

Cahill (2011)

Konni Intonation

# Overview

- Cahill:
- Kɔnni has intonation properties that distinguish:
  - Declaratives from Polar Questions
  - Simplex vs. compound or complex sentences
- but there is no clear evidence for boundary tones
- LG:
  - Downstep and downdrift are keys to understanding the overall intonation patterns
  - Not well presented in terms of how they differ and how they influence f0. I will present picture I created from the text and f0 data.
  - Worth thinking about how to model these (particularly downdrift).

# Basic Tone System

- H, L tones
- Syllable may have one two tones
- In addition to H, L there are downstep tones !H
  - Intermediate height

## (1) Monosyllabic

$\widehat{LH}$ vs. H	kùán	‘back’	kúán	‘farm’
$\widehat{LH}$ vs. $H^!\widehat{H}$	jìín	‘spitting cobra’	jí'ín	‘tree (sp.)’
H vs. $H^!\widehat{H}$	chíín	‘moon, month’	chí'ín	‘squirrel’
$\widehat{HL}$ vs. $\widehat{LH}$	chíàn	‘chair’	chìàn	‘bottom, waist’
$\widehat{HL}$ vs. $H^!\widehat{H}$	yîi	‘blind person’	yí'ín	‘nail, arrow’
$\widehat{HL}$ vs. H	táà	‘sister’	tá	‘and (joining clauses)’

## (2) Disyllabic

L.H vs. H.H	nùùrí	‘the tree (sp.)’	núúrí	‘the chest’
L.H vs. $H^!\widehat{H}$	hààrín	‘tree (sp.)’	háá'rín	‘boat’
$L.\widehat{LH}$ vs. H.H	nànjùúŋ	‘pepper’	nánjùúŋ	‘fly’

# Analysis of Downstep

- Downstep applies to HLH sequences.
- The H spreads leftward and the L—>!H

➡ Can we view this as “blending”?

(11) a.  $\begin{array}{ccc} H & L & H \\ | & | & | \\ \sigma & \sigma & \sigma \end{array} \rightarrow \begin{array}{ccc} H & L & H \\ | & / & | \\ \sigma & \sigma & \sigma \end{array}$       b.  $\begin{array}{ccc} H & L & H \\ | & | & | \\ n\upsilon & ra + & ha \end{array} \rightarrow \begin{array}{ccc} H & L & H \\ | & / & | \\ n\upsilon & ra & ha \end{array}$

*nórà* ‘ chests ’      *nó!ráhá* ‘ the chests ’.

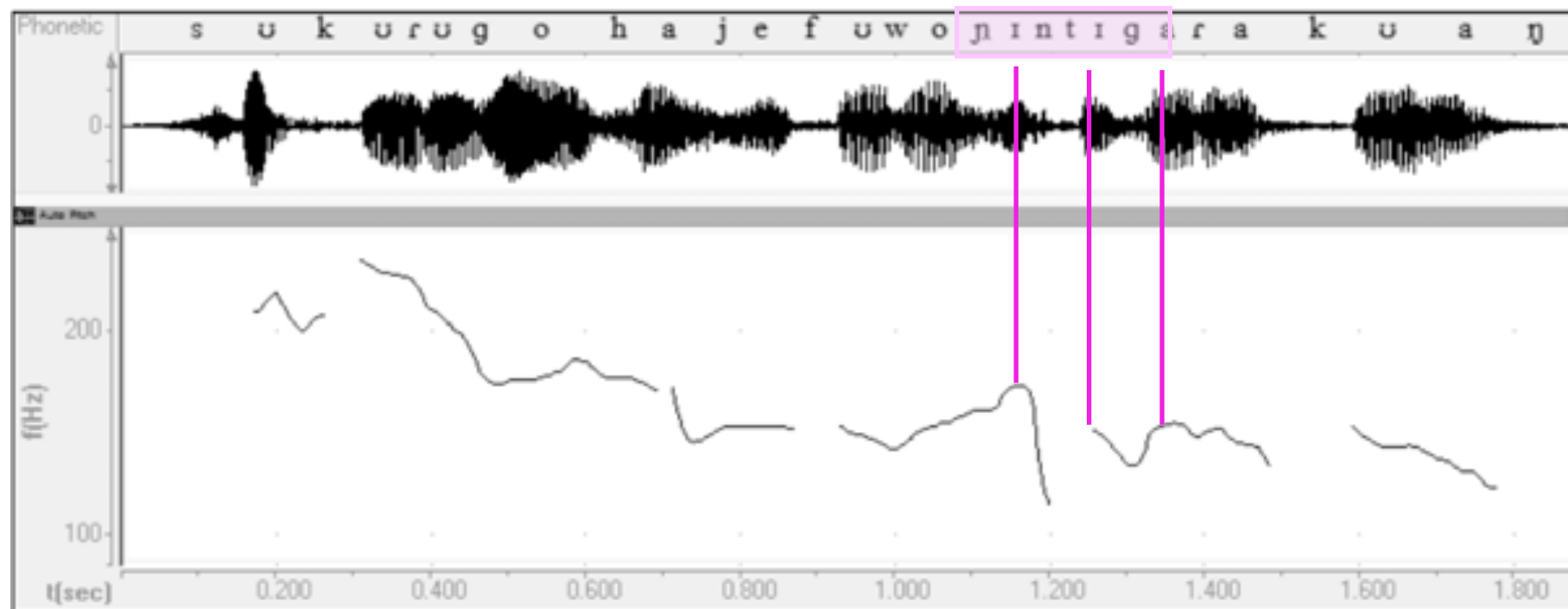
(12)  $\begin{array}{ccc} H & H & L & H \\ | & | & | & | \\ j\omicron r\omicron \eta & & kaani \end{array} \rightarrow \begin{array}{ccc} H & H & L & H \\ | & | & & / & | \\ j\omicron r\omicron \eta & & kaani \end{array}$

*kàgbà kààní*      *jórón !káání* ‘ one ladder. ’

# Analysis of Downstep

- In the the affix and cross-word case, HLH → H !H H
- the resulting !H is presumably higher than the L would have been.
- Is the second underlying H also lower than the first?
- Cahill seems to imply that... and it would be predicted from the the way downdrift works.
- Only example I could find:
 

(8) *sòkòrù gè ó háá jìè fò wó nín'tí gárá kǒ'áŋ* 'This morning he woke up seeing you lack things going to farm.' (speaking of a watchman and a thief)



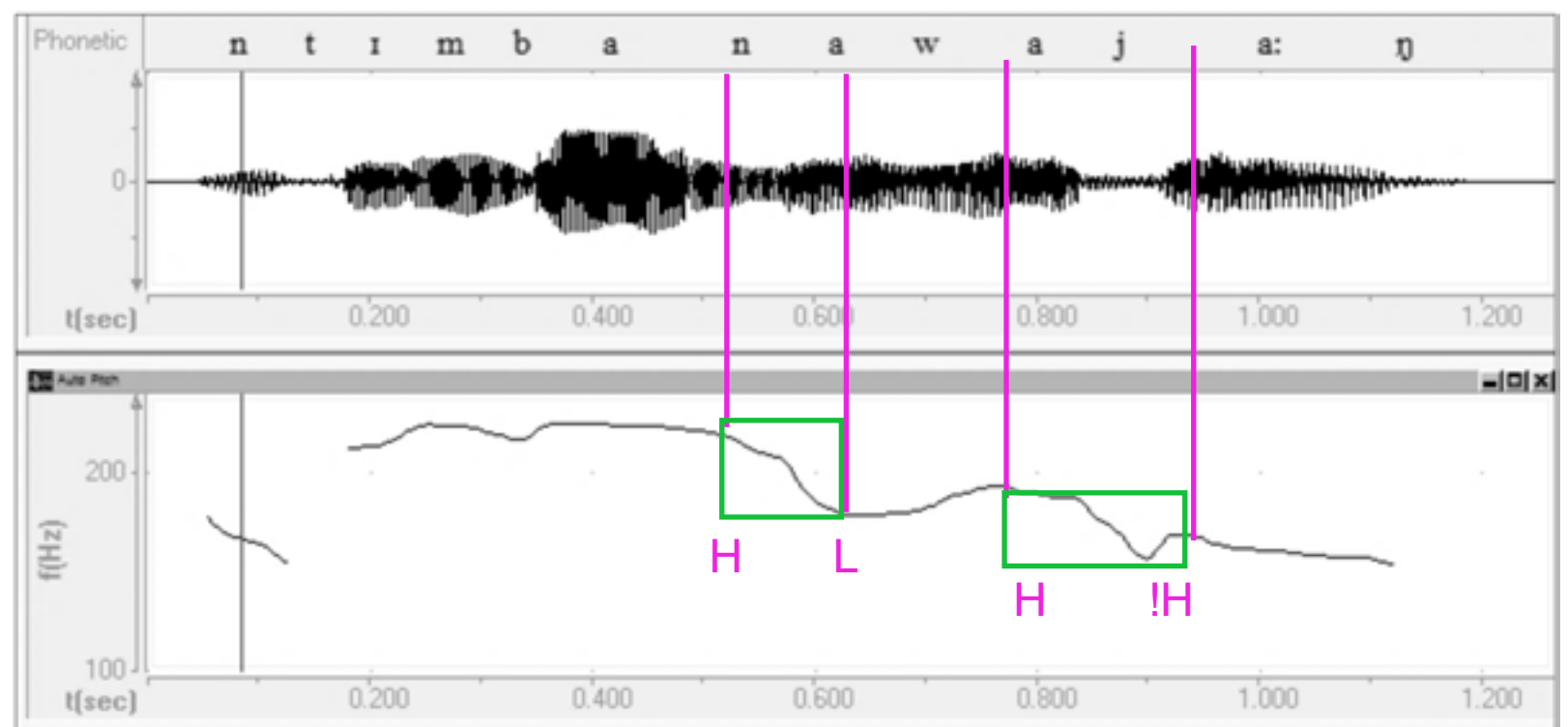
# Lexical Downstep

- Lexical downstep:  
Due to underlying floating L tone between H tones
- The effect is that the L+H result in tone that is intermediate in height
- H!H falls less than HL

*kpá'án* 'guinea fowl'

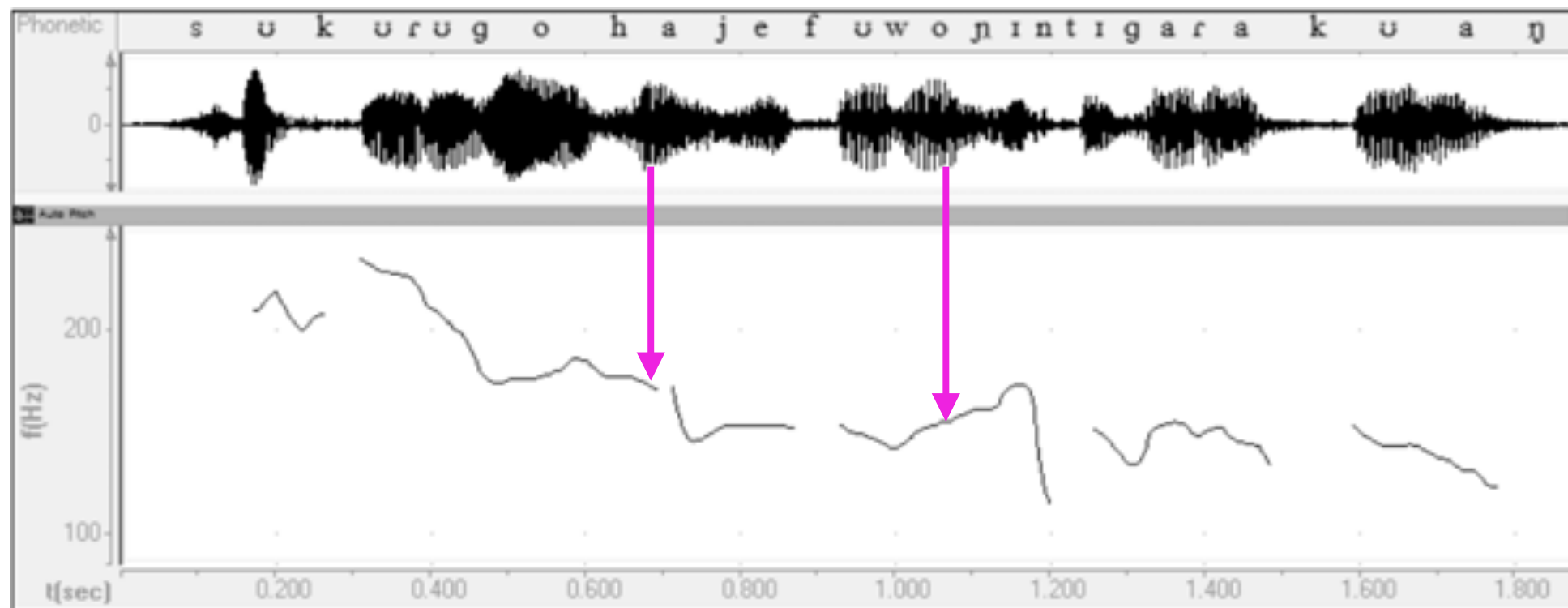
(5)     H L H  
          \ /  
        kp a a ŋ

*n̂      tím      bá      n̂      nàwá      'jáán<sup>10</sup>*  
 1SG   PAST   want   1SG   pick   thing   'I intended to get something'



# Downdrift

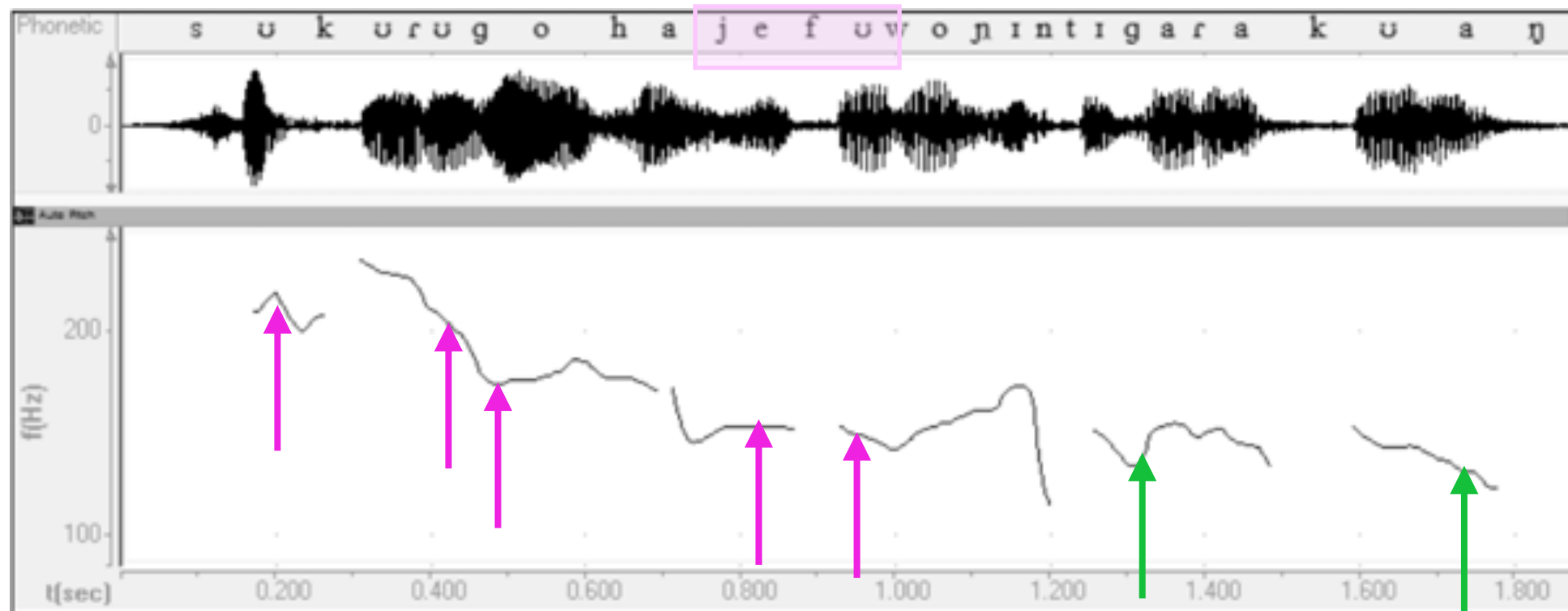
- (1) “High after overt phonetic Lows is lowered”
- (2) “The second H of a HLH sequence is phonetically lower than the first”
- (3) Downdrift does occur on an H after more than one low (apparently this is the main difference between downdrift and downstep, though Cahill assumes downdraft is “phonetic” and downstep “phonological”)
- (4) So the statement (2) was apparently not meant to be exclusive.
- (5) And because we saw that H is lower after !H, the “overt” stipulation in (1) doesn’t seem right.
- (8) *sùkùrù gè ó háá jìè fù wó nín'tí gárá kǔ'án* ‘This morning he woke up seeing you lack things going to farm.’ (speaking of a watchman and a thief)



# Downdrift

- “High after overt phonetic Lows is lowered”
- But lows are also lowered too.
- Lows seem to be lowered after H (or !H)
- No lowering in sequence of L

(8) *sòkùrù gè ó háá jìè fò wó jín'tí gárá kǒ'án* ‘This morning he woke up seeing you lack things going to farm.’ (speaking of a watchman and a thief)





# Possible Dwindrift Models

- Model sequence of F0 targets for tone gestures  $Target_{Hz}$  as a function of an input tone sequence
- First order dynamics regulating exponential decrease in  $F_{neut}$

$$(1) F_{neut} = 140$$

$$(2) F_{min} = 110$$

$$(3) range = 40$$

$$(4) Target = \{-range/2, range/2\}$$

$$(5) dF_{neut} = -k_1 F_{neut} \frac{(|Target_{(i)} - Target_{(i-1)}|)}{range} - k_1 F_{min}$$

$$(6) F_{neut}(i) = F_{neut}(i-1) + dF_{neut} \text{ where } i = 1 : N, \text{ the number of tones}$$

$$(7) Target_{Hz}(i) = Target(i) + F_{neut}(i)$$

- $F_{neut}$  will decrease exponentially towards  $F_{min}$
- Decrease will only occur on a syllable if the two previous syllables differ in  $Target$ .

# Problems with simple model

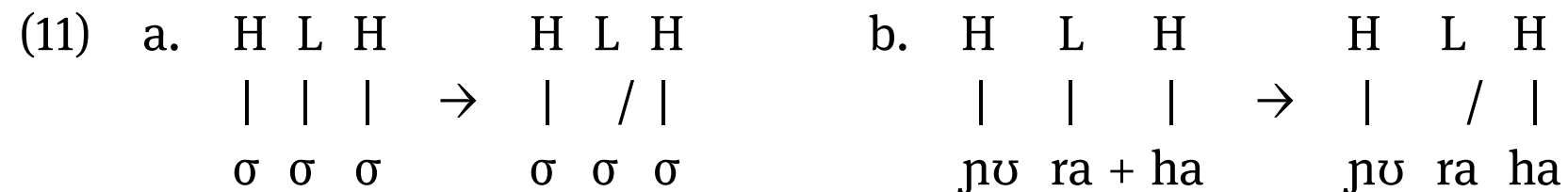
- *Range* likely needs to decrease exponentially also.  
First-order system for *Range*, like that for  $F_{neut}$  could be added.
- What if downdrift only lowers when a H follows a L?

- $$dF_{neut} = -k_1 F_{neut} \left( \left( \frac{Target_{(i)} - Target_{(i-1)}}{range} \right) + 1 \right) - k_1 F_{min}$$

# Incorporation of downstep

(I) non-floating down step:

- As far as the downdrift is concerned, the model will work fine as is
- in HLH, the second H will be lowered due to downdrift of  $F_{neut}$
- The L will have the “wrong” target (will be too low).
- This can be handled by the gestural dynamics: (overlap and blending).



*nŭrà* ‘chests’    *nŭ!ráhá* ‘the chests’.

# Incorporation of downstep

(2) floating down step:

- The floating L needs to be in the input sequence, so  $F_{neut}$  will can be lowered due to the downdrift dynamics.
- The floating low needs to be marked as such so that it does not add an output tone target to the sequence of gesture targets  $Target_{Hz}$

*kpá'áη* 'guinea fowl'

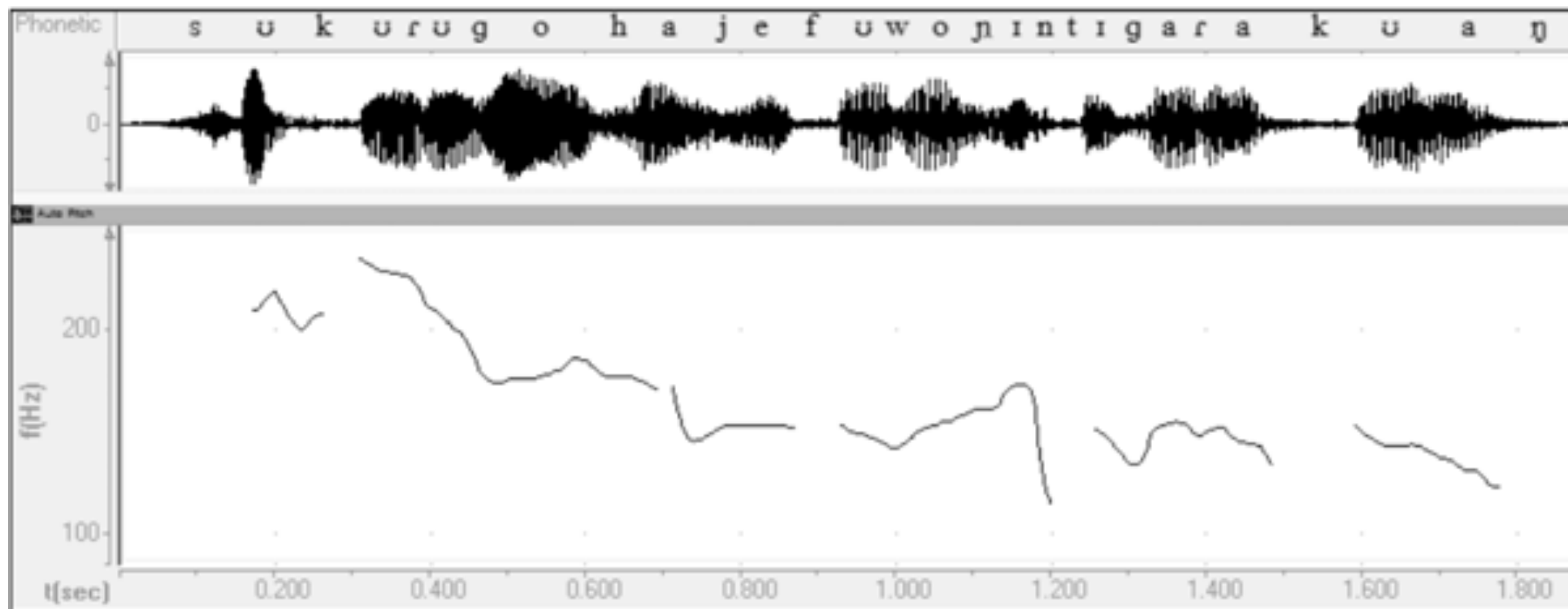
(5)     H L H  
         \ /  
       kp a a η

# Alternative Model

- Use Anharmonic Oscillator to set up  $f_0$  landscape with two attractors: H, L
- Over time, increase tilt in the direction of lower  $F_0$ .
- For every syllable's *intensional target* is a linear first-order system with an attractor at the high or low target.
- Add the landscape potential to the intensional potential to get the actual  $f_0$  potential.
- Intensional potentials will be shifted by tilted landscape and produce downdraft.

# Declarative intonation: Basic sentences

- Downtrending F0 due to downdraft.
  - No boundary tone.
- (8) *sùkǔrù gè ó háá jìè fù wó jīn'tí gārā kǔ'án* 'This morning he woke up seeing you lack things going to farm.' (speaking of a watchman and a thief)



# Compound sentences

Similar to Basic sentences except:

- (1) They often have pauses.
- (2) First clause is higher in pitch than the second.
- (3) Range of second clause is wider when it is uttered as an independent sentence.
- (4) Range of initial L-H is greater in the (longer) compound sentence than in the shorter sentence comprising its first clause.

a. I intended to bring something but I forgot.

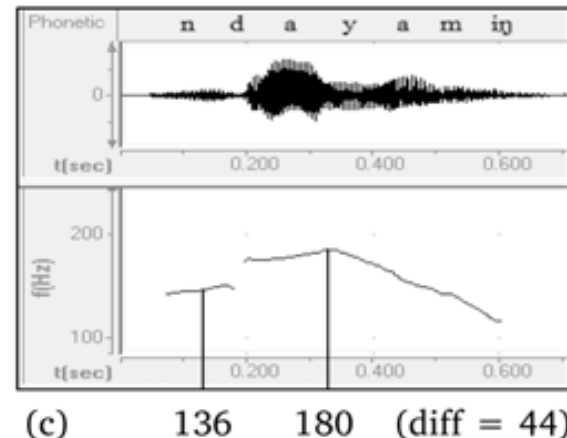
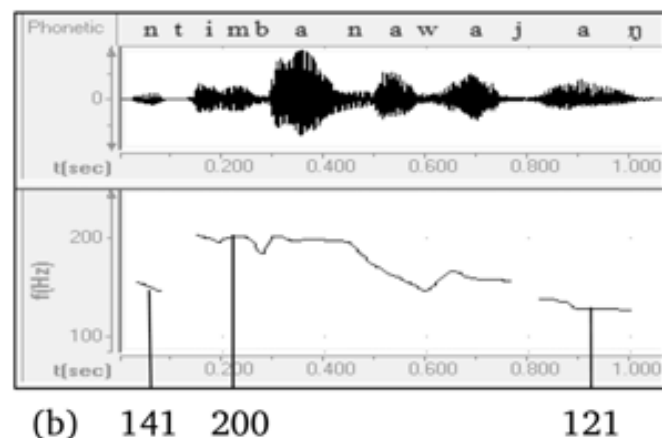
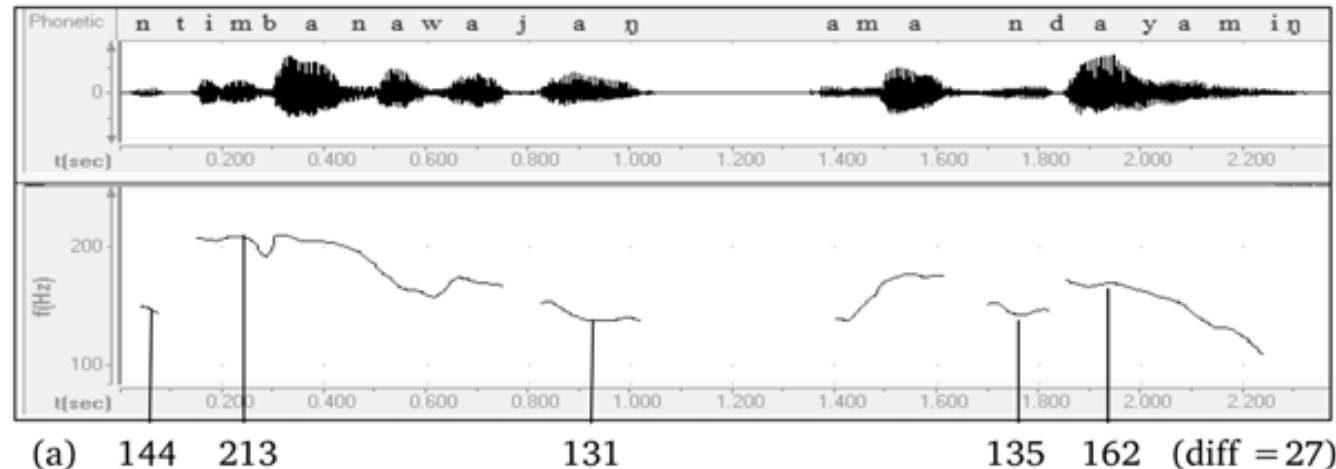
n̩ tím bá nàwá 'jáán̩ <pause> àmá n̩ dáá'yá mìn̩  
144 213 153/170 133 <361> 133-173 137 165

b. I intended to bring something

n̩ tím bá nàwá 'jáán̩  
135 196 141/154 123

c. I forgot.

n̩ dáá'yá mìn̩  
135 171



## Model

- Downtrend continues across clause boundaries. (2)
- *Range* exponentially decreases across utterance like  $F_{neut}$  (3)
- Compound sentences have higher initial  $F_{neut}$  and/or *Range*. Or maybe just this is determined by sentence length. (4)

# Polar Questions

- Lengthen Final vowel or nasal
- One of three forms of creating falling final pitch

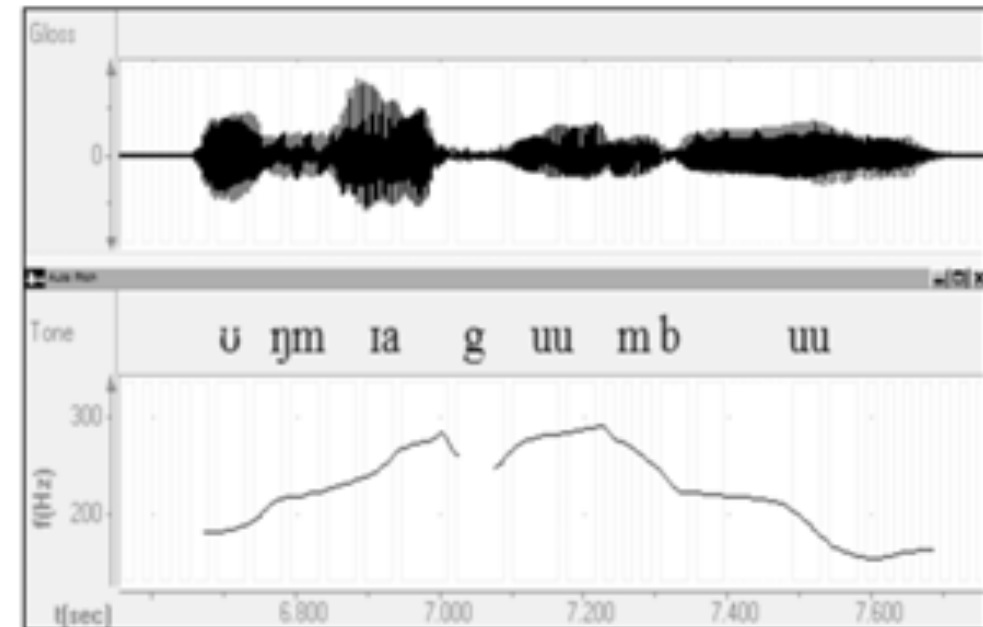
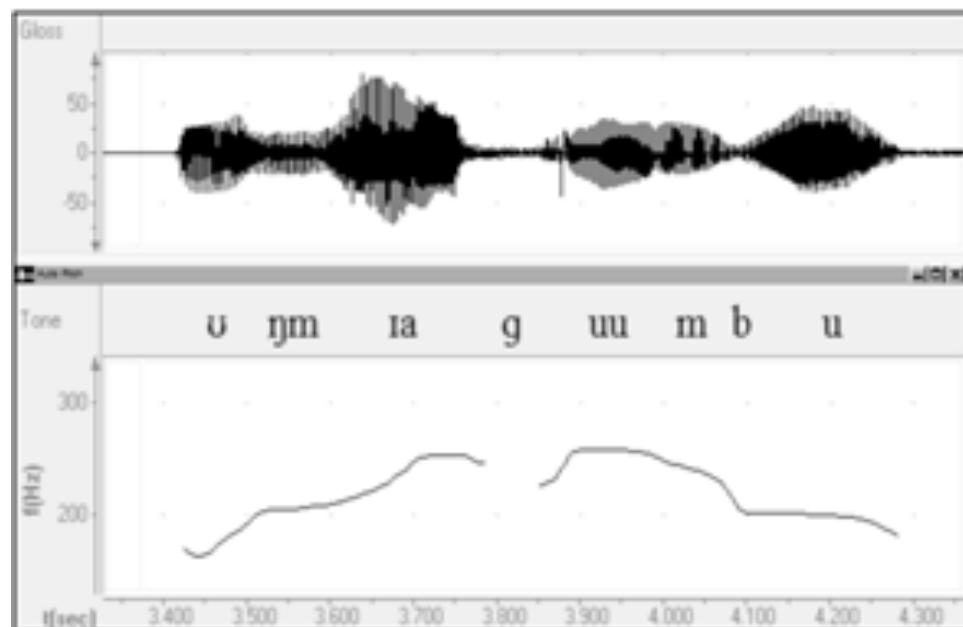


# Case I

- Insert down stepped High at the end, creating H!H
- (last tone is !H)

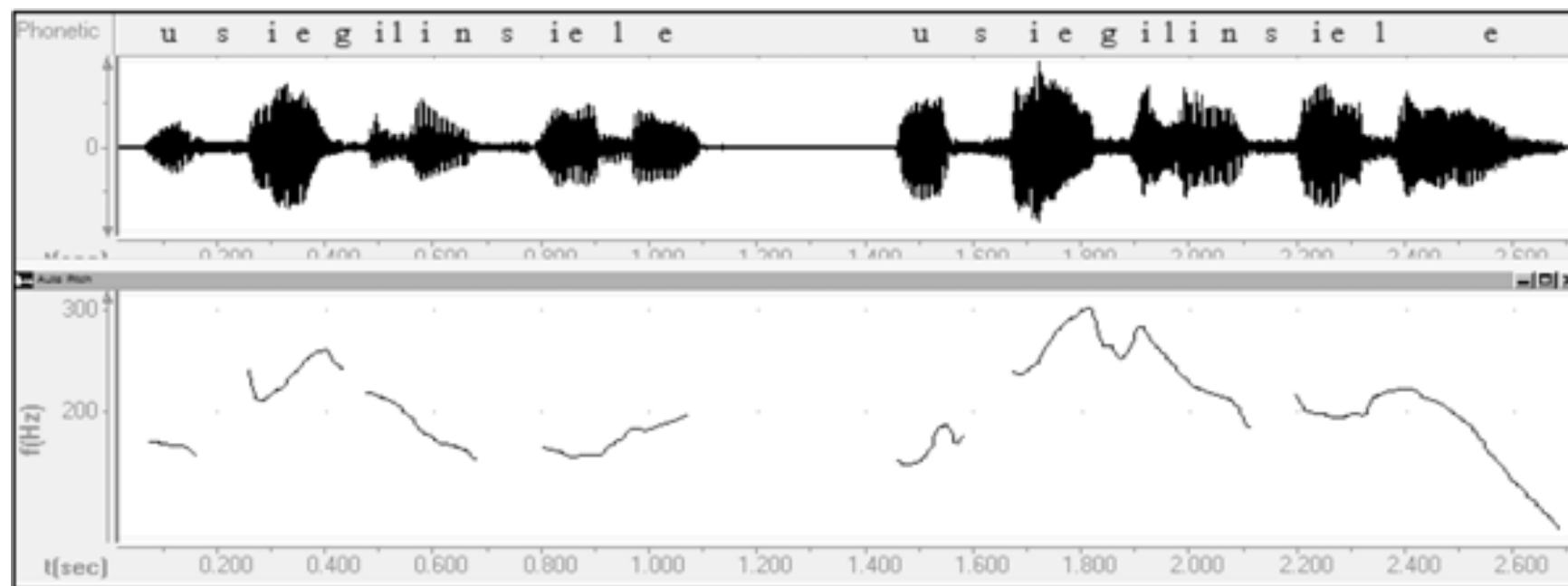
a. *ò ηmìá gúúm' bú* 's/he is rolling the rope'<sup>19</sup>

b. *ò ηmìá gúúm' bú'ú* 'is s/he is rolling the rope?'



# Case 2

- Add a Low at the end
- (last tone is H)
  - a. *ù sié gílinsièlé* ‘s/he is dancing gilinsiele dance’
  - b. *ù sié gílinsièléè* ‘is s/he dancing gilinsiele dance?’



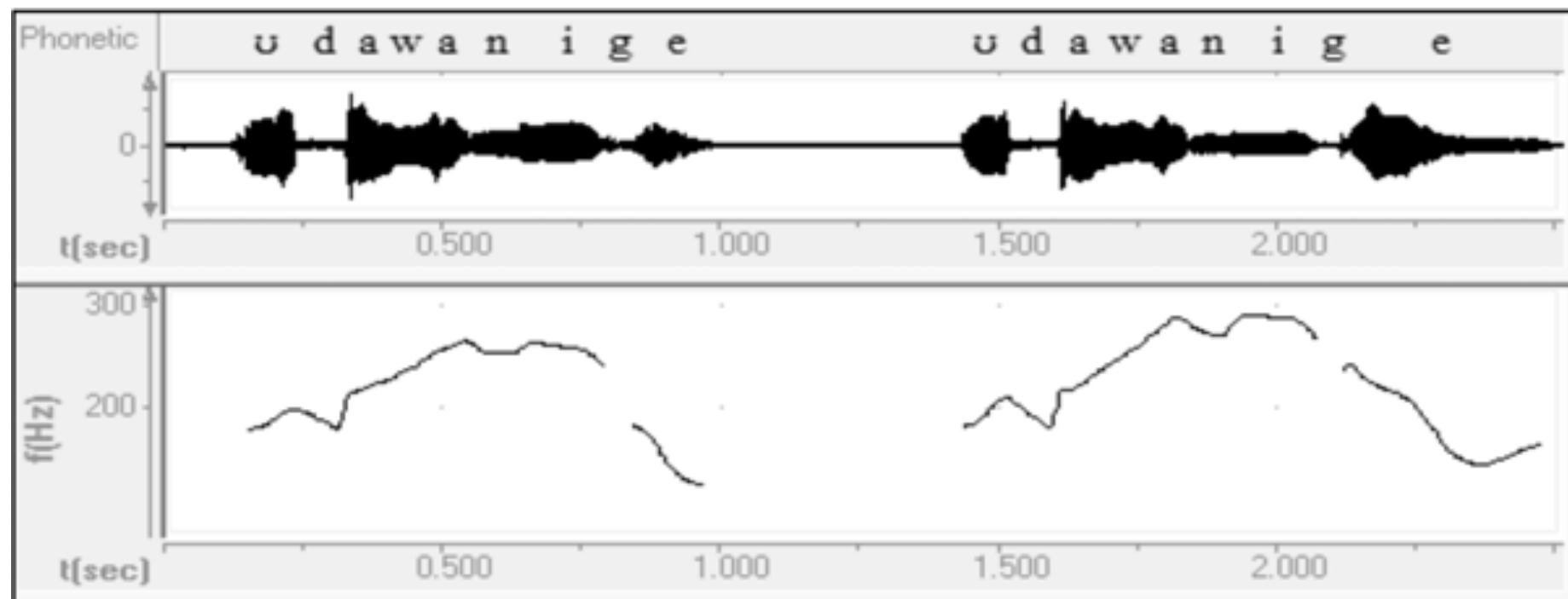
Phonologically, *gúúm' bú*, *sààbú*, *gílinsièlé*, and *jóríkú* all end with a H auto-segment, but LH is added to the first two and only a L to the last two.

# Case 3

- replace final L with HLH, producing H!H

a. ờ *dàwá nígè* ‘s/he has bought cows’

b. ờ *dàwá ní'gé'é* ‘has s/he bought cows?’



# Boundary Tone

- Cahill argues that Q is not associated with a boundary tone, because it is produced in three distinct ways.
- But suppose that there is a %HL boundary tone associated with polar questions:
  - In Case 3, the boundary tone shows up clearly as a distinct tone.
    - Note that the underlying L still shows up as the initial H of the boundary tone is not as low as the previous H
  - In cases 1 and 2, the H of the boundary tone merges with the underlying H (dynamics for that?)
  - How to derive the difference between cases 1 and 2 is not clear... but not clear in Cahill's analysis either.