Consonants and tones: A view from two Tibeto-Burman languages.

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This project is supported by Strategic Japanese-Swiss Science and Technology Programme of JSPS and SNSF.
Segments and Tone: Issues

• The relationships between segments and tones have posed an interesting challenge to phonological theorization (Yip 2002)

  • There do not seem to be any languages in which tones are contrastive on consonants.
  
  • F0 differences due to phonological tonal contrasts manifest themselves most clearly during vowels.
  
  • These observations seem to suggest that tones should be phonologically associated with vowels.
Segments and Tone: Issues

• Consonants can interact with tones in non-trivial ways:
  
  • Only H-tones are allowed after aspirated consonants in Dränjongke (van Driem 2001).
  
  • Consonants need to have some relationship with tonal features (cf. Bradshaw 1992)

• Lee’s (2008) proposal:
  
  • (i) tones can be directly associated with consonants phonologically, but
  • (ii) there are no faithfulness constraints that protect underlying tonal specifications on consonants.
Segments and Tone: Issues

• Predictions by Lee’s xTBU theory (2008):

  • Consonants can be tonal targets at the phonetic level, a prediction which remained to be tested.
  • Testing the targets is possible when we look into syllables with a sonorant onset.
Aims

• We report phonetic data from two Tibeto-Burman languages—Dzongkha and Dränjongke—which show that this prediction made by Lee (2008) is in fact born out.

• We propose phonological representations that account for the tonal realization patterns in these languages, and develop an Optimality Theoretic (Prince & Smolensky 2004) analysis to derive these representations.
Phonetic data

• Our on-going research on Dränjongke and Dzongkha (both Tibeto-Burman languages) has examined the tonal realization patterns in CV-syllables (Lee et al. 2018a, b).

• In syllables such as [na] and [la], both Dränjongke and Dzongkha speakers show a clear f0 separation between H-toned and L-toned syllables during onset sonorant intervals.

• Some speakers of Dränjongke even neutralize the difference during the vowel intervals.
Dränjongke (Lee et al. 2018a)

• Much of the difference between the H-toned and L-toned tokens appears during the consonantal syllables (the first 10 pitch frames).

• For Speakers 2, 3, 5, 6, 8, 9, 10, the f0 differences appear to be neutralized—not observed—during the vocalic intervals (the last 10 pitch frames).
Dzongkha (Lee et al. 2018 b):
Analysis of sounds in van Driem & Tschering (2015)
Proposal: Phonological representation

• (1a) for those speakers who show tonal differences during consonants only

• (1b) for those speakers who show f0 differences during both consonants and vowels.
Proposal: Phonological representation

• Both in Dzongkha and Dränjongke, different types of obstruents affect the f0 of the following vowels in different ways.

  • In both languages, for example, f0 is higher next to aspirated consonants than next to voiced consonants.
  • We propose that these patterns also follow from the representation in (1a).
An OT analysis: Constraints

• **ALIGN-L(T, σ)**
  - An alignment constraint which requires tonal features to be aligned with the left edge of syllables.

• **TONETOVOWEL**
  - A constraint that requires tonal features to be associated with a vowel.

• **MULTIPLELINK**
  - A constraint that prohibits autosegmental multiple-linking.
An OT analysis: Ranking for C\textsuperscript{[+son]}V syllables

• The ranking ALIGN-L(T, σ), *MULTIPLELINK ∪ TONETOVOWEL yields the representation in (1a)

• The ranking ALIGN-L(T, σ), TONETOVOWEL ∪ *MULTIPLELINK yields the representations in (1b)

• The ranking *MULTIPLELINK, TONETOVOWEL ∪ ALIGN-L(T, σ) yields the representations in (1c)
An OT analysis: Ranking (1a) as the winner

<table>
<thead>
<tr>
<th></th>
<th>ALIGN-L(T, σ)</th>
<th>*MULTIPLELINK</th>
<th>TONEToVOWEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>-&gt;</td>
<td>(a)</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>(b)</td>
<td>* W</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>(c)</td>
<td>* W</td>
<td>L</td>
</tr>
</tbody>
</table>

(a) \( \sigma \) \( \text{C V} \) \( \text{T} \) 
(b) \( \sigma \) \( \text{C V} \) \( \text{T} \)
An OT analysis: Ranking (1b) as the winner

<table>
<thead>
<tr>
<th></th>
<th>ALIGN-L(T, σ)</th>
<th>ToneToVowel</th>
<th>*MultipleLink</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td></td>
<td>* W</td>
<td>L</td>
</tr>
<tr>
<td>-&gt;</td>
<td>(b)</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>(c)</td>
<td>* W</td>
<td></td>
<td>L</td>
</tr>
</tbody>
</table>

(a) and (b) diagrams show the structure of the linguistic analysis.
An OT analysis: Ranking (1c) as the winner

<table>
<thead>
<tr>
<th></th>
<th>*MULTIPLELINK</th>
<th>TONE TO VOWEL</th>
<th>ALIGN-L(T, σ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td></td>
<td>*W</td>
<td>L</td>
</tr>
<tr>
<td>(b)</td>
<td>*W</td>
<td></td>
<td>L</td>
</tr>
<tr>
<td>-&gt; (c)</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

(a) \[ \text{C \ V} \]
(b) \[ \text{C \ V} \]

\[ \text{T} \]
F0 in $C_{[-\text{son}]}V$ syllables
An OT analysis: Ranking for $C_{-\text{son}}V$ syllables

• Two other constraints
  • A constraint that coerces particular types of obstruents to have particular tonal features (e.g. aspirated consonants need to be associated with H-tone: ASPToHIGH).
  • A constraint that requires tonal features be associated with some [+son] segments (TONETOSON).

• These constraints dominate *MULTIPLELINK, thereby forcing the $C_{-\text{son}}V$ syllables to have the representation in (1b).
An OT analysis: Ranking C[-son]V syllables

<table>
<thead>
<tr>
<th></th>
<th>AspToHigh</th>
<th>Align-L(T, σ)</th>
<th>ToneToSon</th>
<th>*MultipleLink</th>
<th>ToneToVowel</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) pʰa</td>
<td></td>
<td></td>
<td>*W</td>
<td>L</td>
<td>*W</td>
</tr>
<tr>
<td>-&gt;</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>(b) pʰá</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>(b’) pʰà</td>
<td>*W</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

- (a) High tone is linked to the onset consonant only.
- (b) High tone is linked to the onset and the vowel (i.e. the syllable).
- (b’) Low tone is linked to the onset and the vowel (i.e. the syllable).
Discussion

- Tang
- Perkins
- Bradshaw
ABC-Q theory (Inkelas & Shih)

• How to account for consonant-tone interaction without an autosegmental representation.
Conclusion

• Complex interactions of violable constraints account for the tonal manifestation patterns in the two Tibeto-Burmese languages.
Acknowledgements

• This project is supported by Strategic Japanese-Swiss Science and Technology Programme of JSPS and SNSF.
• We thank George van Driem, Selin Grollman, Pascal Gerber and Julián Villegas for comments.
• We also Hanna Kaji and Haruka Tada who annotated the Dzongkha data.
References

• Bradshaw, Mary
• Perkins, Jeremy
• Tang, Kathy (2008)