Acoustic Evidence for Multiple, Quantity-Sensitive Stress in Chukchansi Yokuts

PETER ARA GUEKGUEZIAN
DEPT OF LINGUISTICS, UNIVERSITY OF SOUTHERN CALIFORNIA
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Overview

Conflicting previous accounts of stress in Chukchansi Yokuts

Finding: Multiple, Quantity-Sensitive stress

Penult = primary stress

Pre-penult CVV, CVC (= heavy) = secondary stress
Background
Chukchansi Yokuts

Chukchansi: member of Yokuts language family

**Highly endangered:** fewer than 10 speakers

Yokuts morphophonology, phonotactics: well-studied


Yokuts **stress: not well-studied**, conflicting reports

Newman 1944; Collord 1968; Mello 2012; Guekguezian to appear
Previous Work

Previous studies differ on three points ...

1. Multiple stresses per word?
2. Quantity-sensitive?
3. CVC = heavy?

... and agree on one point

1. Penults stressed, ultimas not stressed (in general)
## Previous Work

<table>
<thead>
<tr>
<th>Author</th>
<th>Multiple Stresses?</th>
<th>Quantity Sensitive?</th>
<th>CVC = Heavy?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newman</td>
<td>NO</td>
<td>NO</td>
<td>N/A</td>
</tr>
<tr>
<td>Collord</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Guekquezian</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Mello</td>
<td>N/A</td>
<td>YES</td>
<td>NO*</td>
</tr>
</tbody>
</table>
Previous Work

**No acoustic evidence**: Newman, Collord, Guekguezian

Mello (2012) gives acoustic evidence

- Phonetic correlates: *pitch* and *intensity*

Limitations of Mello (2012):

- Mostly *restricted* to di- and trisyllabic words
- Most words recorded in *isolation*
Goals

**Adjudicate** between conflicting accounts
   Multiple stresses, quantity-sensitivity, CVC weight

Provide more **acoustic evidence**
Present Study
Questions

1. Penult: always stressed regardless of syllable weight?

2. Any stress before the penult?
   a. Conditioned by syllable position or weight?
   b. CVC = Heavy?
Recording

Single native speaker (female, born 1941)
Bilingual in Chukchansi and English (primary)
Recorded on H4N Zoom Handy Recorder
   Microphone on stand
Analyzed in Praat (Boersma + Weenink)
Acoustic Evidence

Pitch (F0) and Intensity

Correlates of stress in Chukchansi (Mello 2012)
Generally correlates of stress (Fry 1955, Beckman 1986)

Measurements: average across vowel
Vowel boundaries determined by formants
Penult vs. Antepenult

Question 1: Biggest pitch, intensity peak on penult? Regardless of syllable weight?

Comparison: Penult vs. Antepenult

Conditions: CV vs. CVV; CV vs. CVC
Pre-penult

Question 2: *Earlier* pitch, intensity peaks? Determined by syllable *position or weight*?

Comparison: Antepenult vs. Pre-antepenult

Conditions: **CV** vs. **CVV**; **CV** vs. **CVC**
### Four Conditions

<table>
<thead>
<tr>
<th>Question</th>
<th>Conditions</th>
<th>Item 1</th>
<th>Item 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak on Penult?</td>
<td>CV vs. CVV</td>
<td>CV.CVV.σ</td>
<td>CVV.CV.σ</td>
</tr>
<tr>
<td></td>
<td>CV vs. CVC</td>
<td>CV.CVC.σ</td>
<td>CVC.CV.σ</td>
</tr>
<tr>
<td>Earlier Peaks?</td>
<td>CV vs. CVV</td>
<td>CV.CVV.σ.σ</td>
<td>CVV.CV.σ.σ</td>
</tr>
<tr>
<td></td>
<td>CV vs. CVC</td>
<td>CV.CVC.σ.σ</td>
<td>CVC.CV.σ.σ</td>
</tr>
</tbody>
</table>
Targets

Target Pairs = Syllable Contrast

Largely controlled for segmental quality

CV vs. CVC: [mo.yin.hil] vs. [mon.de.hil]

CV vs. CVV: [loo.lo.lo.taʔ] vs. [ʔo.yoo.lo.taʔ]
Context

Embedded in **carrier sentences**

No phrasal stress effects

[mo.yin.hil] “got tired”

Lagyiw [moyinhil] muula’

Yesterday got tired mule

“Yesterday the mule got tired”
Data
Condition 1

Biggest pitch, intensity peak on penult?

Effect of syllable quantity: $CV$ or $CVV$?

$CVV.CV.\sigma$ vs. $CV.CVV.\sigma$

[maa.mi.la] vs. [ma.naa.lit]
### Condition 1

<table>
<thead>
<tr>
<th>Syllable</th>
<th>[maa.MI.la]</th>
<th></th>
<th>[ma.NAA.lit]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vowel</td>
<td>Pitch</td>
<td>Intensity</td>
<td>Vowel</td>
</tr>
<tr>
<td>Antepenult</td>
<td>Maa</td>
<td>199.3</td>
<td>49.73</td>
<td>Ma</td>
</tr>
<tr>
<td>Penult</td>
<td>MI</td>
<td>211.4</td>
<td>52.28</td>
<td>NAA</td>
</tr>
</tbody>
</table>

**Finding:** biggest peak always on penult

**No effect of syllable quantity**

[maa.MI.la]; [ma.NAA.lit]
Condition 1: [maa.MI.la]
Condition 1: [ma.NAA.lit]
Condition 2

Biggest pitch, intensity **peak on penult**?

Effect of syllable quantity: **CV** or **CVC**?

**CVC.CV.σ** vs. **CV.CVC.σ**

**[mon.de.hil]** vs. **[mo.yin.hil]**
Condition 2

Finding: biggest peak always on **penult**

No effect of syllable quantity

<table>
<thead>
<tr>
<th>Syllable</th>
<th>[mon.DE.hil]</th>
<th>[mo.YIN.hil]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vowel</td>
<td>Pitch</td>
</tr>
<tr>
<td>Antepenult</td>
<td>Mon</td>
<td>211</td>
</tr>
<tr>
<td>Penult</td>
<td>De</td>
<td>215.6</td>
</tr>
</tbody>
</table>
Condition 3

Earlier pitch, intensity peaks before penult?

Determined by syllable position or weight (CV or CVV)?

CVV.CV.σ.σ vs. CV.CVV.σ.σ

[loololo.ta?] vs. [ʔo.yoo.lo.ta?]
Condition 3

<table>
<thead>
<tr>
<th>Syllable</th>
<th>([\text{LOO}.\text{lo}.\text{lo}.\text{ta}?])</th>
<th>([\text{?o.YOO}.\text{lo}.\text{ta}?])</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vowel</td>
<td>Pitch</td>
</tr>
<tr>
<td>Pre-antepenult</td>
<td>Loo</td>
<td>197.9</td>
</tr>
<tr>
<td>Antepenult</td>
<td>Lo</td>
<td>188.6</td>
</tr>
</tbody>
</table>

Finding: *earlier peak* before penult

Determined by syllable *quantity*, not position

\([\text{LOO}.\text{lo}.\text{lo}.\text{ta}?]\); \([\text{?o.YOO}.\text{lo}.\text{ta}?]\)
Condition 3: [LOO.lo.lo.ta?]
Condition 3: [Po.YOO.lo.ta?]
Condition 4

**Earlier** pitch, intensity peaks before penult?

Determined by syllable **position or weight** (CV or CVC)?

CVC.CV.σ.σ vs. CV.CVC.σ.σ

[mon.de.mix.hil] vs. [mo.yin.mix.hil]
# Condition 4

<table>
<thead>
<tr>
<th>Syllable</th>
<th>[MON.de.mix.hil]</th>
<th>[mo.YIN.mix.hil]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vowel</td>
<td>Pitch</td>
</tr>
<tr>
<td>Pre-antepenult</td>
<td>Mon</td>
<td>220.8</td>
</tr>
<tr>
<td>Antepenult</td>
<td>De</td>
<td>218.7</td>
</tr>
</tbody>
</table>

**Finding:** *earlier peak* before penult

Determined by syllable *quantity*, not position

[MON.de.mix.hil] vs. [mo.YIN.mix.hil]
Analysis
Results

Conditions 1 & 2: **Position**, not **Weight**
- **Penult** = always stressed, not Antepenult
  - Regardless of syllable weight

Conditions 3 & 4: **Weight**, not **Position**
- **Pre-penult CVV, CVC** = always stressed, not CV
  - Regardless of syllable position
Interpretation

**Penult** CV = stress peak, not antepenult CVV, CVC

Pre-penult: **CVV, CVC** = stress peak, not CV

**Primary stress:** Penult

**Secondary stress:** Pre-penult CVV, CVC

**Unstressed:** Pre-penult CV
Conclusion

**Multiple stresses**
Penult and pre-penult CVV, CVC

**Quantity-sensitive** (secondary) stress
Pre-penult: CVV, CVC = stressed, CV = unstressed
THANK YOU!
Crucial Thanks

To my Chukchansi consultant **Holly Wyatt**, for her dedication to her native tongue and her good humor despite my annoying linguist questions

To my fellow researchers on Chukchansi at CSU Fresno, especially **Niken Adisasmito, Chris Golston and Daniel Mello** for their generous cooperation with data collection and discussion on Chukchansi stress

To my adviser, **Karen Jesney**, for her tireless feedback

To the **PhonLunch** audience at University of Southern California
Selected References


Guekguezian, Peter. to appear. The great Chukchansi Yokuts iambic conspiracy. in *Supplemental Proceedings of Phonology 2014*. LSA.


Next Steps

Secondary stress in [CVC.σ.σ], [CVV.σ.σ]?  
Contrast with [CV.σ.σ]?  

Stress on ultima?  
Contrast: [σ.CV] vs. [σ.CVC]?  

Pitch contour as acoustic correlate of stress?