Sonority restricts laryngealized plosives in Southern Aymara

Paola Cépeda & Michael Becker
Department of Linguistics, Stony Brook University
paola.cepeda@stonybrook.edu
The sonority curve in Southern Aymara

Distribution of non-initial laryngealized plosives
Roadmap

• Description of the distribution of non-initial laryngealized plosives in Büttner & Condori’s (1984) dictionary.

• Analysis: a stringent constraint family for the sonority hierarchy in root-initial segments + a positional constraint demanding leftward orientation for laryngeal features.

• A MaxEnt model using the conjunction of these constraints generates half of the sonority curve.

• The unconjoined positional constraint completes the model.

• Comparison with a UCLAPL model (Hayes & Wilson 2008), whose constraints do not necessarily target the sonority hierarchy.

• Conclusions
Southern Aymara

- Aymara (or Jaqi) is an Andean family of languages which includes Southern Aymara, Jaqaru, and Kawki.
- Currently, Southern Aymara is spoken in Southern Peru, Northern Chile and Western Bolivia.
## Inventory

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>i</td>
<td>u</td>
</tr>
<tr>
<td>Low</td>
<td>a</td>
<td></td>
</tr>
</tbody>
</table>

### Phonemes

- **Labial**
  - Plain plosives: p, t, 𝓽, k, q
  - Aspirated plosives: pʰ, tʰ, 𝓽ʰ, kʰ, qʰ
  - Ejective plosives: p', t', 𝓽', k', q'
- **Alveolar**
  - Fricatives: s, x, χ
  - Nasals: m, n, ŋ
  - Laterals: l, r
  - Glides: w, j, w
- **Palatal**
- **Velar**
- **Uvular**

### Glides

- Laryngealized plosives

### Phonaesthetics

- Front: i, u, a
- Back: u, a

- High: i, u
- Low: a
Lowest sonority: Initial plosives

**Left orientation of laryngealized plosives** (Landerman 1994) (99%)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>[ʧʰaqa] ‘to get lost’</td>
<td>b.</td>
</tr>
<tr>
<td></td>
<td>but *[ʧaqʰa]</td>
<td></td>
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</tbody>
</table>

**Laryngeal assimilation with homorganic plosives** (Landerman 1994; Cerrón-Palomino 2000) (99%)

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<table>
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<th></th>
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</thead>
<tbody>
<tr>
<td>a.</td>
<td>[ʧatʃa] ‘husband’</td>
<td>b.</td>
</tr>
<tr>
<td></td>
<td>but *[ʧ'atʃa] *[ʧʰatʃa]</td>
<td></td>
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</tbody>
</table>

**Synchronic result:**
Very few internal laryngealized plosives in plosive-initial roots
## Highest sonority: Initial vowels

### Historical Epenthesis: \( \emptyset \rightarrow [\text{h}] \rightarrow [\text{x}] \) (Landerman 1994; Cerrón-Palomino 2000) (98%)

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>a.</td>
<td>*[apa] ( \rightarrow ) [apa]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‘take’</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>*[atʃ’a] ( \rightarrow ) *[hatʃ’a] ( \rightarrow ) [xatʃ’a]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‘big’</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>*[atʰa] ( \rightarrow ) *[hatʰa] ( \rightarrow ) [xatʰa]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‘seed’</td>
<td></td>
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</tbody>
</table>

### Etymological \( [\text{h}] \rightarrow [\text{x}] \) (Cerrón-Palomino 2000)

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<tr>
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<tbody>
<tr>
<td>a.</td>
<td>*[haqe] ( \rightarrow ) [xaqe]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‘person’</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>*[haru] ( \rightarrow ) [xaru]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‘bitter’</td>
<td></td>
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<tr>
<td>c.</td>
<td>*[hawi] ( \rightarrow ) [xawi]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‘flow’</td>
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</tbody>
</table>

### Synchronic result:

Very few internal laryngealized plosives in vowel-initial roots
Lexicon study

- 1,968 disyllabic roots from Büttner & Condori’s (1984) dictionary of Puno Southern Aymara (Peru)

- The sonority curve:
  - Plosive-initial roots (8%)
  - Fricative-initial roots (37%)
  - Nasal-initial roots (34%)
  - Glide-initial roots (24%)
  - Vowel-initial roots (9%)
## Root-initial sonority hierarchy

### Onset Hierarchy (Dell & Elmedlaoui 1985)

<table>
<thead>
<tr>
<th>Onset/Plo</th>
<th>Onset/Fri</th>
<th>Onset/Nas</th>
<th>Onset/Liq</th>
<th>Onset/Gli</th>
<th>No Onset</th>
</tr>
</thead>
</table>

### Stringent Hierarchy (following De Lacy 2003)

- **Onset/\{Vow\}**
- **Onset/\{Vow, Gli\}**
- **Onset/\{Vow, Gli, Liq\}**
- **Onset/\{Vow, Gli, Liq, Nas\}**
- **Onset/\{Vow, Gli, Liq, Nas, Fri\}**
- **Onset/\{Vow, Gli, Liq, Nas, Fri, Plo\}**
Sonority + laryngealized plosive

**CONJUNCTION** (following Smolensky 1995)

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{*Onset}/{\textit{Vow}} &amp; \textit{C}OIN\textit{C}I\textit{D}E</td>
<td>Assign one violation mark to every laryngeal feature occurring in non-initial position.</td>
</tr>
<tr>
<td>\textit{*Onset}/{\textit{Vow}, \textit{Gl}i} &amp; \textit{C}OIN\textit{C}I\textit{D}E</td>
<td></td>
</tr>
<tr>
<td>\textit{*Onset}/{\textit{Vow}, \textit{Gl}i, \textit{Liq}} &amp; \textit{C}OIN\textit{C}I\textit{D}E</td>
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<td>\textit{*Onset}/{\textit{Vow}, \textit{Gl}i, \textit{Liq}, \textit{Nas}} &amp; \textit{C}OIN\textit{C}I\textit{D}E</td>
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<tr>
<td>\textit{*Onset}/{\textit{Vow}, \textit{Gl}i, \textit{Liq}, \textit{Nas}, \textit{Fri}} &amp; \textit{C}OIN\textit{C}I\textit{D}E</td>
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</tr>
</tbody>
</table>

\textbf{COIN\textit{C}I\textit{D}E} (McCarthy 2003)
Model # 1 in MaxEnt Grammar

- Using the MaxEnt Grammar Tool (Wilson 2006), we trained a model on the Southern Aymara lexicon using the constraint conjunction family.

- The model was unable to replicate the sonority curve.
**Positional constraint**

<table>
<thead>
<tr>
<th><strong>COINCIDE</strong> (McCarthy 2003)</th>
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<td>Assign one violation mark to every laryngeal feature occurring in non-initial position.</td>
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Model # 2 in MaxEnt Grammar

- We trained a new MaxEnt model on the lexicon using the constraint conjunction family and COINCIDE.
- The model matches the lexical statistics very closely and generates the expected sonority curve.
Using the UCLA Phonotactic Learner (Hayes & Wilson 2008), we trained a model on the lexicon and a testing list of 16,866 real and nonce disyllabic roots.

Reporting on the difference in probability, non-initial laryngealized plosives are predicted to be less probable in:
- **Plosive**-initial roots (-9%)
- **Fricative**-initial roots (-7%)
- **Vowel**-initial roots (-7%)
Conclusions

• We have identified a previously unknown generalization on the distribution of non-initial laryngealized plosives in Southern Aymara roots.

• By using stringent constraints for the sonority hierarchy and a restriction on the position of the laryngeal features in a root, we have offered an analysis that predicts the acceptability of non-initial laryngealized plosives in novel roots.

• We are currently preparing to test these predictions with a nonce word rating task (wug test; Berko 1958) with native Southern Aymara speakers in Puno (Peru).
References


¡Yusulupay!
Thank you!

paola.cepeda@stonybrook.edu