Structure of Hmong-Mien Languages
Session #3 Tonology

Martha Ratliff
2017 LSA Institute
University of Kentucky
Session overview

• Tone language types
• White/Green Hmong tones
• Phonation as a phonetic cue in tone identification
• West Hmongic tone sandhi
• Tonally constrained music
• The origin of HM tones
• Other tone topics in sessions to come
  – Tonal morphology (session #4)
  – Autosegmental representation of tone (session #7)
  – Language contact and the spread/realization of tone (session #8)
• Assignment #1 again
The “Asian” and “African” tone language types

<table>
<thead>
<tr>
<th>“Asian” type</th>
<th>“African” type</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-12 tones</td>
<td>2-3 tones</td>
</tr>
<tr>
<td>Tone cues: pitch level, pitch change, phonation type, duration</td>
<td>Primary tone cue: pitch</td>
</tr>
<tr>
<td>Unitary level and contour tones</td>
<td>Level tones only (contours analyzed as combinations of levels)</td>
</tr>
<tr>
<td>Tone change in particular contexts (tone sandhi) limited; involves replacement rather than spread</td>
<td>Tone spread, bunching, delinking, reattachment, floating, displacement common</td>
</tr>
<tr>
<td>Monosyllabic words</td>
<td>Polysyllabic words</td>
</tr>
<tr>
<td>Few bound segmental morphemes</td>
<td>Numerous bound segmental morphemes</td>
</tr>
<tr>
<td>Tone primarily used for lexical discrimination</td>
<td>Extensive grammatical use of tone</td>
</tr>
</tbody>
</table>
• Why use quotes around “Asian” and “African”?
  – African types in Asia (some Wu dialects of Chinese)
  – Asian types in Africa (some Khoisan and West African isolating languages)

• And tone languages of the Americas can be of either type
  – Athabaskan languages with only 2 tones, while
  – Meso-American languages with enormous inventories (Chatino class going on at the Institute right now)

• Hmong-Mien languages do belong to the classic “Asian” type, however.
**Hmong tones**

on a 5-point scale: 5 highest, 1 lowest

<table>
<thead>
<tr>
<th>Tone</th>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>tob</td>
<td>deep (+ a spinning top)</td>
</tr>
<tr>
<td>52</td>
<td>toj</td>
<td>a hill</td>
</tr>
<tr>
<td>24</td>
<td>tov</td>
<td>to add water</td>
</tr>
<tr>
<td>33</td>
<td>to</td>
<td>to be pierced</td>
</tr>
<tr>
<td>42</td>
<td>tog</td>
<td>to sink (+ a block, + half)</td>
</tr>
<tr>
<td>22</td>
<td>tos</td>
<td>to wait (+ to meet)</td>
</tr>
<tr>
<td>21ʔ</td>
<td>tom</td>
<td>there (+ to bite)</td>
</tr>
<tr>
<td>(213)</td>
<td>tod</td>
<td>over there</td>
</tr>
</tbody>
</table>

[https://www.youtube.com/watch?v=M2-flB3AwR4](https://www.youtube.com/watch?v=M2-flB3AwR4)
… a footnote on Hmong dialect differences

*Lub luv luj luj lug lawm.*
CLF car big big come PFV

*Green Mong*

*Lub tsheb loj loj los lawm.*
CLF car big big come PFV

*White Hmong*
Phonation as a phonetic cue in tone identification


Additionally:
The famous five level tones of “Black Miao”

Black Miao (Hēi Miáo) is a variety of Hmu (East Hmongic) spoken in eastern Guizhou Province.

The initial fieldwork and description was done in the 1940s by Li Fang Kuei, whose student Julia Kwan wrote an oft-cited Univ. of Washington MA essay on the language in 1966.

A world record that tests the limits of human perception? Perhaps not, as Jianjing Kuang shows.
Problem: the “JND”

• The Just Noticeable Difference for contrastive tones in an inventory is c. 20-30 Hz in speech (but interestingly, smaller differences are not difficult to perceive in non-speech: in music, presumably).

• But the normal pitch range for a male speaker cross-linguistically is c. 100 Hz (Fig. 1). Therefore, Kuang contends that speakers can perceive no more than 3 levels without help.

• Expand acoustic space or add extra dimensions: duration, contour, and/or phonation.
Phonation and tone

• Laryngealization in Black Miao evident in the lowest and in the highest tone in different ways, for different reasons, but both involve the effects of pitch extremes.
  – 55 tone (220 Hz): “longitudinal tension of the vocal folds increases as pitch increases…T55 is produced with a tense (or stiff) phonation.”
  – 11 tone (75 Hz): “The high CQ of T11 is likely to be due to vocal fry, caused by the compression in the vocal folds which naturally occurs with low pitches.”

• Breathiness, on the other hand, is independent of pitch: see esp. Fig. 8, which shows a strong correlation among all the EGG factors proposed for breathiness, but only weak correlation of those factors with pitch.

• Revisiting the Hmong breathy tone and its differing characterizations by Garellek et al. (“high falling”), by our You Tube instructor Jay Her (“lowest tone”), and by me.
Experiments and results

• Pitch measurements: $F_0$ trajectories of three mid-tones very similar (22, 33, 44) (Figs 3 & 4)
• Perception test: the greatest confusability between 22 and 44 (judged different only 70% of the time) (Table 3)
• Factoring in acoustic measurements (H1-H2, H1-A1, and electroglottographic measurements of vocal fold contact, speed, etc.), the 33 tone is clearly distinguished from 22 and 44 in tonal space (Figs 9 & 10)
A typology of pitch/phonation relationships
(all attested in Southeast Asia)

• Contrastive tones, all in modal voice (Thai)
• Contrastive phonation types ("registers") (Yi, Chong)
• Contrastive tones, some of which are characterized by non-modal voice (most Hmongic, Vietnamese, Burmese)
• Contrastive tones and contrastive phonation — independent and cross-cutting systems (A-Hmao breathy consonants with any tone; Jingpho with 3 tones x 2 registers = 6 contrasts)

Andruski & Ratliff 2000
West Hmongic tone sandhi

“Tone sandhi” is a phonological change occurring in tonal languages, in which the tones assigned to individual words or morphemes change based on the pronunciation of adjacent words or morphemes.

White Hmong examples:

- de\(^{52}\) sia\(^{24}\) > de\(^{52}\)-sia\(^{33}\)
  - water cooked > water cooked (boiled)

- hnu\(^{55}\) te\(^{22}\) > hnu\(^{55}\)-te\(^{42}\)
  - sun hand > sunray

- poŋ\(^{55}\) de\(^{52}\) > poŋ\(^{55}\)-de\(^{42}\)
  - fall water > drown
Prerequisites for tone change

- West Hmongic tone sandhi now involves a paradigmatic replacement of one tone in the inventory by another tone in the inventory.
- The first word (the trigger) must have either the 55 or 52 tone.
- The second word must have one of the following tones:
  - 52, 22, or 21? (>42)
  - 24 (>33)
  - 33 (>22)
- Pretty senseless, synchronically
In order to understand tone sandhi…

… you need to understand tone categories based on historical origin:

55  A1  <  *open syllable, voiceless initial
52  A2  <  *open syllable, voiced initial
24  B1  <  *-ʔ syllable, voiceless initial
22  B2  <  *-ʔ syllable, voiced initial
33  C1  <  *-h syllable, voiceless initial
42  C2  <  *-h syllable, voiced initial
22  D1  <  *-p, -t, -k syllable, vless initial
21? D2  <  *-p, -t, -k syllable, vd initial
“upper register” tones < syllables with vless initials:

55   A1   <  *open syllable, voiceless initial
52   A2   <  *open syllable, voiced initial
24   B1   <  *-ʔ syllable, voiceless initial
22   B2   <  *-ʔ syllable, voiced initial
33   C1   <  *-h syllable, voiceless initial
42   C2   <  *-h syllable, voiced initial
22   D1   <  *-p, -t, -k syllable, vless initial
21? D2   <  *-p, -t, -k syllable, vd initial
“lower register” tones < syllables with voiced initials:

| 55 | A1  | < *open syllable, voiceless initial |
| 52 | A2  | < *open syllable, voiced initial   |
| 24 | B1  | < *-ʔ syllable, voiceless initial  |
| 22 | B2  | < *-ʔ syllable, voiced initial     |
| 33 | C1  | < *-h syllable, voiceless initial  |
| 42 | C2  | < *-h syllable, voiced initial     |
| 22 | D1  | < *-p, -t, -k syllable, vless initial |
| 21?| D2  | < *-p, -t, -k syllable, vd initial |
Historical interpretation of West Hmongic tone sandhi

<table>
<thead>
<tr>
<th></th>
<th>White Hmong</th>
<th>Green Mong</th>
<th>Xuyong</th>
<th>Xianjin</th>
<th>Shimen</th>
<th>Qingyan</th>
<th>Gaopo</th>
<th>Zongdi</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2 &gt; C2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>B2 &gt; C2</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>D2 &gt; C2</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1 &gt; C1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>C1 &gt; D1</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>environment A1- or A2- __________</td>
<td>environment A1- __________</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The phonetic values of the tones involved are unimportant; only the historical categories involved are important. When the process was active, presumably the phonetic nature of the syllable types involved were important, however.
Key features of West Hmongic tone sandhi

• The requirements for tone sandhi do not involve phonetic tone values, but rather historical tone categories. It was presumably once a natural phonological process, but is no longer.
• Tone sandhi is more likely to occur in certain lexical categories than others.
• Particular lexical items are more likely to trigger or undergo tone sandhi than others.
• Tone sandhi rarely involves a change in meaning and apart from a few lexicalized compounds is always optional.
• Although it is possible to predict non-occurrence, it is impossible to predict when tone sandhi will occur.
Typical constructions

• Numeral-Classifier
  – o\textsuperscript{55}-dai\textsuperscript{42} ntaw\textsuperscript{24} (\textless{} dai\textsuperscript{21}) ‘2 sheets of paper’

• Reciprocal-Verb (could justify analysis of the reciprocal as a bound morpheme)
  – si\textsuperscript{55}-tua\textsuperscript{22} (\textless{} tua\textsuperscript{33}) ‘kill each other’

• Noun-Modifier
  – nploŋ\textsuperscript{52}-qhua\textsuperscript{33} (\textless{} qhua\textsuperscript{24}) ‘dry leaves’

• Noun-Noun
  – te\textsuperscript{55}-chaw\textsuperscript{22} (\textless{} chaw\textsuperscript{33}) ‘country’ (land-place)

• Verb-Noun
  – ka\textsuperscript{52}-ntu\textsuperscript{42} (\textless{} ntu\textsuperscript{52}) ‘morning’ (be bright-sky)
What happens to musical “tunes” in songs when pitch is already being used to convey lexical contrasts? Is instrumental music the only possible type of music?
“Hmong secular poetry is organized into stanzas which are memorized, improvised, or spontaneously constructed by the singer using a combination of both techniques. A stanza may contain any number of unrhymed “lines” of non-specific lengths … but four rhymed lines provide the basic framework around which a … stanza must be built …” (Catlin 1982:172)

**Kwv txhiaj**

**Initial Motive (long, high note)**
Unrhymed line(s)
Rhyming line A my Bonnie lies over the sea
Unrhymed line(s)
Rhyming Line B oh, bring back my Bonnie to me
Unrhymed line(s)
Rhyming line A’ my Bonnie lies over the sky
Rhyming line B’ oh, bring back my Bonnie before I die
Concluding signature (glissando to low short note)
Lexical tone and musical pitches
*hais kwv txhiaj*, lit. ‘speak kwv txhiaj’

Typical tone/pitch equivalences (Catlin 1982:178):

<table>
<thead>
<tr>
<th>lexical tone</th>
<th>4-pitch system</th>
<th>5-pitch system</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>52</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>33</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>42</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>21ʔ</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
How many basic pitches does this singer use?

https://www.youtube.com/watch?v=kYFJ_UUpI_c

Don’t count “ornamentation” (grace notes, decorative notes) – listen to the notes she holds for a longer period of time.
The origin of HM tones

• All languages in the Sinosphere (Chinese, Vietnamese, Tai-Kadai languages, Hmong-Mien languages) seem to have developed tone in the same way: from loss of final laryngeal consonant contrasts in a first wave, doubled by loss of initial laryngeal consonant contrasts in a second wave. Tone is thus a language contact feature, although which language developed tone first is unknowable.

• The origin of tones in Vietnamese was discovered by André Haudricourt in 1954. This was possible due to the fact that close relatives of Vietnamese (Muong, Thavung, etc.) are atonal—we can see the “before” and “after” within one compact family, Vietic. His account of tonogenesis has served as a model for the study of all other tone languages in the area.
## Tonogenesis in White Hmong

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Atonal</strong></td>
<td>CV</td>
<td>CV?</td>
<td>CVH</td>
<td>CVC(vl)</td>
</tr>
<tr>
<td><strong>Genesis</strong></td>
<td>CV</td>
<td>CV(↗)</td>
<td>CV(↘)</td>
<td>CVC(vl)</td>
</tr>
<tr>
<td><strong>Split</strong></td>
<td>A1 (*t-) upper</td>
<td>A2 (*d-) lower</td>
<td>B1 (*t-) upper</td>
<td>B2 (*d-) lower</td>
</tr>
<tr>
<td><strong>Hmong</strong></td>
<td>tɔ(^{55}) deep</td>
<td>tɔ(^{52}) hill</td>
<td>tɔ(^{24}) mix</td>
<td>tɔ(^{22}) wait</td>
</tr>
</tbody>
</table>


Tonal categories and phonetic values

• Presumably, when tones were new, the “upper register” tones from originally voiceless initials had a higher pitch than their “lower register” counterparts from originally voiced initials.

• This is true for categories B and C (from -ʔ and –h) to this day: of 70 varieties, 81% of B2 tones are lower than B1 tones and 89% of C2 tones are lower than C1 tones. But for category A (from -ø), this is not the case: in exactly half of the 70 varieties, A2 is lower than A1, but in the other half, A1 is lower than A2. Why?
### Phonation-to-tone development

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>CV</td>
<td>CVʔ</td>
<td>CVH</td>
</tr>
<tr>
<td>Stage II</td>
<td>CV</td>
<td>CṾ ↑</td>
<td>CṾ \→</td>
</tr>
<tr>
<td>Stage III</td>
<td>upper: CV</td>
<td>upper: CṾ</td>
<td>upper: CṾ</td>
</tr>
<tr>
<td></td>
<td>lower: CḥV</td>
<td>lower: CḥṾ</td>
<td>lower: CḥṾ</td>
</tr>
<tr>
<td>Stage IV</td>
<td>A1: CV</td>
<td>B1: CV</td>
<td>C1: CV</td>
</tr>
<tr>
<td></td>
<td>A2: CV ~ CṾ</td>
<td>B2: CV ~ CṾ ~ CṾ</td>
<td>C2: CṾ ~ CV</td>
</tr>
</tbody>
</table>
More evidence

• Residual phonation in modern languages
  – breathiness hierarchy  $C_2 < B_2 < A_2$
  – Mun: creakiness in category B

• Raised vowels in Zongdi categories B2 and C2 (a lax glottis effect)

• Complex contour tones (fall-rise or rise-fall) almost exclusively in categories B1 and B2
To put it another way . . .

<table>
<thead>
<tr>
<th>HM tone</th>
<th>HM initial</th>
<th>Ancient voice quality</th>
<th>Modern voice quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>A modal</td>
<td>voiceless</td>
<td>A1 modal-modal</td>
<td>&gt; modal</td>
</tr>
<tr>
<td></td>
<td>voiced</td>
<td>A2 breathy-modal</td>
<td>&gt; modal (rare: breathy)</td>
</tr>
<tr>
<td>B creaky</td>
<td>voiceless</td>
<td>B1 modal-creaky</td>
<td>&gt; modal</td>
</tr>
<tr>
<td></td>
<td>voiced</td>
<td>B2 breathy-creaky</td>
<td>&gt; modal or breathy (rare: creaky)</td>
</tr>
<tr>
<td>C breathy</td>
<td>voiceless</td>
<td>C1 modal-breathy</td>
<td>&gt; modal</td>
</tr>
<tr>
<td></td>
<td>voiced</td>
<td>C2 breathy-breathy</td>
<td>&gt; breathy or modal</td>
</tr>
</tbody>
</table>
Other references


Assignment #1
(posted on website)

Mo Piu is a West Hmongic language spoken in Năm Tu Hà, Năm Xé commune, Văn Bàn district, Lào Cai Province, Vietnam. The local people report that it is the least numerous of all the local Hmongic groups (Andrew Hsiu, p.c.). Number of speakers: 237 in 2011 (Caelen-Haumont 2012).

You will listen to recordings of a Mo Piu speaker reading a wordlist. The wordlist is posted on the class website (each word is in a separate file). You have to try to figure out how many tones there are in this language and then give a description of each one, using your ears alone.

See the full assignment description posted on the website for instructions (and hints).