Why Comaltepec Chinantec is not different

Daniel Silverman
Department of Linguistics
and the Beckman Institute for Advanced Science and Technology
University of Illinois
dan@uiuc.edu

Introduction

- In Comaltepec Chinantec, high tones spread to a following syllable when immediately preceded by a tautosyllabic low tone (Silverman 1997, *pace* Pace 1990, Anderson, Martinez, and Pace 1990). The pattern is almost always allophonic, and only rarely neutralizing.
- Comaltepec is but one of many languages that displace/spread high tones rightward, especially in the context of immediately preceding lower pitch.

Outline

- Summary of Comaltepec pattern
- Functional/Diachronic scenario
- Zulu tone displacement
- Other systems

Comaltepec Chinantec tone sandhi:

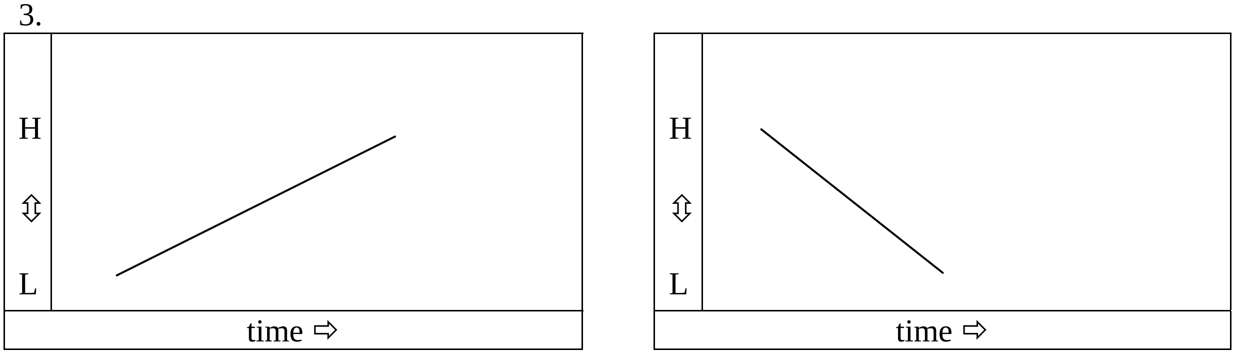
- High tones spread rightward from Low-High syllables

1.	non-sandhi context:			sandhi context:	gloss:
	kwa˩˥	,	toː˩	kwa˩˥ toː˥˩	‘give a banana’
	kwa˩˥	,	ŋɨh˩	kwa˩˥ ŋɨh˥˩	‘give a chayote’
	kwa˩˥	,	kuː˧	kwa˩˥ ku:˥˧	‘give money’
	kwa˩˥	,	^{n}dʒuː˧	kwa˩˥ ^{n}dʒuː˥˧	‘give a jug’

Phonetic underpinnings

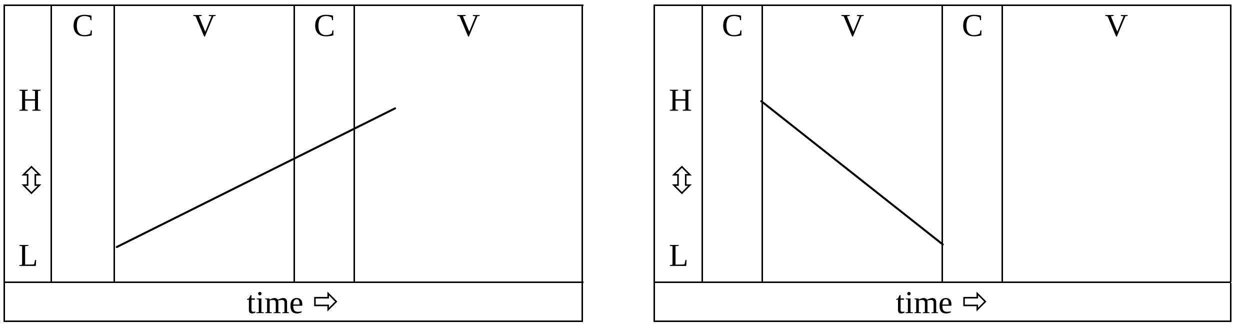
- Pitch rises take longer to implement than do pitch falls (Ohala 1979, Sundberg 1979)

3.



- Given the sluggishness of pitch rises in comparison to pitch falls, the supralaryngeal articulators may already have achieved the proper configuration for a following consonant *before* the pitch rise is fully achieved: upon the release of this subsequent consonantal gesture, finally, the high pitch is achieved. As suggested by Ohala (1978:31), "...[S]ince falling tones can be produced faster than rising tones...they might be less likely to 'spill over' onto the next syllable."

3.

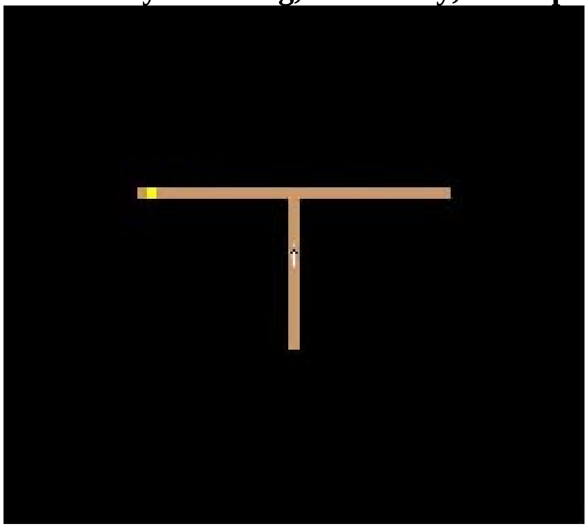


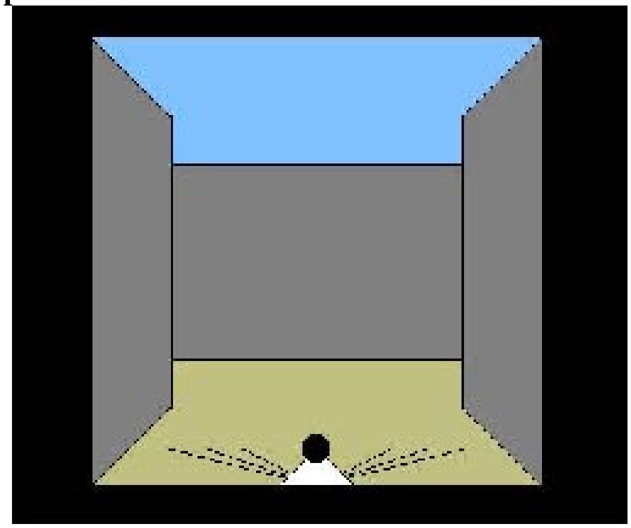
- Speakers exhibit exquisite control of their articulatory apparatus, and might modify their productions to accommodate to any raw, physical, ceiling- or floor-effects.
- Phonetic explanations alone cannot fully account for language-specific production conventions, but nonetheless might serve to constrain the general direction of sound change—where functional forces on the system become relevant.

Tone spread has functional value: non-spread might neutralize contrasts

- Due to the only limited temporal domain in which the pitch rise is implemented, it may be sufficiently curtailed so that it might be misperceived by the listener as belonging to the low tone category. Spreading the tone may increase the likelihood that all contrastive values are effetively transmitted.
- Of course, synchronic neutralizations and diachronic mergers are commonplace. However, the overwhelming tendency is for contrasts to neutralize in contexts with insufficient opportunity for the salient expression of acoustic cues, for example, coda position, where consonants typically lack their all-important release cues. But when the opportunity for cue expression is greater, neutralization is much less common.

Probability matching, variability, and a proposed diachronic scenario





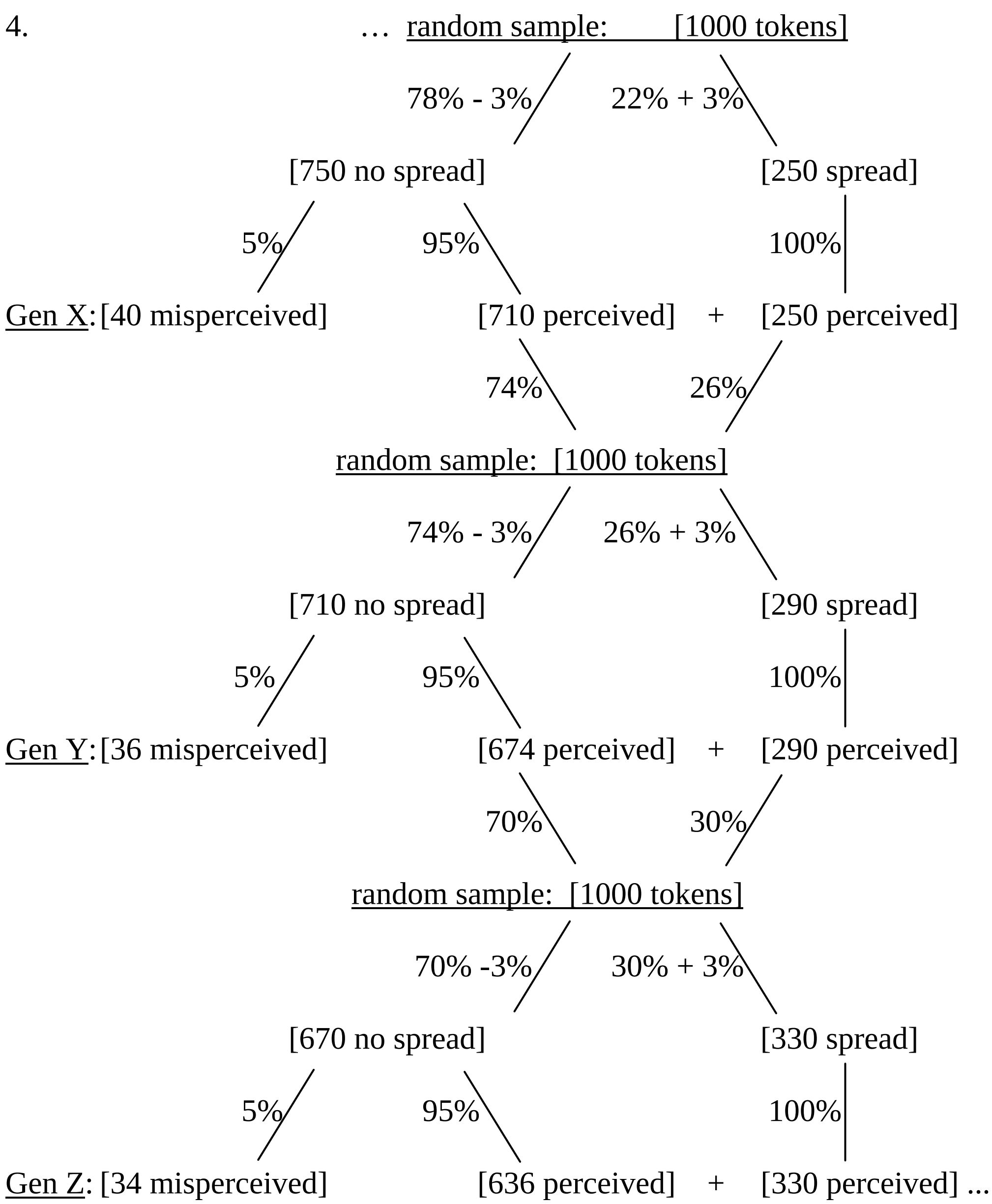
- Gallistel (1990:352ff.): Rats in a T-Maze were rewarded with food 75% of the time at one end, 25% of the time at the other. When provided with feedback, rats matched the probability of reward—running to the one end 75% of the time, the other end 25% of the time—despite the fact that they would receive more rewards if they ran to the one end 100% of the time (62.5% versus 75%).
- The “irrationality” of such behavior is only apparent; from a broader evolutionary point of view, in the context of natural, populated settings, the observed behavior is actually beneficial.
- Humans engage in similarly “irrational” behavior in terms of speech production: learners come to largely reproduce the nuances of variation they perceive their elders and peers engaging in, despite the fact that certain of these variants are more successful at keeping contrastive elements distinct.
- For example, young English-learning children initially produce their stops unimodally, with short-lag VOT regardless of category. Through three years of age, a bimodal distribution begins to develop, but still, voicing lead is extremely infrequent, though less so for labials. Even up to six years of age, the lenis category involves fewer tokens with voicing lead than adults’. Finally learners come to match the nuanced variability of their elders (Preston and Yeni-Komshian 1967, Preston, Yeni-Komshian, and Stark 1967, Zlatin and Koenigsknecht 1976), even though fully voiced variants are more distinct from voiceless aspirates than are the more commonly produced devoiced variants.
- Labov (1994:583ff.), “It is not a hypothesis that children do probability matching [during language learning-D.S.]. It is simply a description of the observed facts…”
- Nonetheless, sound changes may slowly progress due to phonetic and/or functional factors, which influence the perception of the speech signal, consequently affecting the variability over which probabilities are matched.

- There is inherent variability in speech production; both spread and non-spread tokens are among the possible variants.
- Learners come to largely reproduce the nuances of variation they perceive their elders engaging in, despite the fact that variants with spread tones are more successful at

keeping contrastive elements distinct. That is, the variability engaged in by elders will be largely matched by learners.

- Ambiguous tokens will sometimes be impossible to categorize, and hence will not be added to the pool of tokens over which variability is calculated.
- Due to the greater likelihood of unambiguous perception of spread variants, learners's calculated variability may differ slightly from their elders', in that the variants which contrast more sharply with oppositions will more often be perceived correctly, hence, in turn, be more likely produced.
- The variability inherent in speech production may be the fodder for these sorts of sounds changes: the more distinct the variant from an acoustically similar contrastive value, the more likely the system will wend towards this variant.

4.



Complications

- M tones on syllables which lack post-vocalic laryngeals (V^M, $Vː^M$ and $Vː^{HM}$) are triggers as well

5. non-sandhi context: sandhi context: gloss:

non-sandhi context:		sandhi context:	gloss:
mɨː˧ ,	hi˩	mɨː˧ hi˥˩	‘I ask for a book’
mɨː˧ ,	mohʔ˩	mɨː˧ mohʔ˥˩	‘I ask for squash’
mɨː˧ ,	kuː˧	mɨː˧ kuː˥˧˥	‘I ask for money’
mɨː˧ ,	ʔoː˧	mɨː˧ ʔoː˥˧˥	‘I ask for papaya’
mɨː˧ ,	ŋi˩˧	mɨː˧ ŋi˦˥	‘I ask for salt’
mɨː˧ ,	loh˩˧	mɨː˧ loh˦˥	‘I ask for a cactus’

- But these derive from Proto-Chinantec high tones

6.

Comaltepec:	Proto-Chinantec:	
kuː˧	*kuː˥	‘money’
ⁿdʒœː˧	*dʒuː˥	‘earthen jar/jug’
ʔwɨːŋ˧	*ʔwɨː˥	‘Ojitlán’ (a large Chinantec village)

High tone displacement in Zulu

- “Depressor” consonants have been characterized as phonetically and/or historically breathy-voiced.
- Following depressor consonants, high-tones on short vowels are displaced from their vowel of origin to a following vowel: DV˧ CV˩ → DV˩ CV˥˩
- Tone displacement is blocked if a depressor immediately follows: DV˧ DV˩ → DV˩˨ DV

Data from Cope 1966; depressors are <u>underlined</u>; displaced tones are **bold**; depressor effects are *italicized*.)

7. <u>schematic</u>:

```
D V C  V(ː)
  |      |
  L      H
```

<u>examples</u>:

```
i s i ɬ aː l o          chair            i z i ɬ aː l o       chairs
| |   | |                                |   |  /\   |
L H   L L                                L   L  HL   L

i↓ n s iː z w a         young man        j̤ i n s iː z w a     by a young man
|       |     |                            |    /\      |
H↓      L     L                            L    HL      L
```

i ɲ oː n ɨ — bird
| | |
H L L

n̤ e ɲ oː n ɨ — with a bird
| /\ |
L **H**L L

8. a. no displacement from long vowels:
z iː kʰ oː n a — they being present
/\ | |
*L*H L H

displacement from short vowel:
z i kʰ oː n a — they are present
| /\ |
L **H**L H

b. no displacement from phrase-final (lengthened) penults:
i↑ n dʰ uː n a — headman
| /\ |
H *L*H L

displacement from short vowel:
e n dʰ u n eː n i — to a headman
| | /\ |
H *L* **H**L L

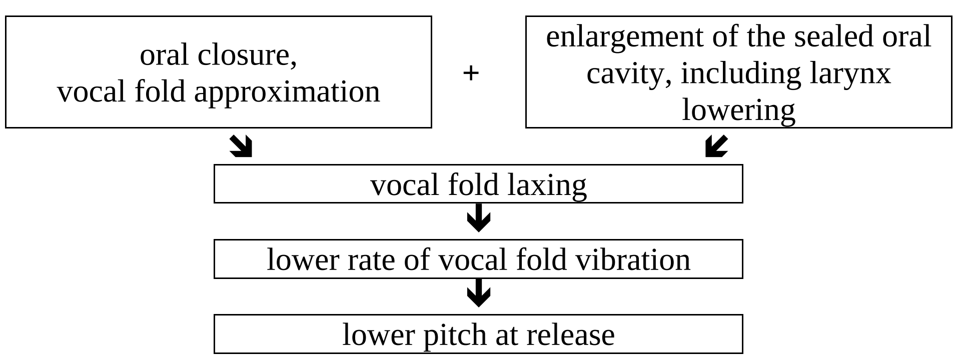
c. no displacement when a depressor follows:
i z i gɬʰ oː k o — hats
| /\ | |
L *L*H *L* L

e↑ mbʰ u z iː n i — to a goat
| /\ | |
H↑ *L*H *L* L

Phonetic underpinnings

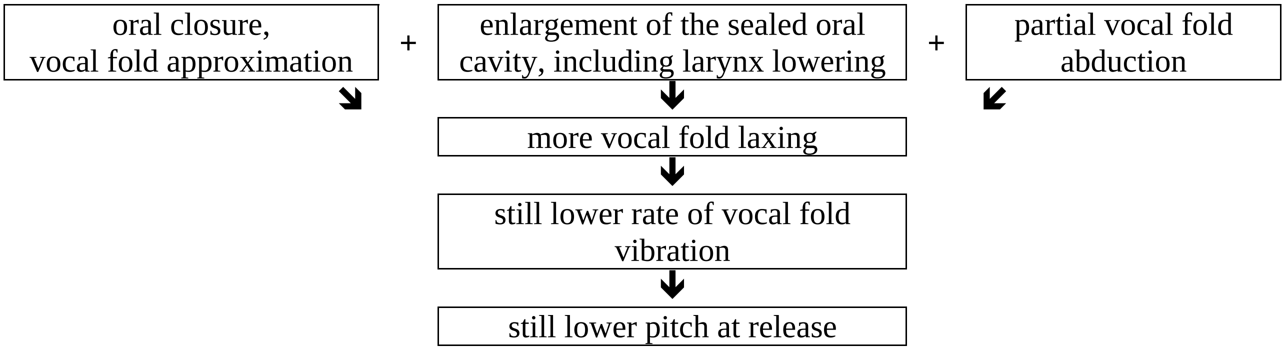
- Obstruent voicing in general, and obstruent breathy-voicing in particular, is associated with pitch lowering at consonant release.

9.



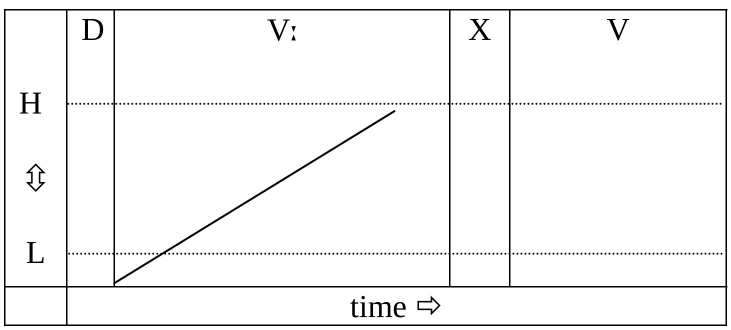
When we add the partial vocal fold abduction necessary for breathy voicing, further pitch lowering may be induced, as the fold laxing which accompanies abduction typically occurs with a still-lower rate of vocal fold vibration.

10.



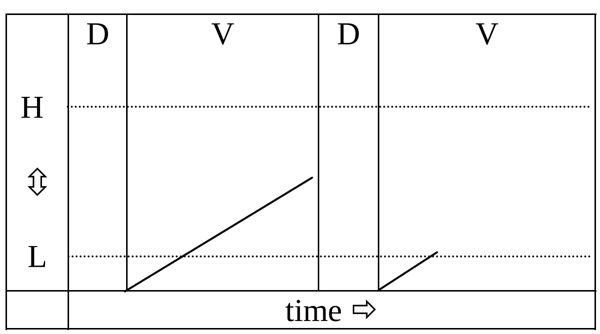
- Again, pitch rises take longer to implement than do pitch falls
- In the context of a depressor consonant, a following high tone may be achieved only *after* the following consonantal gesture has been completed, culminating in an apparent displacement of the high tone.
- As penults are automatically lengthened in Zulu, such vowels are apparently of sufficient duration to accommodate the pitch rise: the rise is achieved before the following consonant is implemented, and so there is no apparent displacement.

11.



- As following depressors once again induce a pitch-lowering effect upon their release, there is equally little hope of the displaced high tone being realized in this context.

12.



Dissimilar languages possess similar patterns

- According to Gardner and Merrifield (1990), in the Quiotepec dialect of Chinantec, an arbitrary set of open, “ballistic” syllables possessing M or LM tones is raised to H in the context of a preceding LH or MH contour:

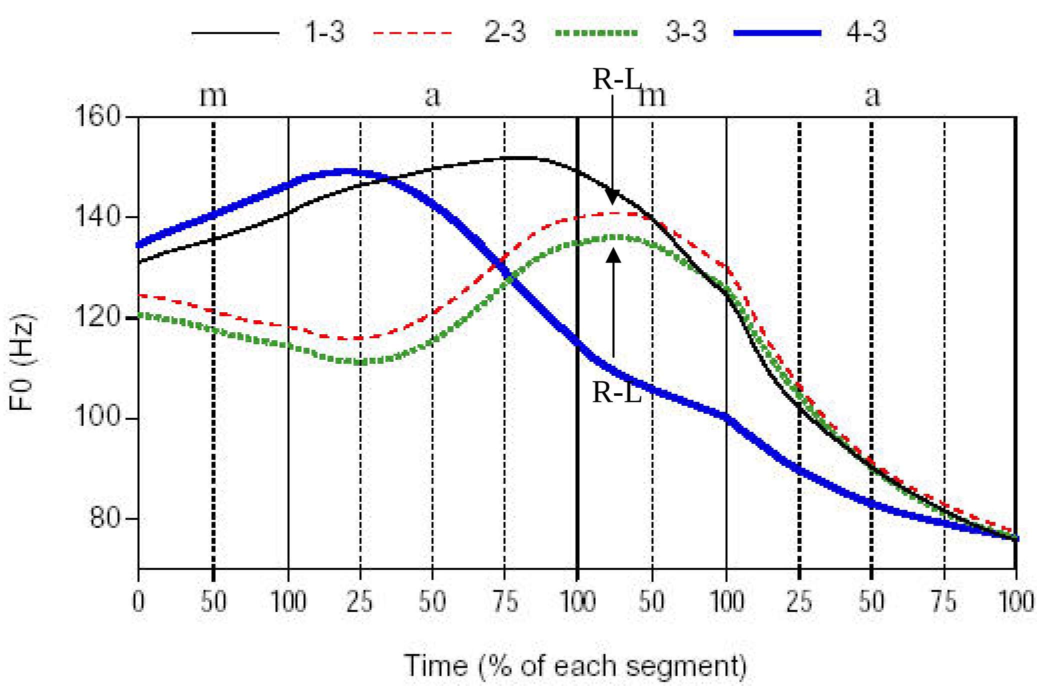
13.	kʷó˧˥	,	tṹ˧	→	kʷó˧˥ tṹ˥	give (me) two
	cý:˧˥	,	tʲý˩˧	→	cý:˧˥ tʲý˥	good earthen jar
	sî:˩˥	,	dʲá˧	→	sî:˩˥ dʲá˥	shave down ten
	ʃýʔ˩˥	,	tʲúj̥˧	→	ʃýʔ˩˥ tʲúj̥˥	good armadillo
	ʃýʔ˩˥	,	bṍ˧	→	ʃýʔ˩˥ bṍ˥	stupid armadillo

- In Mbui Bamileke high tones often shift from a leftward syllable to a rightward syllable (Hyman and Schuh 1974):

14.	lɔ̀ɔ́ + bə̀sə́ŋ	→	lɔ̀ɔ̀ bə́sə́ŋ	look for the birds
	lɔ̀ɔ́ + tìè	→	lɔ̀ɔ̀ tíè	look for the pot
	lɔ̀ɔ́ + sə́ŋ	→	lɔ̀ɔ̀ sə́ŋ	look for the bird

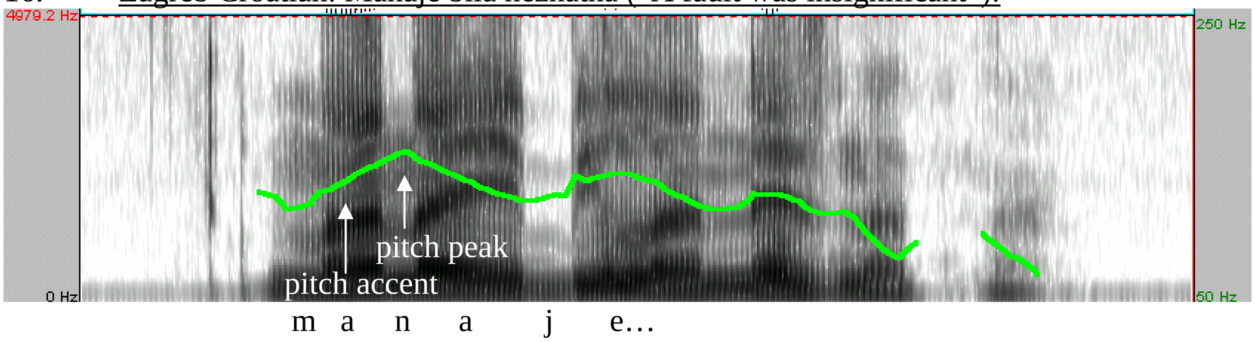
- In Beijing Mandarin, tones with high offsets typically peak only after the following consonant has been implemented; tones with low offsets show a significantly lesser effect in these same contexts (Xu 1997, Xu and Wang 2001; pitch track kindly provided by Yi Xu).

15. <u>[mama]</u> 1-3 = H-L 2-3 = R-L 3-3 = R-L 4-3 = F-L



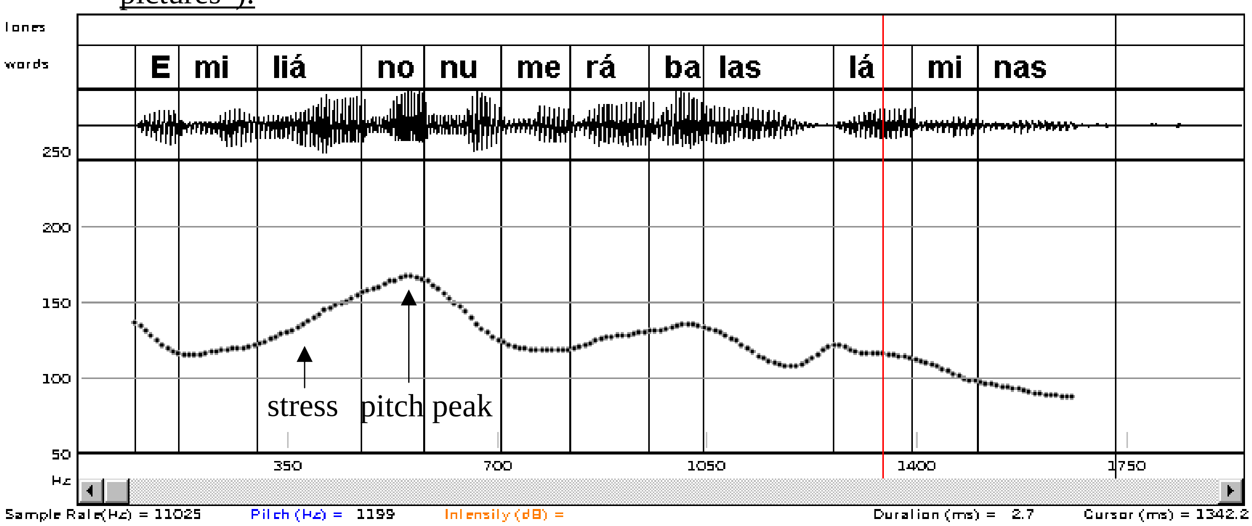
- Zagreb Croatian: high pitch-accented syllables possess a rising pitch contour, pitch peaks being realized on the post-tonic syllable, rather than on the accented syllable itself (Lehiste and Ivic 1986; spectrogram kindly provided by Rajka Smilanic).

16. <u>Zagreb Croatian: Manaje bila neznatna ("A fault was insignificant"):</u>



- Peninsular Spanish: stressed syllables typically possess a pitch rise, with the pitch peak being realized on the post-stressed syllable (Navarro-Tomás 1944, Fant 1984, Prieto, van Santen, and Hirschberg 1995; pitch track kindly provided by Jose Ignacio Hualde).

17. <u>Peninsular Spanish: Emiliano numeraba las láminas ("Emiliano was numbering the pictures"):</u>



Conclusion

- Physical properties of the speech mechanism—phonetic factors—may induce a delay in achieving higher pitch in the context of preceding lower pitch.
- But independent functional factors may induce the conventionalization of high tone spread or displacement. As tones are less likely to neutralize upon spread/displacement, displaced tokens are less often ambiguously perceived, hence more likely to be reproduced.

(please email me for a complete list of references.)