VARIATIONIST APPROACHES TO TONE IN SINO-TIBETAN AREA LINGUISTICS

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OUTLINE OF THIS PRESENTATION

- Background on variationist approaches to tone
  - “Socio-tonetics”

- Case study of Sui tone
  - Adult dialect acquisition and change across the lifespan
  - Child dialect acquisition of clan dialects
  - Sui regional diffusion

- Appendix: Practical application
About 70% of the world’s languages are tonal (Yip 2002)

Over half of the world’s population speaks a tonal language (Fromkin 1978)
Classic sociolinguistic variables: postvocalic /r/, vowel formants, t/d deletion, -ing, etc.
Example: Classic variationist methods with vowels
NEW HAMPSHIRE

Photo: http://blog.jerryandmarcymonkman.com
A typical variationist approach to vowels: Fronting of FATHER vowels in NH

Figure 6. Age contrast in FATHER: Pronunciations of speakers born before 1970 (●) and speakers born after 1970 (▲). Each dot or triangle represents an individual token (660 tokens, 51 speakers).
Fronting of START vowels

Fronting of FATHER vowels
Classic sociolinguistic variables:
- postvocalic /r/, vowel formants, t/d deletion, -ing, etc.

Less common: intonation
- e.g., Yaeger-Dror & Fagyal (2011); Fagyal & Stewart in press; Yaeger-Dror et al. (2003); Grabe (2004)

Even less common: Lexical tone as a sociolinguistic variable
- Zhang (2005); Kerswill (1994); Hildebrandt (2003, 2005); Bauer et al. (2003); Stanford (2007, 2008a-b)
Tone phonetics (tonetics)

Examples:
- Hombert (1978)
- Ohala (1978)
- Ross, Edmondson, & Seibert (1986)
- Edmondson et al. (2004)
- Zhu (1999)
- Wright and Shryock (1993)
Lexical tone + acoustic sociophonetics

= “Socio-tonetics”
SUI OF CHINA

- Indigenous minority of rural Guizhou, China
- Tai-Kadai language
- Tonal, isolating, largely monosyllabic
Clan exogamy
- Approx. 300,000 speakers (Bradley 2007:179)
- Extensive inter-clan contact due to marriage, but clan dialects remain distinct (Stanford 2008a-b, 2009)
- Mutually intelligible
- Largely egalitarian society
- No clan dialect is considered more prestigious than another
- Linguistic exogamy versus clan exogamy
  - Vaupes region of the Amazon (Jackson 1983, Aikhenvald 2002 inter alia)
SUI CLANLECT VARIATION

- Lexical
- Phonetic
  - Two tone variables
  - Two diphthong variables (ua), (ia)
  - Other contrasts

A few examples:

<table>
<thead>
<tr>
<th></th>
<th>North Clan</th>
<th>South Clan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; Singular</td>
<td>ej</td>
<td>ju</td>
</tr>
<tr>
<td>‘socks’</td>
<td>maːt</td>
<td>ʔjo</td>
</tr>
<tr>
<td>‘market’</td>
<td>tɕɛ</td>
<td>qɛ</td>
</tr>
</tbody>
</table>
SUI FIELDWORK: 70 RECORDINGS

- Recordings in a “North clan” village (Zhang):
  - Local speakers: Men, teenagers, children
  - In-married women from the “South clan”

- Recordings in a “South clan” village (Pan):
  - Local speakers: Men and teenagers
  - In-married women from the “North clan”

- Recordings in a “Midland clan” village (Lu):
  - Local speakers: Men, teenagers, children
  - In-married women from 7 different clans
SUI VARIATIONIST RESEARCH QUESTIONS

1. Adult dialect acquisition and lifespan change

2. Child dialect acquisition in multidialectal villages

3. Regional dialect diffusion
1. Adult dialect acquisition and lifespan change

- Do in-married Sui women maintain their original clan dialects after 10+ years in the husband’s village?

- Adult dialect change
  Siegel (2010:22-55); Sankoff & Blondeau (2007)

- Societies where in-married women change their dialects
  Thao (2006:37-40); Meyerhoff (2003); Stanford (2010); Stanford & Pan (forthcoming)
Excerpt (translated from Sui to English)

Interviewer: Now that you’ve been in Ljong a long time, have you changed [your speaking]?

South woman, married 20 years: No... Not even a single word....The Zhang surname people [North] don’t speak like the Pan surname people [South]. If a mother is a Pan person, she won’t speak the same [as her husband and children].
South woman, married for 10 years:
“Those are the Lu people, so they say ej [1st Sg.]. We are the Pan people, so we say ju. Each surname speaks its own way... The Lu people speak like the Lu region. We Pan people speak like Pan people.”
Interviewer: What if someone [like you] said ej [1st Sg. North]? What would people do?

59 year-old South woman, married for 40 years:
They would always laugh. So [that person] wouldn’t talk like that anymore. People would laugh, [saying,] “You don’t speak like your own place anymore! You ate the food of our place [as a child], so you should [speak] like our place.”
South woman, married 20 years:
“If [someone like me] were to speak like they do here [Ljong, North region], people would laugh a lot -- laugh a lot! They would always laugh.
IDEALIZED TONES OF TWO SUI DIALECTS (UNCHECKED TONES)

Tong

Ljong

Note: No systematic tone sandhi observed in Sui
Edmondson et al. (2004, Fig. 5)

Sui Tones 5 and 6 in Miuja (Miaocao)
What speech style(s) can be used for socio-tonetics?

- Free speech: problems with adjacent tones (?)
- Formal citation/list style:
  - Not natural speech
  - “List intonation” (Ladefoged 2003:83-103)
  - Field issues with sentence frames, sentence-final particles
Variationist goals, not a phonetics lab project:
- “Studying humans in their natural habitat”
  e.g., English *walking/walkin’*
• A practical style for socio-tonetics: “Flexible phrase list” style in a semi-conversational picture identification activity

“That is a ___”
“Now I am saying ___”
“I see ___ there”
“Well, I’d call this a ___”

Advantages
- Reduces list intonation
- Provides a slight prosodic focus on the target word
  - Prominence (Liberman & Pierrehumbert 1984)
- Reduces effects of adjacent tones
- Somewhat more natural than word-list style
**Relative Prominence (Mandarin)**

From Xu (2004:6, Figure 4)
TONE VARIABLES

- Two Sui tone variables:
  - Tone 1 and Tone 6
- Extracted from Praat (Boersma & Weenink 2012) “pitch listing” function
**Mean Tones of Non-Mobile Speakers**

North Clanlect  
(765 tokens)

South Clanlect  
(1,018 tokens)
Raw tokens of Tone 6 and **Tone 3** for Speaker 8
NORMALIZATION

- Time normalization
- Pitch normalization

EXAMPLE OF VOWEL NORMALIZATION

“NORM”, THOMAS & KENDALL (2007)
A raw token of a Sui Tone 1 word

10 msec samples
Tailor-made R functions normalize the tone pitch tracks:
- Duration: fitted to 600 “relative time” points
SYLLABLE EDGE EFFECTS
Effects of onsets/codas, tonogenesis
Matisoff (1970, 1973); Hombert (1978); Hombert, Ohala & Ewan (1979); House & Fairbanks (1953); Brown (1975)

Omit the last 10% and first 25% as a conservative cushion for onsets

Mix of voiceless and voiced onsets
- Include as a factor in statistical modeling
PITCH NORMALIZATION

- Wide range of different techniques
  - Zhu (1999:46-56)
Pitch normalization

Finding a mid-line

- Mean of a mid level tone for each speaker
  - Sui Tone 3

- Other options:
  - Mean F0 of stretches of speech
    - Problem: Some tones more common than others
  - Mean of the mean of each tone
**Tone Inventory of a South Baseline Speaker (124 tokens)**

![Graph showing pitch over time for different tones.](image-url)
COMPARISON BETWEEN SPEAKERS

F0, Gender, and Age:

- Women: F0 ~130-300 Hz
- Men: F0 ~80-200 Hz
- Children: F0 over 300 Hz

(Yaeger-Dror & Fagyal 2011)
Women and children:
- typically higher mean F0
- greater overall F0 range


Black = a female speaker’s tone range
Gray = a male speaker’s tone range
Pitch normalization

Accounting for range differences

- Logarithmic scale (semitones)
  - Edmondson et al. (2004); Ross et al. (1986); Baken (1987:127, cited in Zhu 1999:47); Xu 1999:61
Semi-tones: Musical half-step

12 semitones in an octave:
- When a given frequency is doubled, it becomes 12 semitones higher (Xu 2004:2)
Zhu (1999): Shanghai women and men

- Approximately the same range in semitones, despite large differences in raw hertz
- Women’s range: 9.5 semitones
- Men’s range: 9.6 semitones
One semitone = \( (12 \times \ln(H/100)) / \ln 2 \)
where \( H \) is the raw acoustic frequency in hertz
(Praat manual 4.1.28)
MEAN TONES OF NON-MOBILE SPEAKERS

North dialect
(11 speakers, 765 tokens)

South dialect
(8 speakers, 1,018 tokens)
TONE 6 OF NON-MOBILE SPEAKERS
TONE 6 OF NORTH MARRIED WOMEN VERSUS NORTH NON-MOBILE SPEAKERS
TONE 6 OF SOUTH MARRIED WOMEN VERSUS NON-MOBILE SPEAKERS
Pitches of Individual Tone 6 tokens (t=390)  (Stanford 2008a)

North Baseline

South Baseline

South In-married
MEAN TONES OF NON-MOBILE SPEAKERS

North
(765 tokens)

South
(1,018 tokens)
Edmondson et al. (2004, Fig. 3)

Sui Tones 1 and 2 in Miuja (Miaocao)
TONE 1 OF BASELINE SPEAKERS
Figure 24. Slopes of Individual T1 Tokens of North Baseline and North Married Women. Organized by Speaker Number on the Horizontal Axis.

a. North Baseline Speaker

b. North Married Women
Figure 25. Slopes of Individual T1 Tokens of South Baseline and South Married Women Organized by Speaker Number on the Horizontal Axis.

a. South Baseline Speakers

b. South Married Women
SUI LOYALTY TO CLAN DIALECTS

“Our clan ideology is strong. Even though a woman marries into another place, she is still a member of her father’s place. Because people back in her father’s place speak this kind of dialect, she continues on.”
Socio-tonetics in free speech?

Hypothesis: In-married Sui women will maintain their clan dialects in free speech
<table>
<thead>
<tr>
<th>Lexical Variants Observed in Free Speech</th>
<th>North Clan Members</th>
<th>South Clan Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>ju&lt;sup&gt;2&lt;/sup&gt; South variant of 1&lt;sup&gt;st&lt;/sup&gt; Sg.</td>
<td>0 tokens</td>
<td>31 tokens</td>
</tr>
<tr>
<td>nia&lt;sup&gt;2&lt;/sup&gt; South variant of 2&lt;sup&gt;nd&lt;/sup&gt; Sg.</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>qe&lt;sup&gt;4&lt;/sup&gt; South variant of ‘market’</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>tçoj&lt;sup&gt;1&lt;/sup&gt; South variant of ‘to plow’</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>ja&lt;sup&gt;6&lt;/sup&gt; South discourse marker</td>
<td>0</td>
<td>107</td>
</tr>
<tr>
<td>can&lt;sup&gt;3&lt;/sup&gt; South variant of ‘to play’</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>ndom&lt;sup&gt;3&lt;/sup&gt; South variant of ‘correct’</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>ef&lt;sup&gt;2&lt;/sup&gt; North variant of 1&lt;sup&gt;st&lt;/sup&gt; Sg.</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>jne&lt;sup&gt;2&lt;/sup&gt; North variant of 2&lt;sup&gt;nd&lt;/sup&gt; Sg.</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>tœe&lt;sup&gt;4&lt;/sup&gt; North variant of ‘market’</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>li&lt;sup&gt;4&lt;/sup&gt; North variant of ‘to plow’</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
Tone data in continuous speech

Praat script by Joy Zhong
TONE DATA IN CONTINUOUS SPEECH

Praat script by Joy Zhong
TONE DATA IN CONTINUOUS SPEECH

Praat script by Joy Zhong
DECLINATION EFFECTS?
ANTICIPATORY EFFECTS?

Example from Mandarin: Zhou et al. (2004:998)
cf. Ohala (1978); Liberman & Pierrehumbert (1984); Lee et al. (2002:88); Wong (1999)
THE IMPORTANCE OF THE LEFT SIDE

○ Mandarin tone recognition software
  ○ “We were able to find out experimentally that the carry-over effect from the left tone context is much more significant than the anticipatory effect from the right context” Lei (2006:105).

  ● Mandarin tone perception experiments - Huang & Holt (2009)
  ● Vietnamese tone recognition software - Nguyen et al. (2009), Trinh et al. (2005)
SPEECH RECOGNITION:
“MOVING-WINDOW” NORMALIZATION

- Peng & Wang (2005:54)
- Lee et al. (2002:92-3)
- Huang & Seide (2000)
- Chen et al. (1997)
Moving-Window Normalization (Peng & Wang 2005)

Adjust for pitch of an immediately preceding Tone 3, Tone 4 or Tone 5 (script written in R)
UNDERSHOOT / SPEECH RATE ISSUES

```
So he runs, for a while he runs runs away runs...
```
SUI free speech results
SUI FREE SPEECH RESULTS: COMPARING SPEECH STYLES

Free speech style
South speaker, N=227

Phrase-list style
South speaker, N=123
FREE SPEECH TONE RESULTS:
NORTH IN-MARRIED WOMEN VS SOUTH IN-MARRIED WOMEN

Speaker 6, from South,
Married 39 years in the Lu village

Speaker 1, from North,
Married 10 years in the Lu village
Free speech tones from 8 women who had married into a Lu-surnamed village (8+ years)

-Mean tone tracks representing 1,039 total tokens

4 women from South:

4 women from North:
Mean Tone 6 tracks for 8 speakers (141 tokens)
**Linear Mixed Effects modeling for mean of Tone 6**

1. Group: Southern vs. Northern
2. Speaker (as random effect)
3. Onset: voiced vs. voiceless
4. Onset: nasal vs. non-nasal
5. Coda type: open vs. closed (-m, -n, -ng)

Result: **Tone 6 was modeled as 0.974 semitones higher for women who married in from the South (p < 0.0001)**

- Southern Mean: 1.382 semitones
- Northern Mean: -0.473 semitones

No other significant factors (Rbrul step-up/step-down) (Johnson 2009)
CONCLUSION FOR FREE SPEECH ANALYSIS

- Hypothesis confirmed for Tone 6: In-married Sui women maintain their original tone variant regardless of speech style

- Unlike prior work on dialect acquisition and lifespan change (e.g. Siegel 2010; Sankoff & Blondeau 2007)
2. Child dialect acquisition
“By the way, my mother’s dialect is not quite the same as mine... That’s how it is for most children growing up in Sui villages...”
“If [a child] speaks like her mother, the people in our village will laugh at her. They’d say that the child isn’t a member of this village. Then the child would feel very broken-hearted.”

-- A parent in a Sui village
CHILD DIALECT ACQUISITION

- Classic model:
  - Parent influence versus peer influence
    - Dichotomy
  - “In the great majority of cases that we have studied or encountered, children follow the pattern of their peers” (Labov 1991[1972]:304; Payne 1980)
What about non-Western, clan-oriented communities?

For Sui children:
- “Peer group” more than just peers
- “Parent group” doesn’t include both parents
- Instead: local clan versus outsider clan
**SUI CHILDREN IN THE STUDY**

<table>
<thead>
<tr>
<th></th>
<th>Home</th>
<th>Sex</th>
<th>Age</th>
<th>Mother</th>
<th>Father</th>
</tr>
</thead>
<tbody>
<tr>
<td>#9</td>
<td>North</td>
<td>F</td>
<td>3</td>
<td>South</td>
<td>North</td>
</tr>
<tr>
<td>#10</td>
<td>North</td>
<td>M</td>
<td>4</td>
<td>Mixed</td>
<td>North</td>
</tr>
<tr>
<td>#12</td>
<td>North</td>
<td>M</td>
<td>10</td>
<td>South</td>
<td>North</td>
</tr>
<tr>
<td>#14</td>
<td>North</td>
<td>F</td>
<td>12</td>
<td>South</td>
<td>North</td>
</tr>
<tr>
<td>#16</td>
<td>North</td>
<td>F</td>
<td>10</td>
<td>South</td>
<td>North</td>
</tr>
<tr>
<td>#19</td>
<td>North</td>
<td>M</td>
<td>9</td>
<td>South</td>
<td>North</td>
</tr>
<tr>
<td>#25</td>
<td>Midland</td>
<td>M</td>
<td>5</td>
<td>South</td>
<td>Midland</td>
</tr>
<tr>
<td>#27</td>
<td>Midland</td>
<td>F</td>
<td>4</td>
<td>South</td>
<td>Midland</td>
</tr>
</tbody>
</table>
Woman living in her husband’s village for 16 years:
My son says $ei^2$ ($1^{st}$ sg.), but I say $i^2$. I say $maat^8$ (socks), but here they say $jo^1$... Even after being here a long time, I still say $i^2$

Another in-married woman::
When women marry into this village and have children and raise children, they will tell their children to speak like the father.
me² tsop⁷ ni⁴, aw¹ tsop⁷ pu⁴

*not be.like mother should be.like father*

“[When you speak] don’t be like your mother; be like your father.”
CHILDREN AND LEXICAL TONE

- Tone acquired earlier than segmental phonology

- Tone mastered before 2 years old
10 Year-old North girl
(has a South mother)

Non-mobile South Speakers

Non-mobile North Speakers
10 Year-old North boy (has a South mother)

Non-mobile North Speakers

Non-mobile South Speakers
5 Year-old Midland Boy (has a South mother)

Non-mobile Midland Speakers

Non-mobile South Speakers
15 TOKENS, DIVIDED BY WORD

(a) [fan]  N=3
(b) [ngan]  N=3
(c) [mom]  N=6
(d) [tsu]  N=2
(e) [ngan]  N=1
3 Year-old North girl (has a South mother)

Non-mobile North Speakers

Non-mobile South Speakers

Non-mobile North Speakers
CHILDREN’S LEXICAL RESULTS

- Primarily patrilectal for most children
- Some mixing of patrilect and matrilect, especially in younger ages
- Teenage years: Almost entirely patrilectal
3 year-old North girl

Interviewer: *What is this called? [points to a sock]*

Mother: *Say it...*

*Speaker #9: *ma:t* [‘sock’, North variant]*

Interviewer: *Say it again...?*

Mother*[whispering into child’s ear]:* *jo* [‘sock’, South variant]*

*Speaker #9: *ma:t* [‘sock’, North variant]*
29 year-old mother:
...My children aren’t willing to speak [like me]. People in the village would always laugh at them....People would laugh at us -- tease us all the time.
Interviewer: Do you think you speak like your father or your mother?

12 year-old girl: When I was little, I spoke like our mother. Now that I’m older, I speak like our father. ...When I was 4 years old, I spoke like our mother. When I was 7 years old, I spoke like our father.
Interviewer: Why did you change?

12 year-old girl: People would always tease me – they always laughed at me... [They said,] “You’re old now, but you [still] speak like your mother! You’re in Ljong, but you speak like Dong...?”
16 year-old girl: If I spoke like my mother, then other children would laugh at me, so I felt afraid.
16 year-old girl: If I spoke like my mother, then other children would laugh at me, so I felt afraid.

15 year-old boy: If they see you behaving that way, they’ll tell stories about you, “You speak like your mother, but you’re here in your father’s region!”
SUI CHILDREN AND DIALECT ACQUISITION

- Dichotomy of parent influence versus peer influence?
  = a special case of a more general rule

  - More generally: Children select a particular group as primary identity
  - Children have an “outward orientation” in language learning (Labov 2012)
“...the human language learning capacity is outward bound, that is, aimed at the acquisition of the general pattern used in the speech community...”
-Labov (2012)

“Children accept the linguistic forms of their parents only when they are convinced that their parents are representative of the broader speech community...”
-Labov (2012)
SUMMARY

Sui in-marrying women maintain their original dialects to a very high degree.

Sui children acquire the local dialect/patrilect:
- Very young children show some influence of the matrilect.
- By age 7-9, most features are patrilectal.
- Teenagers almost fully patrilectal.
SUI VARIATIONIST RESEARCH QUESTIONS

1. Adult dialect acquisition and lifespan change

2. Child dialect acquisition in multidialectal villages

3. Sui regional diffusion
3. SUI REGIONAL DIFFUSION

- How does diffusion occur in a clan-exogamous society?

- Sui mothers are simultaneously the primary caregivers and the primary agents of dialect contact in the village (?)
American English: Stability on a Large Scale

- North American English dialect patterns reflect “the enduring influence of the original regional patterns” of early settlers (Labov, Ash & Boberg 2006:303)
SUI: STABILITY ON A SMALL SCALE

Shuiyu Diaocha Baogao
-unpublished ms. 1956

Acquired from Jerold Edmondson
Shuiyu Diaocha Baogao
1956

Present day
Diphthongs in Shuiyu Diaocha Baogao 1956

Present day
Figure 8: 1st Singular in the current study. ● = [ei]; ▲ = [ai]; ★ = [εi]
● = [je]; ■ = [ju]; × = [jiu]; ◆ = [i]
**DIALECTOMETRY**

- Prior studies: 16%-38% of dialect variation is due to simple geographic distance (Nerbonne 2010, Kretzschmar et al. 2010)

- Will this be true for a small, clan-oriented indigenous society?
Levenshtein Distance (String-Edit Distance)

- Very strong correlations between Levenshtein distance and perceptions of dialects
  - Norwegian, Dutch, Danish and Chinese (Gooskens & Heeringa 2004; Heeringa 2004; Beijering, Gooskens & Heeringa 2008; Tang & van Heuven 2009)

- Consistent large-scale results in many societies (Nerbonne 2010; Kretzschmar et al. 2010; Heeringa & Nerbonne 2001)
Nerbonne (2010)
Sui dialectometry: “One size fits all?”
• 90-110 words per speaker
• 16 regions representing Sui society

Regional variation in:
- Lexical items
- Tone
- Vowels (-ien/-ian, -iə/-ia, -uə/-ua)
- Consonants
  (b-/ʔb, mə/-wə, q/-tə, ə/-hɬ-, kʰ/-x-, ɳ/-n)
Linear fit: $R^2=0.428$, $p<0.02$
Logarithmic fit: $R^2=0.415$, $p<0.02$

Overall, suggests long-term dialect diffusion (not “airtight” clan dialects)
“Paddy Adjusted Distance”: Humanistic Geography

| uncultivated land | contiguous paddy fields |

Figure 6. Example of satellite imagery of Sandu County: Rice paddy fields in contrast to uncultivated land (Google Earth, © 2011 GeoEye, 2011 Cnes/Sentinel Image, 2010 Mapabc).

Stanford 2012

cf. “Travel distances” in Norway (Gooskens 2005; Trudgill 1974)
ALGORITHM TO CALCULATE “LEAST COST” ROUTES THROUGH CULTIVATED LAND

Result: $R^2=0.444$, $p<0.02$
SUMMARY OF SUI DIALECTOMETRY:

- Long-term diffusion is likely occurring: not perfect patrilineal transmission of clan dialects
  - Clear geographic correlation
  - 42% correlations exceed the 16-38% range in other societies

- See Andy Castro (forthcoming) for more data points
• Sui mothers are simultaneously the primary caregivers and the primary agents of dialect contact in the village

• Are transmission and diffusion occurring at the same time in Sui households – with women as the pivotal players?
SUMMARY

- Background on variationist approaches to tone

- Case study of Sui
  1. Adult dialect acquisition and change across the lifespan
  2. Child dialect acquisition of clan dialects
  3. Regional dialect diffusion
APPENDIX: PRACTICAL APPLICATION

- An example from Lalo
- A quick “how-to” for socio-tonetic analysis
CENTRAL LALO (WEISHAN COUNTY, YUNNAN)
-data from Cathryn Yang & Yu Xiaoyao

Observing change-in-progress
- Weinreich, Labov & Herzog (1968)

Tone split in progress / tonogenesis?

Factors:
- Voiced/voiceless onset
- Age of speaker
- Gender
SOCIO-TONETICS: A PRACTICAL “HOW TO” GUIDE
1. Load your audio file into Praat, [http://www.fon.hum.uva.nl/praat/](http://www.fon.hum.uva.nl/praat/)
2. Click Annotate, To TextGrid
3. For “All tier names”, type “Token Speaker”
4. Select both “Sound my sample” and “TextGrid my sample”, click View & Edit
1. Load your audio file into Praat, http://www.fon.hum.uva.nl/praat/
2. Click Annotate, To TextGrid
3. For “All tier names”, type “Token Speaker”
4. Select both “Sound my sample” and “TextGrid my sample”, click View & Edit
5. Click Pitch, Show Pitch
Select a syllable. Press CTRL-N to zoom in, CTRL-O to zoom out.

Place boundaries around each tone (hit enter in the appropriate tier).

In the top tier, write the word and its tone number.

In the lower tier, write in the speaker number.
- Finish transcribing the rest of the sound file (duration of 10 minutes or less for each sound file)
- Save the TextGrid on your computer
Somewhere on your computer, save the script called “Praat pitch extraction script”

In Praat, select your sound file and your TextGrid file.

Click on the “Praat” tab, then Open Praat Script, find “Praat pitch extraction script”. Click Run.
A table of raw extracted pitches and raw times will appear on your computer in a txt file called “Praat_output.txt”

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</table>
NOW NORMALIZE THE DATA

- Open R (free download at www.r-project.org)

- On your computer, open the file “sociotonetics R scripts 8-3-2013.txt”

- Copy-and-paste it into R. Press enter.
Run the following function in R:

```r
> > myfile <- normalize(1,3)
```

Tone number of a (mid) level tone in your language

Number of files to upload together
Run the following function in R:

```r
> myfile <- normalizer(1,3)
```

Tone number of a (mid) level tone in your language

Number of files to upload together

If there are errors, go back to Praat, reopen your TextGrid file and audio file. Find typos or missing boundaries. Then re-run the Praat script.
Finished!

- In R, type “myfile” and hit enter to see your normalized file, including normalized pitches (semitones), speaker, word, onset, coda, and tone for each token.

```
> myfile
   Time Pitch Token_Number Speaker  Word Onset Coda Tone
 1   1  0.1614477926 1  1  laag8 l g  8
 2   2  0.1596080156 1  1  laag8 l g  8
 3   3  0.1577680430 1  1  laag8 l g  8
 4   4  0.1559278749 1  1  laag8 l g  8
 5   5  0.1540875112 1  1  laag8 l g  8
 6   6  0.1522469518 1  1  laag8 l g  8
 7   7  0.1504061967 1  1  laag8 l g  8
 8   8  0.1473378365 1  1  laag8 l g  8
 9   9  0.1454965594 1  1  laag8 l g  8
10  10 0.1436550864 1  1  laag8 l g  8
11  11 0.1418134175 1  1  laag8 l g  8
12  12 0.1399715526 1  1  laag8 l g  8
13  13 0.1381294918 1  1  laag8 l g  8
14  14 0.1362872350 1  1  laag8 l g  8
15  15 0.1344447821 1  1  laag8 l g  8
16  16 0.1326021331 1  1  laag8 l g  8
17  17 0.1307592879 1  1  laag8 l g  8
18  18 0.1289162466 1  1  laag8 l g  8
19  19 0.1270730090 1  1  laag8 l g  8
20  20 0.1252295752 1  1  laag8 l g  8
21  21 0.1233859451 1  1  laag8 l g  8
22  22 0.1215421186 1  1  laag8 l g  8
```
Now plot the data, run statistics, etc., with the software of your choice, such as R
To plot in R:

```r
> plot.tone(myfile, 6, 8, "red", 0)
```

Tone number to plot  Speaker number to plot
To plot in R:

```r
> plot.tone(myfile, 6, 8, "red", 0)
```
To plot multiple speakers together:

```r
> plot.tone(myfile, 6, 8, "red", 0)
> plot.tone(myfile, 6, 12, "blue", 5)
```

- **Tone number to plot**
- **Speaker number to plot**
- Adds a bit of space between standard deviation bars
To plot multiple speakers together:

```r
> plot.tone(myfile, 6, 8, "red", 0)
> plot.tone(myfile, 6, 12, "blue", 5)
```

- Tone number to plot
- Speaker number to plot
- Adds a bit of horizontal space between standard deviation bars
Or for Excel –

- Export the data from R to your computer:

```r
> write.table (myfile, file.choose(), sep="\t", row.names=F)
```
ACKNOWLEDGEMENTS

Selected References


Stanford, James N. (2008a). A sociotonetic analysis of Sui dialect contact. Language Variation


