Shiraho Devoicing and Pitch Accent

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Overview

1. Brief Overview of Ryukyuan Languages
2. Shiraho Background
3. Pitch Accent and Devoicing
4. Phonological Constraints
5. Diachronic Hints
6. Conclusions
Minimally 5 languages under the “dialect chain” definition (Serafim, 2008)

But boundary between language and dialect unclear

Pellard (2013)
Language Diversity

- **Japanese:** doko=e ik-u=no
- **Shuri Okinawan:** maa=nkai ic-u=ga
- **Miyara Yaeyaman:** zima=ge=du har-u
- **Taketomi Yaeyaman:** maa=i=du har-i=ja
- **Shiraho Yaeyaman:** za=go=du ng-o
- **Yonaguni:** nma=nki hir-u=ŋa

**Gloss:** where=to(=FOC) go-PRS(=Q)

**Translation:** Where are you going?
Endangered Status

- Youngest speakers of most languages 70-80
- A few have speakers as young as 40 (Miyara)
- Difficult to make exact count of number of speakers, due to difficulty of division between language and dialect and no surveys of who is a speaker
- No children are learning the language
- However, an Okinawan language nest has opened in Naha, the capital of Okinawa Prefecture
Profile of Shiraho

- Native name *Ssabu-muni*
- Spoken in Shiraho Village in southeast part of Ishigaki Island
- Most speakers are over 80
- Estimating from the population of Shiraho Village (1,580) and population over 75 in Ishigaki District (Ishigaki City, 2010), a healthy estimate is ~120 speakers
- Likely split from Hateruma ~240 years ago
Map of Yaeyama Islands

Yaeyama Islands 八重山諸島

Yonaguni 与那国島
Iriomote 西表島
Kohama 小浜島
Hatoma 鳥取島
Kuro 黒島
Taketomi 竹富島
Hateruma 波照間島
Shiraho 石垣島
## Phoneme Inventory

### Consonants

<table>
<thead>
<tr>
<th></th>
<th>Bilabial</th>
<th>Dental</th>
<th>Alv/Pal</th>
<th>Velar</th>
<th>Glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stop</strong></td>
<td>p, b</td>
<td>t, d</td>
<td>k, g</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fricative</strong></td>
<td>φ</td>
<td>s ~ ɕ, z ~ dʑ</td>
<td></td>
<td>h</td>
<td></td>
</tr>
<tr>
<td><strong>Affricate</strong></td>
<td></td>
<td>ts ~ tɕ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nasal</strong></td>
<td>m</td>
<td>n, (ŋ)</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Flap</strong></td>
<td></td>
<td>r ~ r</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Approximant</strong></td>
<td>w</td>
<td></td>
<td>j</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Adapted from Aso (2010)*

### Vowels

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Central</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td>i</td>
<td>(ɨ)</td>
<td>u</td>
</tr>
<tr>
<td><strong>Mid</strong></td>
<td>e</td>
<td></td>
<td>o</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td></td>
<td>a</td>
<td></td>
</tr>
</tbody>
</table>
Shiraho has a simple register system

- **Atonic**: relatively flat contour
- **Tonic**: first syllable high, followed by sharp pitch drop

- [\( \text{k}^\text{h}\text{an}\text{g}\text{a}_\text{n} \)] ‘mirror’
- [\( \text{p}^\text{h}\text{i}\text{n}^\prime\text{gu} \)] ‘soot’
Relevant Phonological Rules

- Morpheme-initial voiceless obstruents are aspirated
- Tonic word with (♯/¬)TVTV:
  - Nothing
  - The vowel devoices and pitch accent shifts right
  - The second consonant voices
- If replace second T with /m,n,r/ in tonic word
  - Nothing
  - Vowel & sonorant devoice, pitch accent shifts right
- Atonic words with the same environments have optional devoicing
- Devoicing also appears to occur in (some) high vowels following non-initial voiceless stops
### (#/-)TVTV sequences in tonic words

<table>
<thead>
<tr>
<th>UR</th>
<th>Nothing</th>
<th>Dev+Shift</th>
<th>Voice</th>
</tr>
</thead>
<tbody>
<tr>
<td>/pa’si-ka/</td>
<td>[pʰa’si-ka]</td>
<td>[pʰasî-ka’]</td>
<td>-</td>
</tr>
<tr>
<td>‘20th day’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/e’ni-kʰa’ta/</td>
<td>-</td>
<td>[e’nikʰa’ta’]</td>
<td>-</td>
</tr>
<tr>
<td>‘way of saying’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/ki’pari-ami/</td>
<td>-</td>
<td>[kʰipa’riami]</td>
<td>[kʰi’barami]</td>
</tr>
<tr>
<td>‘mist’</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### (#/-)TVSV sequences in tonic words

<table>
<thead>
<tr>
<th></th>
<th>UR</th>
<th>Nothing</th>
<th>Dev+Shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>/sɪ’nu/</td>
<td></td>
<td>[s(h)ɪ’nu]</td>
<td>[s^hɪ’nu’]</td>
</tr>
<tr>
<td>‘yesterday’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/pi’ra/</td>
<td></td>
<td>-</td>
<td>[pʰɪra’]</td>
</tr>
<tr>
<td>‘spatula’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/sa’no/</td>
<td></td>
<td>[s(h)a’no]</td>
<td>-</td>
</tr>
<tr>
<td>‘didn’t do’</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Atonic Words

<table>
<thead>
<tr>
<th></th>
<th>UR</th>
<th>Nothing</th>
<th>Devoice</th>
</tr>
</thead>
<tbody>
<tr>
<td>/tanumi/</td>
<td>[tʰanumi]</td>
<td>[tʰənumi]</td>
<td></td>
</tr>
<tr>
<td>‘request’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/kutaro/</td>
<td>[kʰutaro]</td>
<td></td>
<td>[kʰʊtaro]</td>
</tr>
<tr>
<td>‘came’</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Constraints

- $*\hat{V}$: Undominated, voiceless segments cannot carry tone
- Three lower constraints working against one another
  - $*T^hVT$: Language independent, phonetically motivated by heavy aspiration on $T^h$ spreading to vowel alongside devoicing between two voiceless stops
  - IDENT$_{IO}$ (C,VOI): Faithfulness of consonant voicing
  - ALIGN-L: Pitch accent must be as far left as possible
# OT Example

### Shiraho Devoicing and Pitch Accent

**Tyler Lau**

**Brief Overview of Ryukyuan Languages**

**Shiraho Background**

**Pitch Accent and Devoicing**

**Phonological Constraints**

**Diachronic Hints**

**Conclusions**

**References**

## OT Example

### Input: `/pa’tu/ ‘dove’`

<table>
<thead>
<tr>
<th></th>
<th><code>*V</code></th>
<th><code>*ThVT</code></th>
<th>Ident-IO (c, voi)</th>
<th>Align-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. <code>ph’a’tu</code></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. <code>ph’atu</code></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>c. <code>ph’a’du</code></td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

### Input: `/tu’sιki/ ‘10 months’`

<table>
<thead>
<tr>
<th></th>
<th><code>*V</code></th>
<th>Align-L</th>
<th>Ident-IO (c, voi)</th>
<th>*ThVT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. <code>thu’sιki</code></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. <code>thu’sιki’</code></td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>c. <code>thu’zιki</code></td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>
## OT Example

<table>
<thead>
<tr>
<th>Input: /ki’pari-ami/</th>
<th>*( V )</th>
<th>*( ThVT )</th>
<th>IDENT-IO ((c, voi))</th>
<th>ALIGN-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ( k^h_i’pari ami )</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. ( k^h_i’pa’ri ami )</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>c. ( k^h_i’bari ami )</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input: /ki’pari-ami/</th>
<th>*( V )</th>
<th>*( ThVT )</th>
<th>ALIGN-L</th>
<th>IDENT-IO ((c, voi))</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ( k^h_i’pari ami )</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. ( k^h_i’pa’ri ami )</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>c. ( k^h_i’bari ami )</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
Why the variation?

- By far, devoice and shift is most common fix
- Why the other two fixes?
- Diachronic?
Macro-Yaeyama Subfamily

Modified from Kajiku (1984, 300)
Voicing as a Fix

Voicing may be related to process of **medial voicing**

Compare forms from related varieties

<table>
<thead>
<tr>
<th>Gloss</th>
<th>Shiraho</th>
<th>Hateruma</th>
<th>Miyara</th>
<th>Ishigaki</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘groom’</td>
<td>mugu</td>
<td>mugu</td>
<td>muku</td>
<td>muku</td>
</tr>
<tr>
<td>‘potato’</td>
<td>anga</td>
<td>agan</td>
<td>akkon</td>
<td>akkon</td>
</tr>
<tr>
<td>‘to be warm’</td>
<td>nugu-čan</td>
<td>noo-san</td>
<td>nuku-hoon</td>
<td>nus-saan</td>
</tr>
</tbody>
</table>

However, the voicing of /ki’pari-ami/ as [kʰi’bārāmι] is at odds with **fortition following voiceless obstruents**

<table>
<thead>
<tr>
<th>Gloss</th>
<th>Shiraho</th>
<th>Hateruma</th>
<th>Miyara</th>
<th>Ishigaki</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘to play’</td>
<td>asupun</td>
<td>asupun</td>
<td>asabun</td>
<td>asabun</td>
</tr>
<tr>
<td>‘paper’</td>
<td>kapi</td>
<td>kapi†</td>
<td>kab†</td>
<td>kab†</td>
</tr>
</tbody>
</table>

Unclear exactly what is going on...
Lack of Devoicing + Shift

- From my knowledge, very few words with target environment do not undergo devoicing and shift
- **Argument:** The holdouts are words with historically long initial vowels
- First, let’s look at the question of vowel length distinction
Vowel Length Distinction

- In Lau (2013), I argue there is no vowel length distinction.
- Phonetic test compared ratio of duration of “long” to “short” vowels in Shiraho with ratio in Miyara Yaeyaman and Japanese, two languages with vowel length distinction.
- ANOVA showed significant effect of language on ratio of “long” to “short” vowels ($F_{2, 222} = 46.18, p < .001$).
- Posthoc Tukey’s HSD showed:
  - Shiraho - Miyara $[p < .001]$
  - Shiraho - Japanese $[p < .001]$
  - Miyara - Japanese $[p = 0.71]$
Means and Standard Deviations of Ratios by Language

- **Shiraho**
  - Devoicing and Pitch Accent
  - Tyler Lau

**Brief Overview of Ryukyuan Languages**

- **Shiraho Background**
- **Pitch Accent and Devoicing**
- **Phonological Constraints**
- **Diachronic Hints**
- **Conclusions**
- **References**

**Means and Standard Deviations of Ratios by Language**

- **Japanese**
  - $n = 77$
  - $\mu = 2.84$
  - SD = 0.76

- **Miyara**
  - $n = 59$
  - $\mu = 2.73$
  - SD = 0.85

- **Shiraho**
  - $n = 88$
  - $\mu = 1.79$
  - SD = 0.72
Levene’s Test for Homogeneity of Variance
($F_{2, 222} = .738, p = .4792$)

Histogram of Japanese$ratio$
Skew = 0.24

Histogram of Miyara$ratio$
Skew = 0.03

Histogram of Shiraho$ratio$
Skew = 0.55
In Lau (2013), I note that many of these tokens that are causing skews are basic vocabulary or proper nouns. Some are surrounded by voiced consonants:
- *maaza-on* ‘name of a shrine’
- *buu-nan* ‘large wave’
Some are in the proper environments for devoicing + shift:
- *puurin* ‘harvest festival’
- *tuu-siki* ‘ten months’
- *kaara* ‘river’
- Nakagawa (2013): Morpheme boundary prevents devoicing
  - sana’ ‘umbrella’
  - s-a’-no ‘don’t do’
- However, could be retention of historically long vowels in commonly used words (cf. Miyaran ha-a’-nu ‘don’t do’)
- Also, as pointed out by (Nakagawa, 2013), /e/ and /o/ are never devoiced
  - I believe historically diphthongs: < *ai/*ia, *au/*ua
  - Shiraho -e : Hateruma -ja ‘perfect particle’
  - Shiraho peri : Miyara pairu ‘vinegar’
- Note that devoicing occurs in Japanese borrowings
  - toku’=ni ‘especially’
  - tocu’ ‘on the way’
Another look at orthography

- The following chart summarizes the number of times a long vowel occurs in the $n^{th}$ syllable of a word

<table>
<thead>
<tr>
<th>Syllable #</th>
<th>Shiraho</th>
<th>Miyaran</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>246</td>
<td>617</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>354</td>
</tr>
<tr>
<td>3</td>
<td>24</td>
<td>210</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>115</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>47</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>8</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>9</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>6</td>
</tr>
</tbody>
</table>

- Total tokens 1425 3811

- Most long vowels past syllable 2 are initial vowel of separate word
- Further proof of lack of distinction
- Lack of long vowels even in syllable 2 suggests pitch accent may not have shifted
Then we can say \( \ast \mathcal{V} \) is not a constraint and IDENT\_IO (voi) is free to refer to both vowels and consonants without harmonic bounding problem.
Conclusions and Further Questions

- Phonological rule devoicing vowels between aspirated stops and voiceless stops becoming increasingly productive.
- Holdouts are basic vocabulary words with historically long vowels. These show both:
  - Retention of long vowels
  - Lack of devoicing
- Corpus data suggests pitch accent shift may be an auditory illusion as the “new nucleus” does not appear to often be longer.
- Need to look at phonetic quality of words that undergo this phonological devoicing rule.
References


Ishigaki City. 2010. Tokē Ishigaki 34.


