː, ũː/

		labial	coronal			dorsal	
			apico-alveolar	lamino-alveolar	post-alveolar		lab'ized
voiceless	stop		t	t^j	tʃ	k	k^w
	cont		s		ʃ	x	
voiced	stop	(^{m}b)	^{n}d	^{n}d^j		(^{n}g)	
	cont	v	l		ʒ		
	nasal	m	n		ɲ		

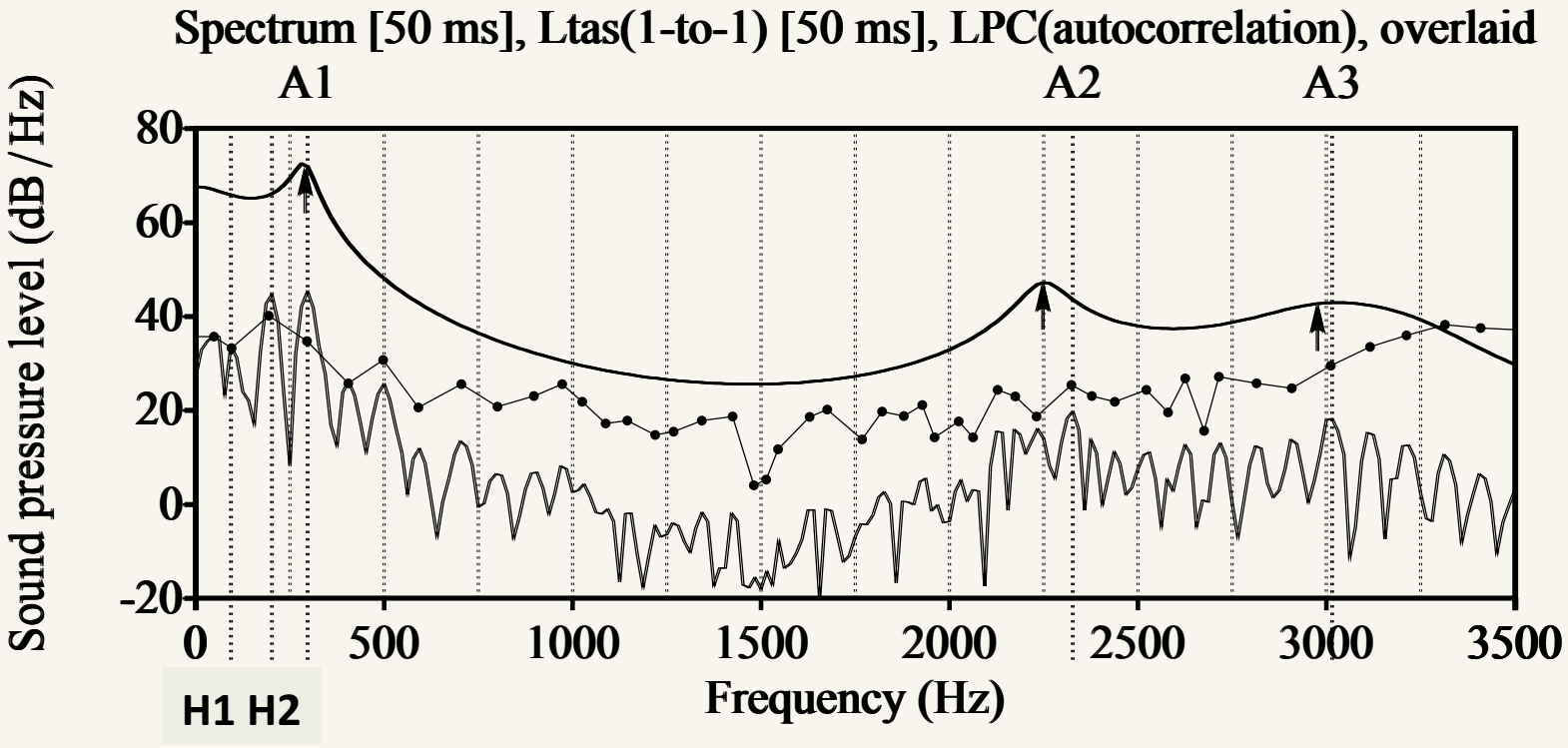
Acoustics of Prosody

Correlate	Word Stress	Phrasal Stress	Tone	Phonation
V Duration	EN, ND, SP, ZP, NH, ...	EN, ND, NH	CM	HM
C Duration	EN, ND	, ND	CM	
V Intensity	SP, ZP	, ND, SW	CM	MZ
Low-band spec tilt (H1-H2)	NH			GJ, MZ, ZP
Mid-band spec tilt (H1-A2)	ND, SP, NH	EN, SW		GJ, MZ
Periodicity (HNR, CPP)				, HM
F0	NH	EN, SW, SP	, MZ	

MIN
MIN
MIN
MIN
MIN
MIN
MIN
MIN

CM: Mandarin (Shen 1993)
EN: English (Campbell & Beckman 2007)
GJ: Gujarati (Keating et al 2011)
HM: Hmong (Garellek et al. 2013)
MZ: Mazatec (Garellek & Keating 2011)
NH: Nahuatl (Guion et al. 2010)
ND: Dutch (Cho & McQueen 2005)
SP: Spanish (Ortega-Llebaria & Prieto 2007)
SW: Swedish (Heldner 2003)
ZP: Zapotec (Chavez Peon 2008)

Spectral Tilt



[to˥(ˈto˥o˧) (ˌⁿda˥ka˨)(ˈtṵ˩ũ˧)]
/tóo–tóo ˊ\ⁿdàkà–tùˀuₙ = úₙ/
moment–moment IPFV\REP:request–word = 2S.FAM
'you are constantly asking questions'

MIN has default stress aligned to the root

Stress Phonology

Stress

MIN word prominence involves default stress:

1. Meets the phonological diagnostics:
   one and only one primary stress per word
2. Is aligned to the word root:
   a trochaic foot is aligned with bimoraic root
3. Affects distributions and processes:
   vowel length, glottalization and nasalization

Distribution of Stress

- Determined by a trochaic foot aligned to the root
  - In minimal word (bimoraic), stress the first syllable

[(ˈⁿdʲītʃī)]	[(ˈnānā)]
/ⁿdʲitʃi/	/nana/
'raised'	'go up'

  - With CVV roots, a single heavy stressed syllable

[(ˈɲɻ́ʔɻ́)]	[(ˈnūɥ̄ɥ̄)]
/ɲíʔí/	/nɥ̨ŭɥ̨/
'hen'	'face'

- Bound morphemes do not affect stress placement

[nɻ̀sìkù(ˈⁿdʲītʃī)ɾā]	[kòní(ˈnānā)ɣàɾà]
/nɻ̀ = sì–ku–ⁿdʲitʃi = ɾa/	/kò´ = nì = nana = kà = ɾa/
PFV = HAB–INCH–raised = 3M	NEG.RE= PFV= go_up= more= 3M
'he was standing'	'he didn't go up anymore'

Secondary Stress

- Final root in compounds bears primary stress

[(ˌhī.kò)(ˈⁿdá?à)]	[(ˌhīⁿdʲī)(ˈsà?à)]
/xikǒ-ⁿda²ă/	/xi²ⁿdʲi-sà²ă/
neck-hand	butt-foot
‘wrist’	‘heel’

- CVV roots with secondary stress may destress

[(ˌⁿdāá)(ˈʒò.hó)] ~ [ⁿdá(ˈʒò.hó)]	[(ˌʒūù)(ˈʒě?é)] ~ [ʒù(ˈʒě?é)]
/ⁿdā²à́-ʒòxó/	/ʒū²ù́-ʒé²ê/
hand-metate	mouth-door
‘pestle’	‘entryway’

- Destressing avoids stress clash

a.	(. X)	b. (. X)	word
	(X) (X .)	. (X .)	feet
	(ˌⁿdāá) (ˈʒò hó)	ⁿdá (ˈʒò hó)	

Stress-dependent Properties

- Vowel length

[(ˌvee)(ˈñù?ù)] ~ [vī(ˈñù?ù)]
/vē²ē-ɲù²ù/
house-religious
'church'

- Glottalization

[(ˌʒūù)(ˈʒě?é)] ~ [ʒù(ˈʒě?é)]
/ʒū²ù́-ʒé²ế /
mouth-door
'entryway'

- Nasalization

[ka(ˈxìkí)]
/kà²à$_n$-xíkí ̀/
speak-play
'joke'

Loanword Stress

Stress position kept in loanwords <Spanish

- Penultimate stress with open final syllable

[(ˈpáɲí)]	[pī(ˈɾátó)]	[lā(ˈmétá)]
<paño [ˈpaɲo]	<aparato [apaˈrato]	<limeta [liˈmeta]
'shawl'	'device'	'bottle'

- Antepenultimate stress with open final syllable

[(ˈnúmè)ɾò]	[tē(ˈléfò)nò]
<número [ˈnumeɾo]	<teléfono [teˈlefono]
'number'	'telephone'

- Closed final syllable: may epenthesize V to avoid coda

[(ˈlúnè)ʃè]	[(ˈmártè)ʃè][11]	[(ˈxúvè)ʃè]
<lunes [ˈlunes]	<martes [ˈmaɾtes]	<jueves [ˈxweβes]
'Monday'	'Tuesday'	'Thursday'

Loanword stress

- Final stress with open final syllable

[xō(ˈséè)]	[tō(ˈʧéè)]	[kā(ˈféè)]
< ‘José’ [xoˈse]	< ‘Ché’ [ˈʧe]	< ‘café’ [kaˈfe]
‘Joseph’	‘Joe’[9]	‘coffee’

- Final stress with closed final syllable
  - Add final vowel

[mī(ˈʒélè)]	[(ˈⁿdʲóʃì)]	[lī(ˈstónî)]
< [miˈɣel]	< ‘Dios’ [ˈdjos]	< listón [lisˈton]
‘Miguel’	‘God’	‘ribbon’

  - OR lengthen the stressed vowel

[dā(ˈɲéə̀l)]	[dā(ˈvîid)]	[grā(ˈβáàɾ)]
< [daˈɲel]	< [daˈβið]	< ‘grabar’
‘Daniel’	‘David’	‘record’

- ➢ Bimoraic trochee required for stress

MIN stress adds duration, intensity, and periodicity

Stress Acoustics

Acoustic Characteristics

Acoustic correlates investigated by comparison of:

- Pre-tonic, tonic, and post-tonic syllables

[ka˥(ˈsi˧ka˧)ɾa˧]	[si˧(ˈka˥si˥)ɾa˧]	[(ˈsi˩ka˥)si˧]
/ˆ\ka–sika = ɾa/	/sì = ˆ\kàsi = ɾa/	/síká = si/
IPFV\RE:walk = 3M	now=IPFV\pick=3M	far=3S.FRM
‘they are walking’	‘he is picking now’	‘he is going far away’

- With matched segmental and tonal properties
  - 4 onsets (/k,s,n,ⁿd/) and 2 vowel qualities (/a,i/)
  - 3 following consonants (/k,s,n/)
  - Mix of H, M, and L tone
- In declarative utterances via translation elicitation (<Spanish)
- Data here: one speaker (M, 54 y.o.) who lives in Nieves

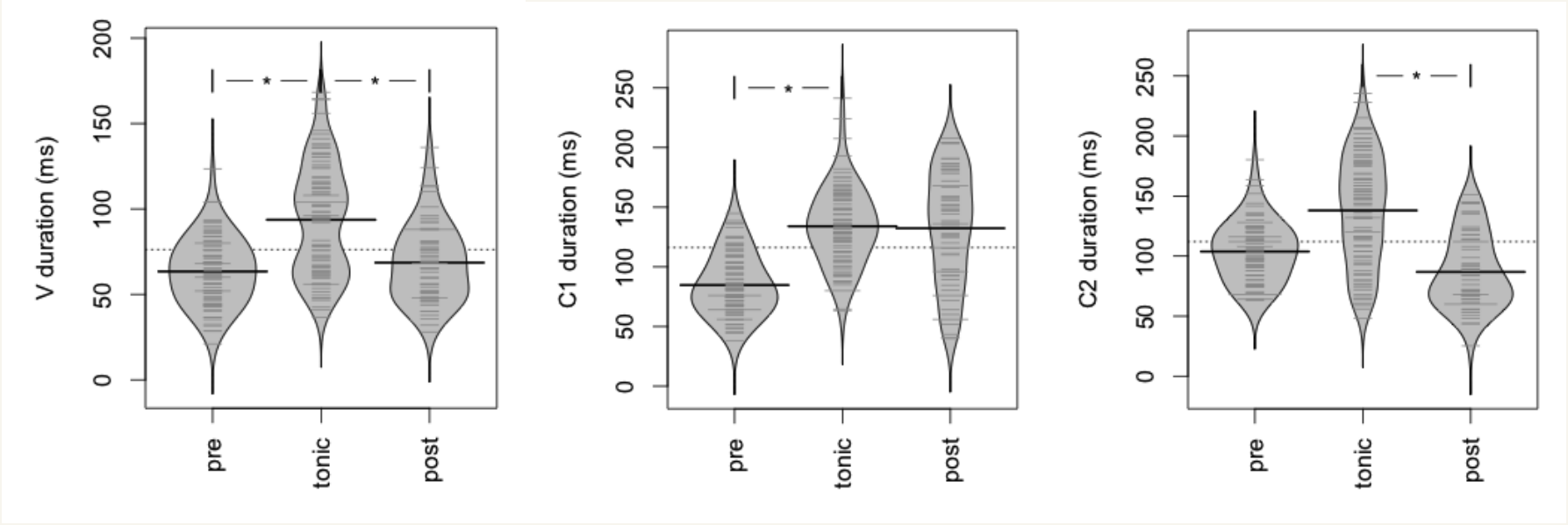
Acoustic Characteristics: Duration

Considered durations of vowel, preceding C and following C:

- Vowel (V): Tonic Vs longer than other Vs
- Onset (C1): Pre-tonic C1 shorter than Tonic C1
- Following C (C2): C2 of Post-tonic shorter than C2 of Tonic

e.g. [s] of /nì=ˈsīkā=[s]ī/

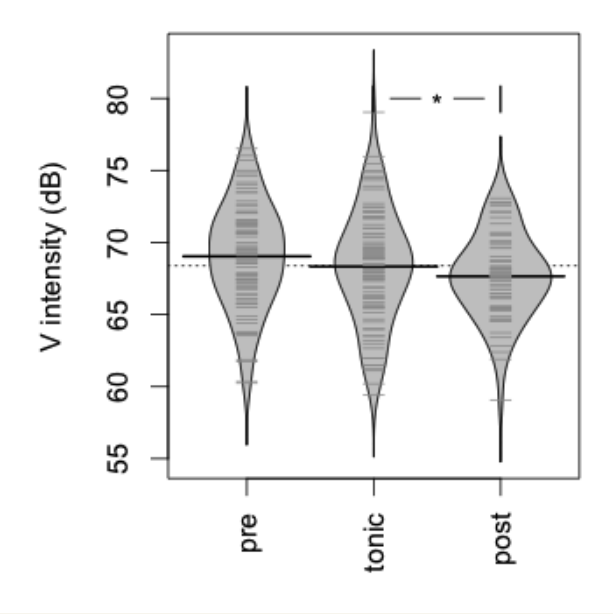
vs. [s] of /nì=ˈkā[s]í=sì/

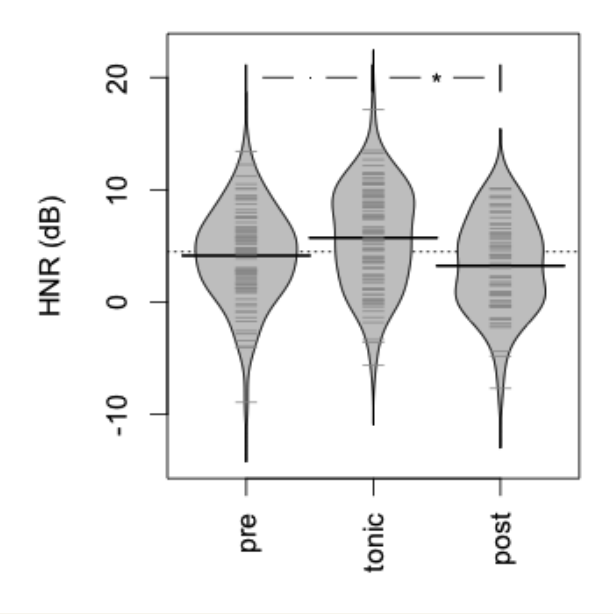


Acoustic Characteristics: Vowel Spectrum

Two properties worth mentioning:

- Intensity: Post-tonic has lower intensity (weaker)
- HNR: Pre-tonic marginally lower (weaker)
  Post-tonic lower (weaker)





Stress Summary

- Phonologically and acoustically, MIN word prominence looks like stress
  - MIN has default stress aligned to the root by a moraic trochee
  - MIN stress increases duration, intensity and periodicity

"This observation leads me to the hypothesis that (c) morphemes are those which historically perhaps ended on a tone [L], whatever their present form, and that this low toneme now usually transfers itself to the following morpheme." (Mak 1953:92)

Up to 1 T (H/∅/L) per mora plus 1 (+H/+L)

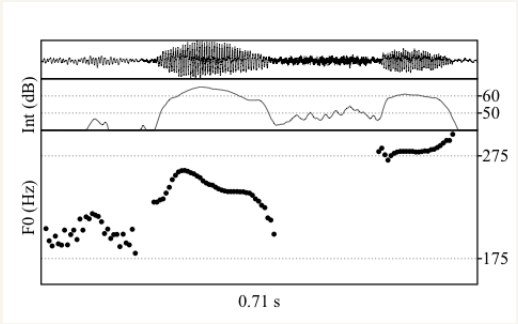
Tonal Phonology

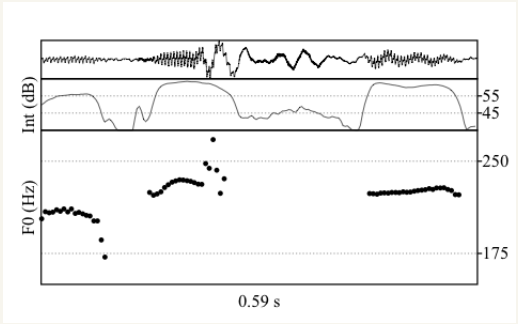
Tone

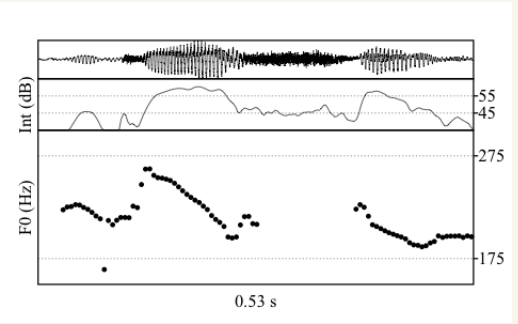
- Tone is L, M or H, with mora as TBU

(12)

a. HH: [kíʃi] ‘sleepyhead’	b. MM: [kīʃī] ‘RE.make’	c. LL: [kìʃi] ‘RE.sleep’
d. MH: [ⁿdʲīʃi] ‘blue’	e. MM: [ⁿdʲīʃī] ‘pulque’	f. ML: [ⁿdʲīʃi] ‘corn cob’







Plain CVCV Tone Patterns

H.H:
[xi˥ko˥]
/xíkó/
'tall'

H.M:
[sa˥ko˧]
/sáko/
'opossum'

H.L:
[ⁿdʲi˥ka˩]
/ⁿdʲíkà/
'wide'

M.H:
[i˧xa˥]
/ixá/
'overmorrow'

M.M:
[tʲu˧ku˧]
/tʲuku/
'again'

M.L:
[ʃi˧ko˩]
/ʃikò/
'smell' (n.)

L.H:
[ʧi˩ki˧]
/ʧìkí/
'cactus pear'

L.M:
[ki˩ki˧]
/kìki/
'sew'

L.L:
[ʒu˧ku˩]
/ʒùkù/
'grass'

CVCV Floating Tone Patterns

H.H+L:
[ko˥tʃi˥]
/kótʃíˋ/
'pig'

M.H+L:
[ka˧si˥]
/kasíˋ/
'eat (sweet)'

L.H+L:
[ⁿdʲu˩ʃu˥]
/ⁿdʲùʃúˋ/
'vain'

H.M+L:
unattested

M.M+L:
[la˧ⁿdʲi˧]
/laⁿdʲiˋ/
'navel'

L.M+L:
unattested

H.L+H:
[kã˥nĩ˩]
/kánì˝/
'long.SG'

M.L+H:
[ʒu˧ku˩]
/ʒūkù˝/
'hill'

L.L+H:
[xi˧ko˩]
/xìkò˝/
'neck'

Tone Linking to Enclitics

Floating +H tones on M-tone enclitic

[ʒu˧˥ku˩nã˥]	[xi˧˥ko˩nã˥]
/ʒūkù´=na`/	/xìkò´=na`/
hill=3P	neck=3P
‘their hill’	‘their necks’

Floating +L tones on M-tone enclitic

[ⁿdʲu˩ʃu˥nã˩]	[ko˥ʧi˥nã˩]
/ⁿdʲùʃú`=na`/	/kóʧí`=na`/
vain=3P	hill=3P
‘they’re vain’	‘their hill’

Tone Linking to Roots

Floating +L tone may displace H.H root tones

[i˦lo˦ ku˩su˥]	[i˦ta˦kʷã˩ã˩]
/ilo` kúsú/	/ita`–kʷáá$_n$`/
rabbit white	flower–yellow
‘a white rabbit’	‘marigold’

Floating +H tone may replace root-initial M tone

/^{n}dʲìvì ´ laa/	/ʒusà ´ satʲì/
egg bird	dough spicy
‘the bird’s egg’	‘spicy dough’

L+H Proclitics

+H tone from counterfactual /kǒ / replaces L tone of PFV /nǐ/

[nĩ˩ka˦ʔa˦ ja˦a˦]	[ko˩nĩ˥ka˦ʔa˦ ja˦a˦]
/nì = ka²a ʒaa/	/kò´ = nì = ka²a ʒaa/
PFV = play music	NEG.RE = PFV = play music
‘there was music’	‘there wasn’t music’

+H tone from negative potential /ùń / replaces root tone

[kʷa˦ku˦nã˦]	[ũ˩kʷa˥ku˦nã˦]
/kʷaku = na/	/ù$_n$´ = kʷaku = na/
IR:cry = 3P	NEG.IR = IR:cry = 3P
‘they will cry’	‘they won’t cry’

+L Proclitic

L tone of /nì/ spreading onto M tone prefix

[nĩ˧nã˩ⁿdʲi˩ko˩ra˩]	[nĩ˧ku˩si˥ka˧nã˧]
/nì=na–ⁿdʲìkò=ra/	/nì=ku–síká=na`/
PFV=REP–follow=3M	PFV=INCH–far=3P
‘he followed’	‘they went away’

+L tone linking to M tone prefix as only marker of PFV

[ka˩kã˧nĩ˧ra˧]	[nã˩sĩ˧nõ˩ra˩]
/`\ka–kani=ra/	/`\na–sinù=ra/
PFV\PL–hit=3M	PFV\REP–descend=3M
‘they hit (something)’	‘he went back down’

+H Proclitic

+H tone replacing M tone of root

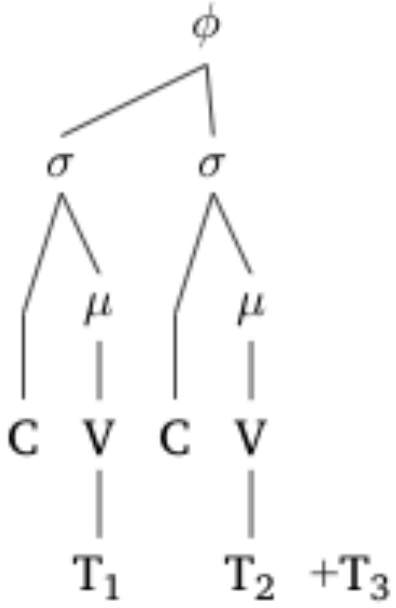
[ⁿdʲa˧ji˧nãꜜ]	[ⁿdʲa˥ji˧nãꜜ]
/ⁿdʲaʒì = na/	/´\ⁿdʲaʒì = na/
shake = 3P	IPFV\shake = 3P
‘they will shake’	‘they are shaking’

+H tone replacing L tone of root

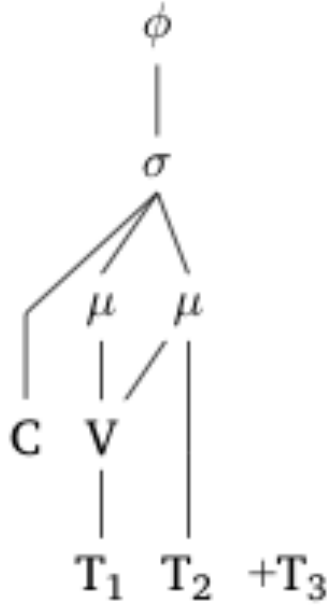
[ʃiꜜko˥na˧]	[ʃi˥ko˥nã˧]
/ʃìkó = na/	/´\xìkó = na/
sell = 3P	IPFV\sell = 3P
‘they will sell’	‘they are selling’

Summary

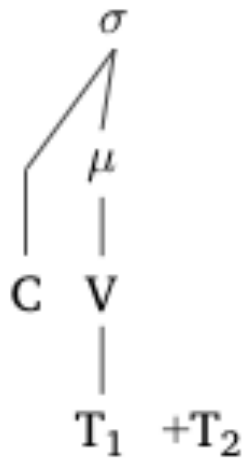
a. CVCV root



b. CVV root



c. CV clitic



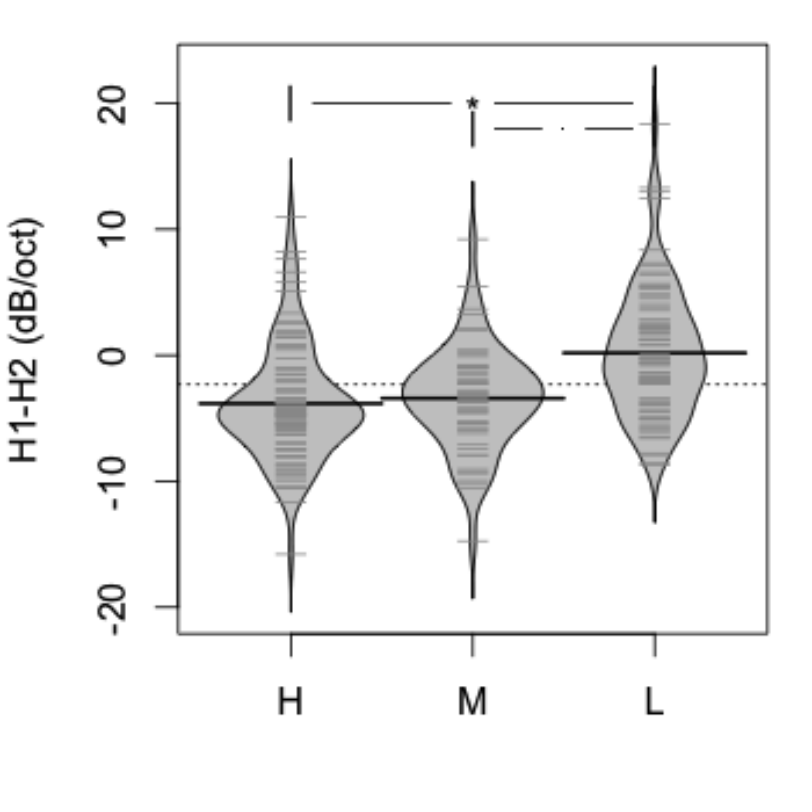
Tonal coarticulation echos phonology

Tone Acoustics

Tone

- It is cued primarily by pitch
- But also associated with low-band spectral tilt (H1-H2)

➢ L is breathy



Study Design

- Separate CVCV, CVV and CVʔV roots
- 3 words of each common tone pattern
- With and without M-tone enclitic

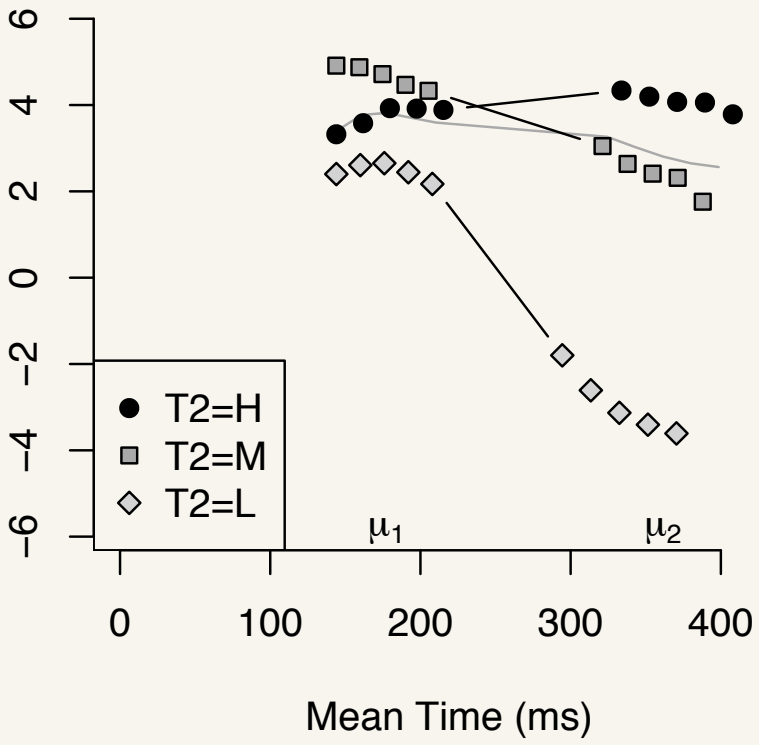
[tʃe˥le˧nã˧]	[ka˧si˥nã˩]
/tʃéle = na`/	/kasí` = na`/
rooster = 3P	IR:eat.sweet = 3P
'their rooster'	'they will eat (fruit)'

- In quotative carrier phrase

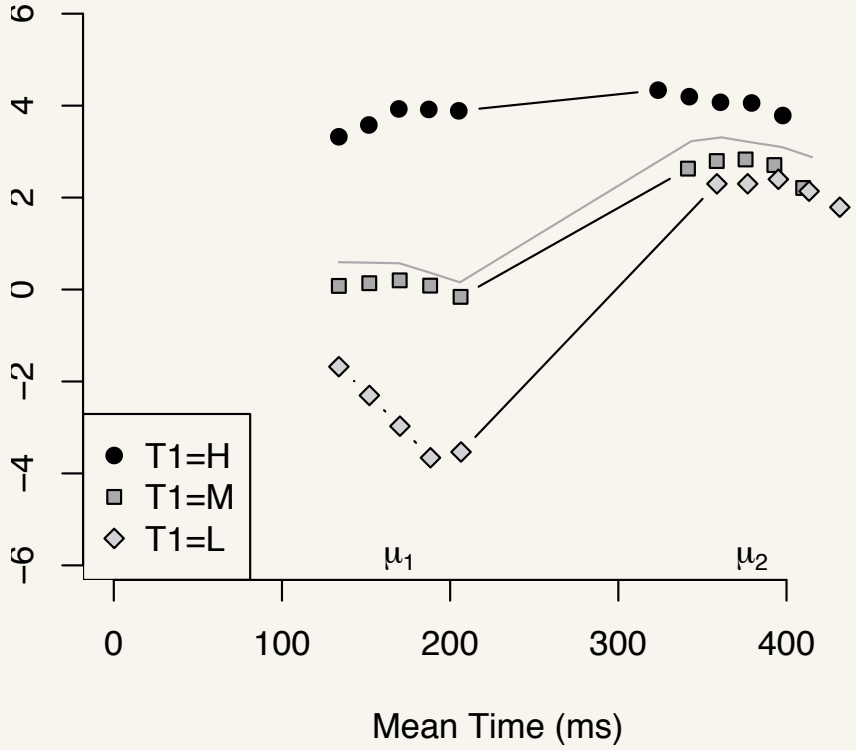
[kũ˧nĩ˧xo̰˩o̰˧	__	ʔĩ˧ĩ˧	tʲa˥ʔⁿdʲa˥]
/kuni-xòʔo	__	ii_n	tʲáʔⁿdʲá/
IR:perceive-ear	__	one	cut
'listen to __ one time'			

H Tone Coarticulation

Initial H tone

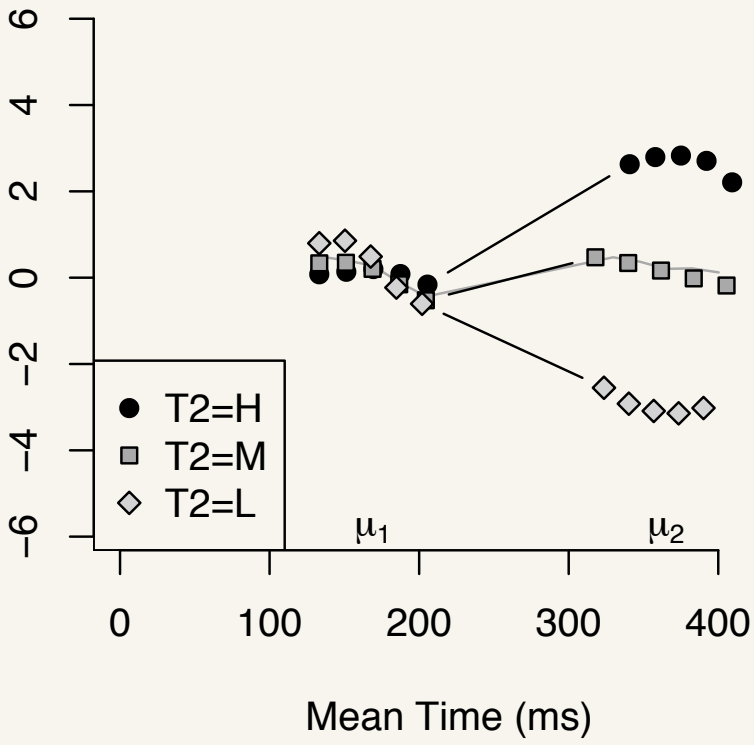


Final H tone

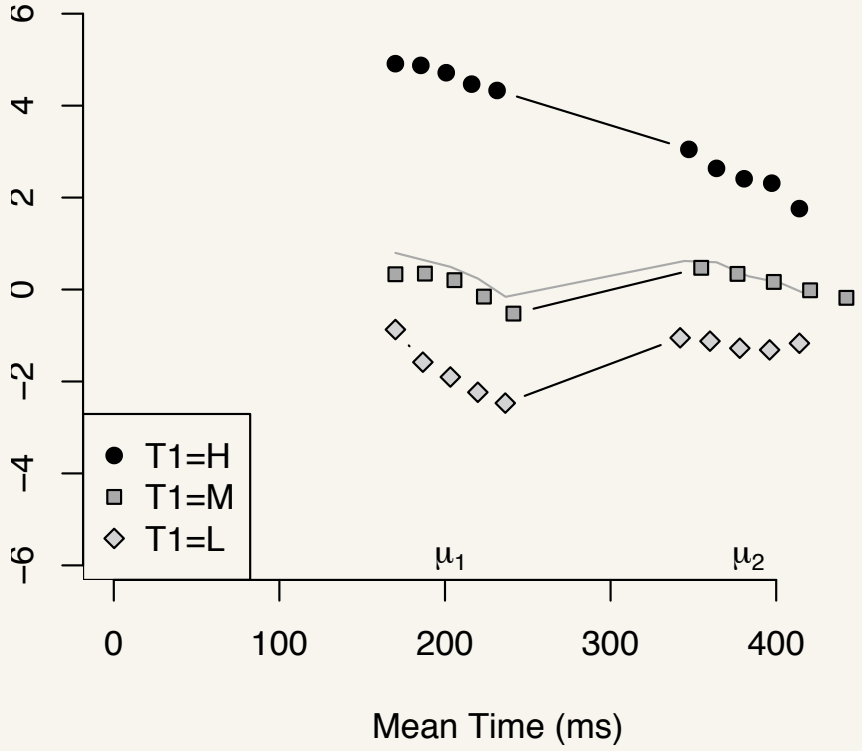


M Tone Coarticulation

Initial M tone

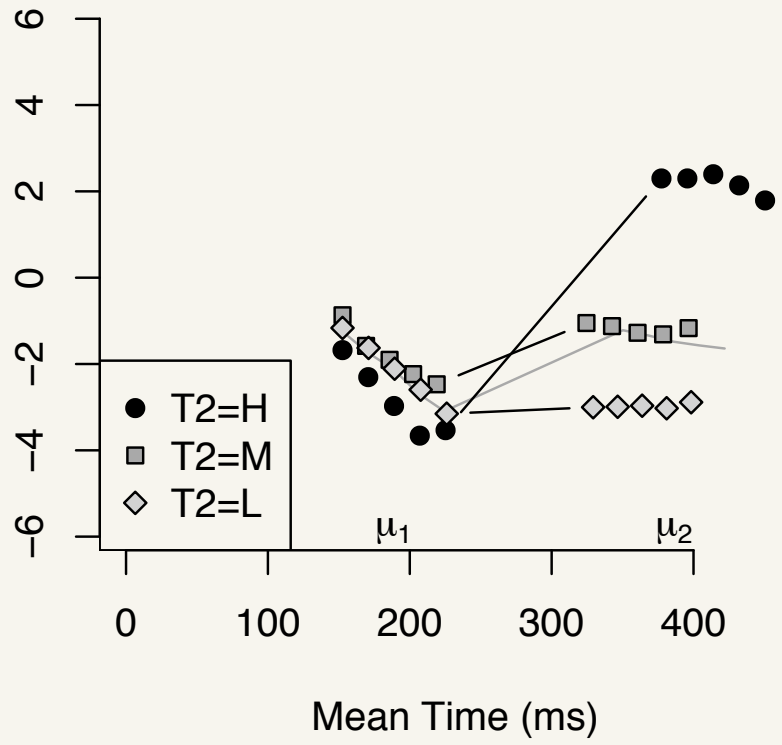


Final M tone

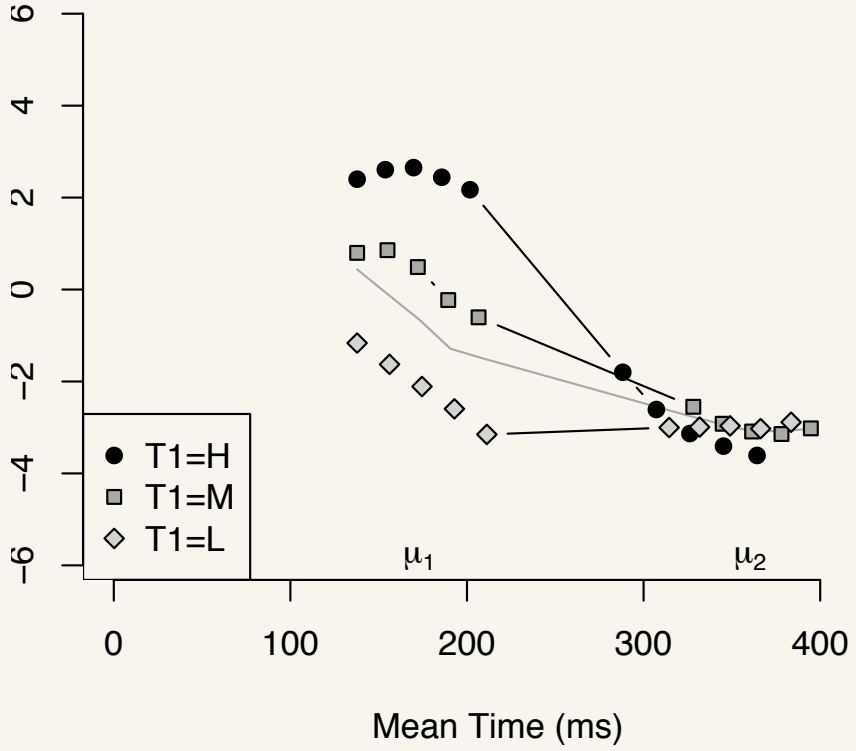


L Tone Coarticulation

Initial L tone



Final L tone



Tone summary

- In the phonology
  - floating +H and +L act rightward
  - especially on M tone
  - causing neutralization
- In the phonetics
  - H and L tone act rightward
  - especially on M tone
  - without neutralization

Conclusions

Acoustics of Prosody

Correlate	Word Stress	Phrasal Accent	Tone	Phonation
V Duration	EN, ND, SP, ZP, NH, ...	EN, ND, NH	CM	HM
C Duration	EN, ND	, ND	CM	
V Intensity	SP, ZP	, ND, SW	CM	MZ
Low-band spec tilt (H1-H2)	NH			GJ, MZ, ZP
Mid-band spec tilt (H1-A2)	ND, SP, NH	EN, SW		GJ, MZ
Periodicity (HNR, CPP)				HM
F0	NH	EN, SW, SP	, MZ	

MIN
MIN
MIN
MIN
MIN
MIN
MIN
MIN

CM: Mandarin (Shen 1993)
EN: English (Campbell & Beckman 2007)
GJ: Gujarati (Keating et al 2011)
HM: Hmong (Garellek et al. 2013)
MZ: Mazatec (Garellek & Keating 2011)
NH: Nahuatl (Guion et al. 2010)
ND: Dutch (Cho & McQueen 2005)
SP: Spanish (Ortega-Llebaria & Prieto 2007)
SW: Swedish (Heldner 2003)
ZP: Zapotec (Chavez Peon 2008)

Conclusions: Stress

- MIN has word-level stress
- The stress is fixed, aligned to the root by a moraic trochee
- The acoustic correlates of stress are:
  - Greater segmental durations of
    onset C, V, and following C
  - Vowel spectra with higher intensity and periodicity

Conclusions: Tone

- MIN has tone, with high tone density
- Tones H and L phonologically active
- Tone M is less marked
- Morphemes sponsor 1 tone/mora +1
- Coarticulation mirrors phonological tone processes: rightward; H, L > M

References

Caponigro, I., Torrence, H., and Cisneros, C. (2013). Free relative clauses in two Mixtec languages. International Journal of American Linguistics, 79(1):61–96.

Daly, J. P. (1978). Notes on Diuxi Mixtec tone. Workpapers of the Summer Institute of Linguistics, 22:98–113.

de Lacy, P. (1999). Tone and prominence. ROA–333.

de Lacy, P. (2002). The interaction of tone and stress in optimality theory. Phonology, 19:1–32.

Hyman, L. (2006). Word-prosodic typology. Phonology, 23:225–257.

Josserand, K. J. (1983). Mixtec dialect history. PhD thesis, Tulane University.

Ritchart, A. and Chung, Y. (2014). Question prosody in Ixpantepec Nieves Mixtec. Presented at SSILA Meeting, Jan 2, 2014.

Villas-Boas, M. A. (2010). Narrative strategies in Ixpantepec-Nieves Mixtec. Master's thesis, San Diego State University.

Zhang, J. (2004). Contour tone licensing and contour tone representation. Language and Linguistics, 5(4):925–968.

Cross-linguistic typology

Restricting stressed low tone:

- De Lacy's (1999, 2002) analysis of tone-sensitive stress argued for fixed preference of
  1. H over M over L in prominent positions
  2. L over M over H in non-prominent positions
- MIN tone process shows limited (M > L) of (1):
  - Stress is not tone-sensitive in MIN, but the restriction on /L/ spreading may be functionally related

Restricting contour tones:

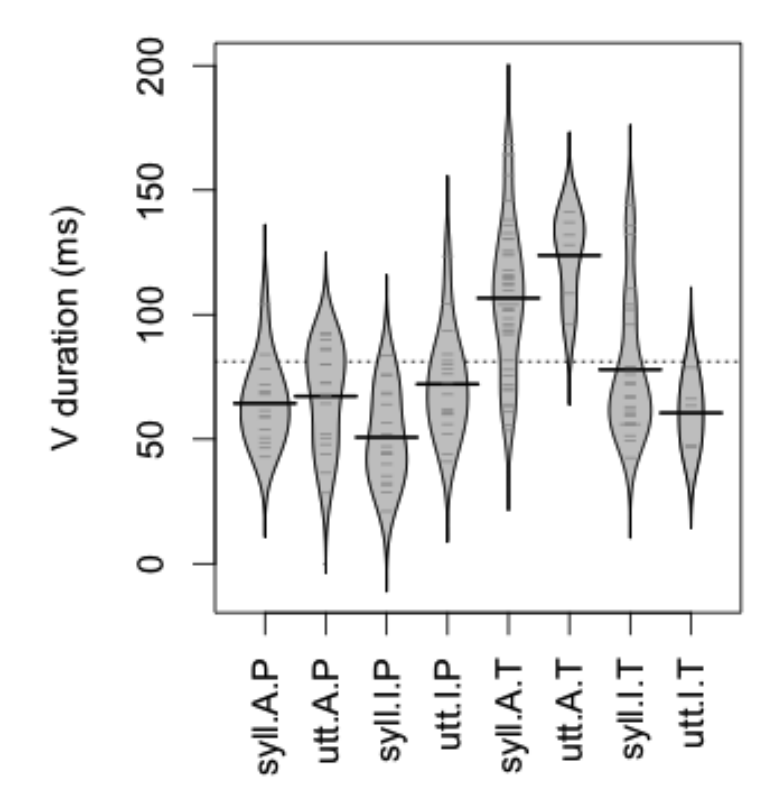
- Zhang's (2004) survey of contour tones
  - showed preference for stressed V over unstressed V
- MIN stressed V are phonetically longer
  - But contour tones are found in unstressed V

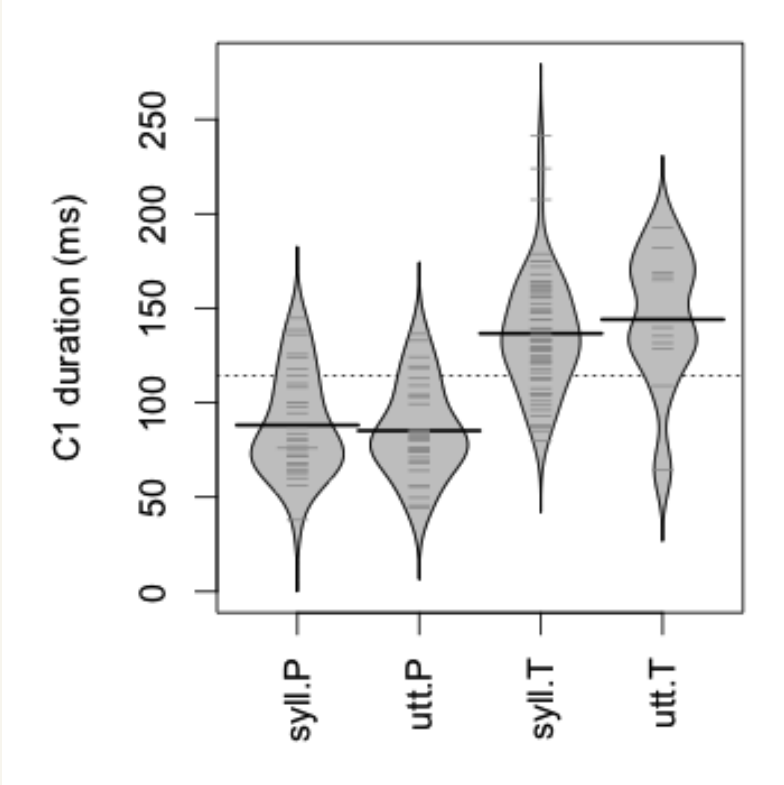
Areal context

- MIN has fixed stress and stress-sensitive tone
  - Unlike the tone-dependent stress of Ayutla, Huajuapan, Molinos, etc.
  - Consistent with Josserand's (1983) generalization about fixed stress throughout Mixtec varieties
- No evidence of additional final stress
  - Cf. the final stress reported in Diuxi:
    - cognate to MIN HL and LH monomoraic contours
    - i.e. a tonal property (Daly 1978)

Effect of Prosodic Boundary

- Effect of prosodic boundaries not in design, but relevant data:
  - "syll": word-internal; "utt": utterance-initial
  - "P": pretonic; "T": tonic



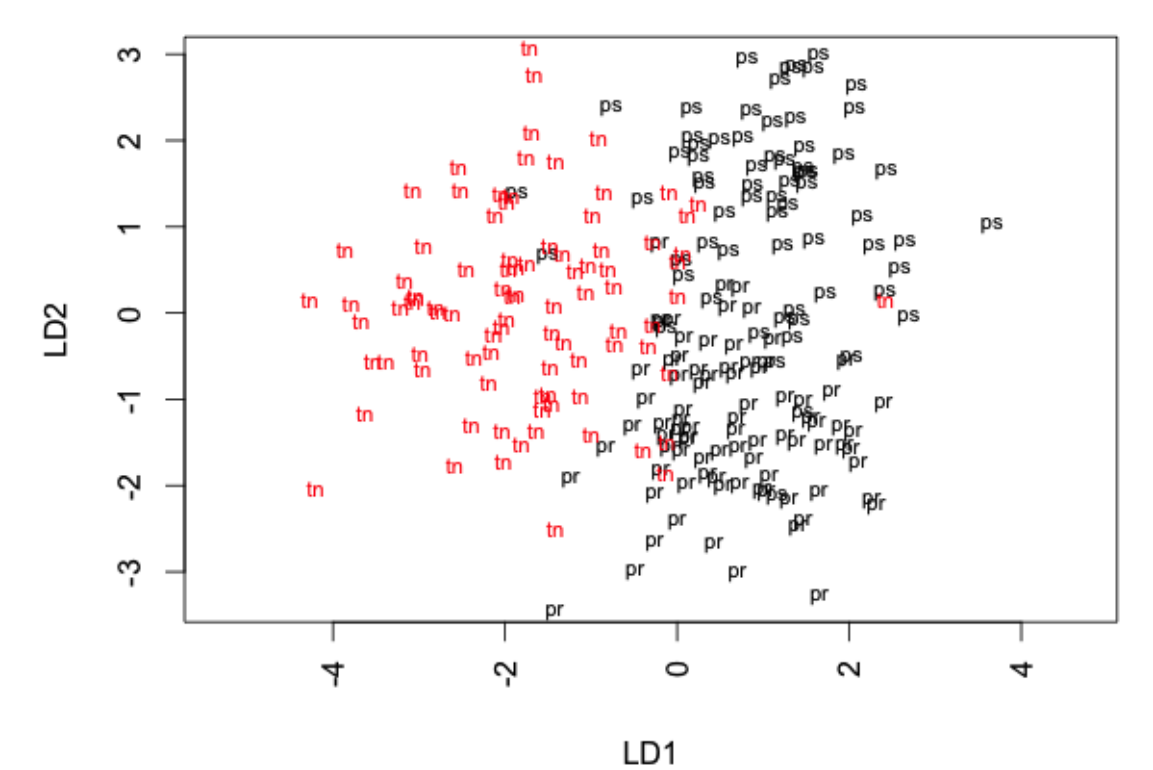


Diagnostics of Stress

- Obligatory: every open-class word has a stressed syllable
  - Function words tend to be mono-moraic and stressless
- Culminative: only one syllable has primary stress
  - Some evidence of secondary stress in compounds, but single primary stress is on last root

Acoustic Characteristics: Summary

- Linear Discriminants Accuracy: 81%



LD1
(Tonic vs unstressed):
-VDur, -C2Dur, -C1Dur
(and +H1A2, -HNR, …)

LD2
(Pre- vs Post-tonic):
-C2Dur, -Int, +C1Dur
(and +VDur, -H1H2, -H1A2, -CPP, …)

Stress-Sensitive Tone Processes

- Stressed roots resist tone changes:
  - L tone spreads onto stressless M-tone vowels in bound morphemes (17a)
  - But blocked when vowel is stressed (17b)

(17) a. [nìⁿdàkāʔàɾà]

/nì = ⁿda-kąʔą = ɾa/

PFV = REP-talk = 3MS.FAM

b. [nì(ˡⁿdāsī)ɾā]

/nì = ⁿdasi = ɾa/

PFV = wet = 3MS.FAM

Tone and Phonation Type

DC: discriminant coeffs

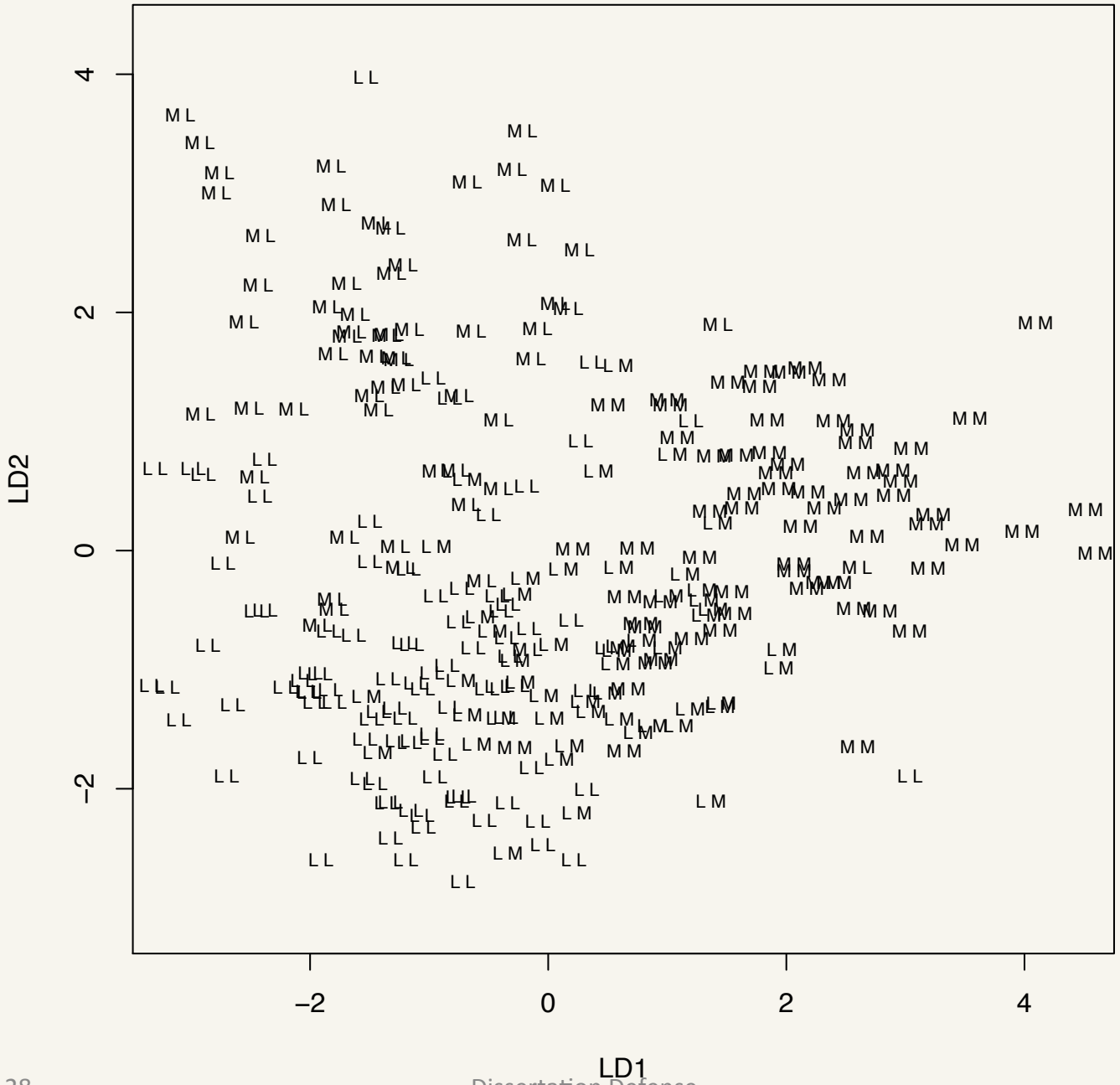
SC: structure coeffs

a.) Glottalization

	DC	SC
F0	1.036	0.422
CPP	-0.877	-0.830
HNR	-0.628	-0.706
H1–H2	-0.341	-0.273
H1–A2	0.033	-0.455
Int	-0.113	-0.383

b.) Tone

	DC_1	SC_1
F0	1.694	0.915
CPP	0.496	0.401
HNR	0.005	0.443
H1–H2	0.255	0.650
H1–A2	0.139	0.245
Int	0.231	0.313

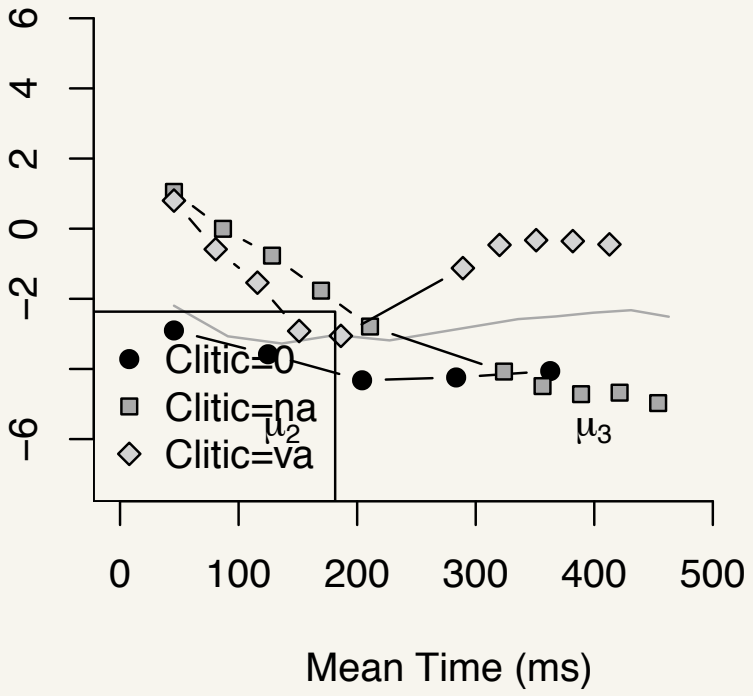

LD2
LD1
4
2
0
−2
−2
0
2
4

Tone and Phonation Type

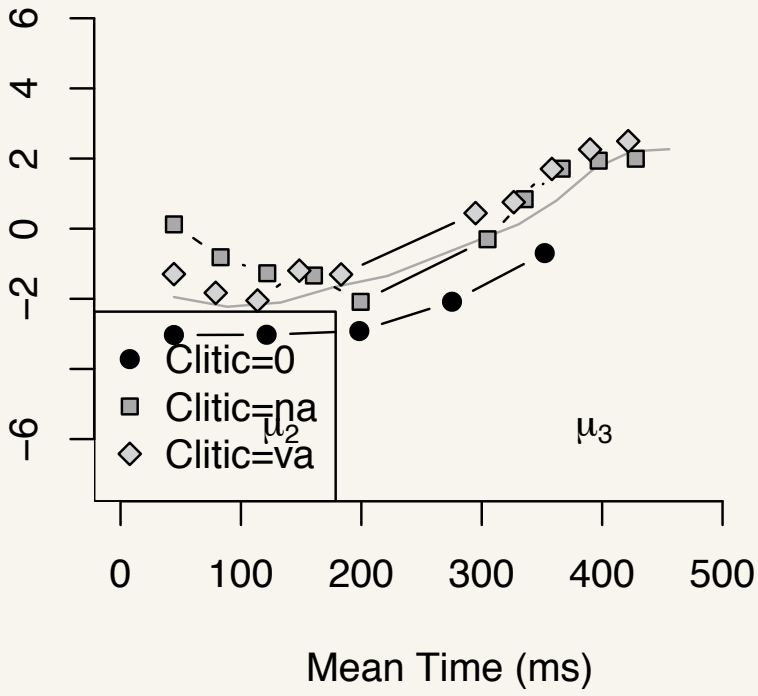
	Glottal	Tone D_1	Tone D_2
$F0_i$	0.142	0.348	0.635
$F0_m$	0.185	0.110	0.036
$F0_f$	0.549	-0.049	1.047
CPP_i	-0.276	-0.157	0.229
CPP_m	-1.070	-0.738	0.038
CPP_f	0.001	-0.299	0.031
HNR_i	0.046	0.452	0.106
HNR_m	-0.082	-0.733	-0.349
HNR_f	-0.268	-0.508	0.111

Floating +H effect (CVV)

X.L tone patterns

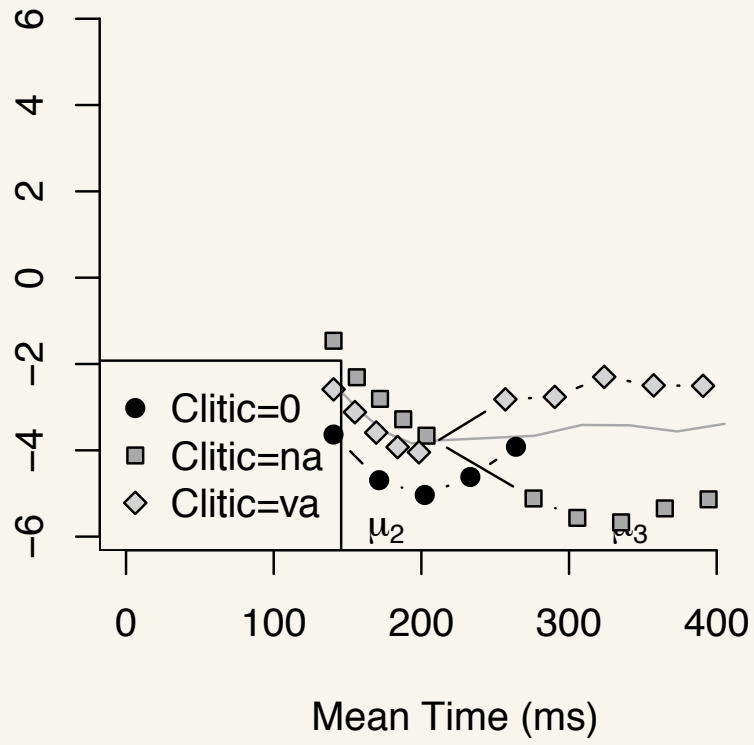


X.L+H tone patterns

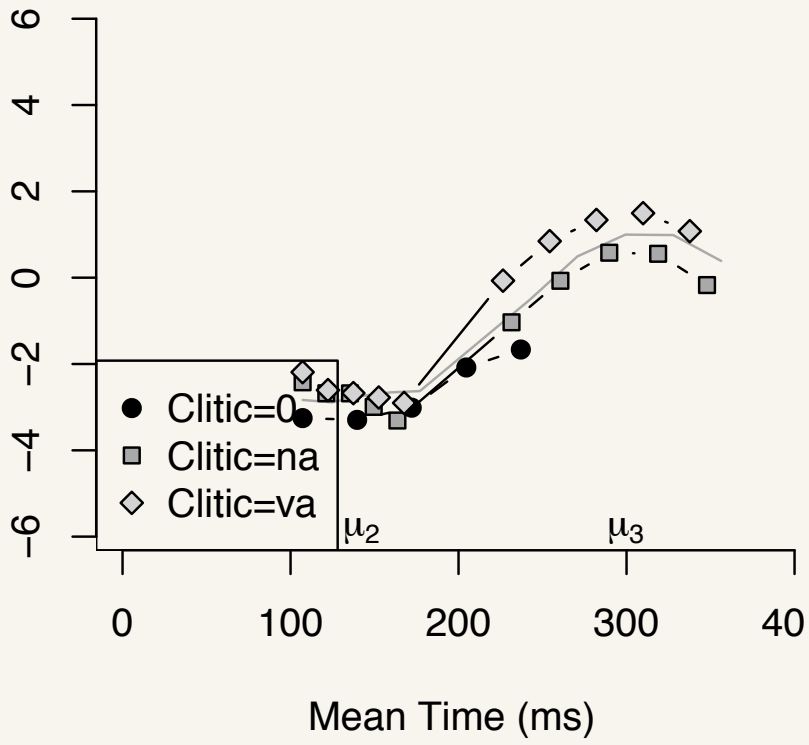


Floating +H Effect (CVCV)

X.L tone patterns

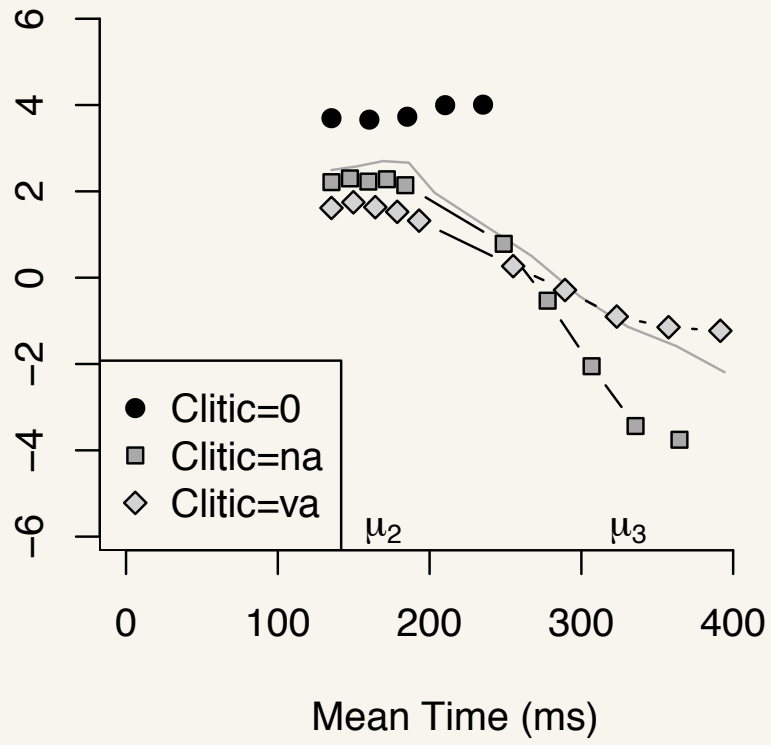


X.L+H tone patterns



Floating +L Effect (CVCV)

X.H tone patterns



X.H+L tone patterns

