The Sound System of Thok Reel

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About this presentation

- Thok Reel – a hitherto undocumented language (a word list in Roettger & Roettger (1989) and anthropological study by Burton 1981a, 1981b, 1987)
- Step 1 in the description: the sound system
- Phonemic inventory
- Phonetic realisations of the phonological distinctions

- The structure of the presentation:
  - background: the language and its speakers
  - outline of syllable and word structure
  - consonants
  - vowels
  - tone
Geographical location and neighbouring languages

- Thok Reel – Western Nilotic, Dinka-Nuer subgroup; Yirol West county, Lakes State, Southern Sudan
Thok Reel and its speakers

- Thok Reel is spoken by approximately 50,000 people known as Atuot

Diagram:

- Atuot
  - Reel
    - Luac
    - Jilek
    - Akot
    - Jikeyi
    - Kuek
  - Apak
    - THONG APAK (a Dinka dialect)
Thok Reel and its speakers cont.

- The speakers distinguish two dialects: Thok Reel Cieng Luai and Thok Reel Cieng Nhyam
- The difference is reported to be purely lexical

**Thok Reel Cieng Luai** (solid line)
lit. ‘language of the land of Luac Reel’

**Thok Reel Cieng Nhyam** (broken line)
lit. ‘language of the front side of the Reel land’

**Dinka**-speaking sections (dotted line)
## Syllable structure

<table>
<thead>
<tr>
<th>C (j/w) V (V) (V) C</th>
<th>CV(V)</th>
<th>V(V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gàt</td>
<td>gàa</td>
<td>è</td>
</tr>
<tr>
<td>cenh</td>
<td>cề</td>
<td>áa</td>
</tr>
<tr>
<td>jôor</td>
<td>piti</td>
<td></td>
</tr>
<tr>
<td>réec</td>
<td>lâ</td>
<td></td>
</tr>
<tr>
<td>tüşut</td>
<td>cাং</td>
<td></td>
</tr>
<tr>
<td>gàaat</td>
<td>‘PST\PASS’</td>
<td></td>
</tr>
<tr>
<td>jwįC</td>
<td>‘PST\1SG’</td>
<td></td>
</tr>
<tr>
<td>cjên</td>
<td>‘water’</td>
<td></td>
</tr>
<tr>
<td>gwąp</td>
<td>‘animal\SG\GEN’</td>
<td></td>
</tr>
<tr>
<td>rwâaj</td>
<td>‘husband\SG\GEN’</td>
<td></td>
</tr>
<tr>
<td>nwįeere</td>
<td>‘human’</td>
<td></td>
</tr>
</tbody>
</table>

- ‘child’
- ‘sun’
- ‘forest’
- ‘rat’
- ‘male animal’
- ‘children’
- ‘head’
- ‘home’
- ‘skin’
- ‘conversation’
- ‘human’
- declarative particle
- existential particle
Word structure

- Most words are monosyllabic
- Morphology is expressed by alternations of phonological parameters of the monosyllabic roots and also by affixation
- A small number of polysyllabic words

<table>
<thead>
<tr>
<th>native polysyllabic words</th>
<th>native compounds</th>
<th>borrowed words</th>
</tr>
</thead>
<tbody>
<tr>
<td>adeer ‘water pot’</td>
<td>kwac-renge  male name</td>
<td>amaaná ‘meaning’ (from Arabic)</td>
</tr>
<tr>
<td>inaw ‘so and so’</td>
<td>pan-kaar  village name</td>
<td>galam ‘pen’ (from Arabic)</td>
</tr>
<tr>
<td>ekëc ‘bitter’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dapooook ‘decorated pot’</td>
<td>mapuor-dit  town name</td>
<td></td>
</tr>
<tr>
<td>makëc ‘yellow’</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Consonants

- **Twenty consonant phonemes**

<table>
<thead>
<tr>
<th></th>
<th>Labial</th>
<th>Dental</th>
<th>Alveolar</th>
<th>Palatal</th>
<th>Velar</th>
<th>Glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voiceless</td>
<td>p</td>
<td>ŧ</td>
<td>t</td>
<td>c</td>
<td>k</td>
<td>?</td>
</tr>
<tr>
<td>Voiced</td>
<td>b</td>
<td>d</td>
<td>d</td>
<td>ʃ</td>
<td>g</td>
<td></td>
</tr>
<tr>
<td>Nasal</td>
<td>m</td>
<td>ŋ</td>
<td>n</td>
<td>ŋ</td>
<td>ŋ</td>
<td></td>
</tr>
<tr>
<td>Lateral</td>
<td></td>
<td></td>
<td>l</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibrant</td>
<td></td>
<td></td>
<td>r</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glides</td>
<td>(w)</td>
<td></td>
<td>j</td>
<td>(w)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Consonants: near-minimal pairs

<table>
<thead>
<tr>
<th>Consonants</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>páaap</td>
<td>spread\1SG’</td>
</tr>
<tr>
<td>bâaar</td>
<td>‘boldness’</td>
</tr>
<tr>
<td>mác</td>
<td>‘fire\SG\NOM’</td>
</tr>
<tr>
<td>tâaal</td>
<td>‘cook\1SG’</td>
</tr>
<tr>
<td>dâl</td>
<td>‘boy\PL\NOM’</td>
</tr>
<tr>
<td>njâaar</td>
<td>‘like\1SG’</td>
</tr>
<tr>
<td>tâaat</td>
<td>‘build\1SG’</td>
</tr>
<tr>
<td>dâaw</td>
<td>‘distribute\1SG’</td>
</tr>
<tr>
<td>nâaw</td>
<td>‘kill\1SG’</td>
</tr>
<tr>
<td>câam</td>
<td>‘eat\1SG’</td>
</tr>
<tr>
<td>jât</td>
<td>‘tree\SG\NOM’</td>
</tr>
<tr>
<td>nál</td>
<td>‘girl\SG\NOM’</td>
</tr>
<tr>
<td>kâaar</td>
<td>‘dry\1SG’</td>
</tr>
<tr>
<td>gàaat</td>
<td>‘child\PL\NOM’</td>
</tr>
<tr>
<td>njâaw</td>
<td>‘vomit\1SG’</td>
</tr>
<tr>
<td>?âaal</td>
<td>‘pound\1SG’</td>
</tr>
<tr>
<td>lâaak</td>
<td>‘insult\1SG’</td>
</tr>
<tr>
<td>râak</td>
<td>‘lulu.tree\SG\NOM’</td>
</tr>
<tr>
<td>wâaar</td>
<td>‘change\1SG’</td>
</tr>
<tr>
<td>jân</td>
<td>‘cow\SG\NOM’</td>
</tr>
</tbody>
</table>
Consonants: phonetics

- The lateral is always palatalised
  - /rêeel/ [rêeel\] ‘Reel people’
  - /lwàc/ [l\wàc] ‘Luac’

- In slow deliberate speech dental stops are sometimes produced as interdentals

- Labial, dental and palatal stops can be realised as fricatives
  - /àpák/ [à\fák] ‘Apak’
  - /tôk/ [s\ók] ‘mouth’
  - /çêK/ [çêk] ‘woman’
Consonants: phonology and phonotactics

- Glottal phoneme is only found in onset position
  - two allophones [ʰi] in context of breathy vowels and [ʔ] elsewhere
    - `/ʔt/ [ʔʰʔt] ‘house’
    - `/ʔt̚/ [ʔʔt̚] ‘heads’

- `/ŋ/ only occurs in complex onsets (followed by /j/)

- The rest of the consonants occur in simple and complex onsets

- Voicing is only distinctive in onset position, and more specifically, root-initially

- Root-final consonants are voiced in intervocalic position and voiceless elsewhere
Vowels: vowel quality

- Seven vowel phonemes /i, e, ɛ, a, ɔ, o, u/

  - bîiir  ‘spear\3SG’
  - bêeer  ‘willow.for.roofing\PL’
  - bêeeer  ‘tallness (length)’
  - bàaar  ‘boldness’
  - guuur  ‘father\2SG’
  - gőoor  ‘search\3SG’
  - gůoor  ‘mark\3SG’
  - gáaar  ‘body.mark\SG’

- The phonemes combine with the suprasegmental distinctions – voice quality and vowel length
Vowels: voice quality

- All vowels appear in two voice qualities – modal and breathy

<table>
<thead>
<tr>
<th>Vowel</th>
<th>Word</th>
<th>Meaning</th>
<th>Vowel</th>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>bîiir</td>
<td>‘spear\3SG’</td>
<td>bîiir</td>
<td>‘drum\3SG’</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>rêeel</td>
<td>‘Reel\PL’</td>
<td>rêeel</td>
<td>‘Reel\PL\GEN’</td>
<td></td>
</tr>
<tr>
<td>ɛ</td>
<td>wêeër</td>
<td>‘scattering’</td>
<td>wêeër</td>
<td>‘night\SG’</td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>cáaar</td>
<td>‘to.aim’</td>
<td>cáaar</td>
<td>‘black’</td>
<td></td>
</tr>
<tr>
<td>ɔ</td>
<td>kòoor</td>
<td>‘forearm\SG’</td>
<td>kòoor</td>
<td>‘dry\3SG’</td>
<td></td>
</tr>
<tr>
<td>o</td>
<td>ròook</td>
<td>‘molar\SG’</td>
<td>ròook</td>
<td>‘molar\PL’</td>
<td></td>
</tr>
<tr>
<td>u</td>
<td>gúuur</td>
<td>‘remove\3SG’</td>
<td>gúuur</td>
<td>‘follow\AP\3SG’</td>
<td></td>
</tr>
</tbody>
</table>
Means (symbols) and standard deviations (ellipses) for the two voice qualities of the seven vowel phonemes. Solid line – modal voice, broken line – breathy voice.
Voice quality: spectrum

Spectrum representations calculated over a > 40 ms window centered on the temporal mid point of the vowel /i/
Breathy vowel /ɛ/ 

- Lower and more centralised than its modal counterpart
- Fairly close to /a/
- Perceptually it is often difficult to tell the difference between the breathy /a/ and /ɛ/
  
  \[
  \begin{align*}
  \text{ kèc} & \quad \text{‘bite\R\3SG’} \quad \sim \quad \text{ kấc} & \quad \text{‘bite\R\1SG’} \\
  \text{ ngèc} & \quad \text{‘milk\3SG’} \quad \sim \quad \text{ ngáac} & \quad \text{‘milk\1SG’} \\
  \text{ lềeŋ} & \quad \text{‘good\PL\PRED’} \quad \sim \quad \text{ lấaŋ} & \quad \text{‘good\PL\ATTR’}
  \end{align*}
  \]

- The native speakers also tend to disagree about the quality of these vowels
- But... 
  
  \[
  \begin{align*}
  \varepsilon & \quad 599 & \quad 1838 & \quad \text{(averaged)} \\
  \text{a} & \quad 712 & \quad 1520
  \end{align*}
  \]
Vowels: vowel length

- Vowels can be short /V/, mid /VV/ or long /VVV/

- **r̥ɪ̆n** ‘meat\PL’
- **r̥ɪ̆ŋ** ‘meat\SG’
- **r̥ĭĭŋ** ‘run\PET\3SG’

- **r̥el** ‘white.ant\SG’
- **r̥eel** ‘Reel\SG’
- **r̥eeel** ‘Reel\PL’

- **t̥et** ‘dig\1SG’
- **t̥eet** ‘build\AP\3SG’
- **t̥eette** ‘build\3SG’

- **ŋ̥aac** ‘know\AP’
- **ŋ̥aac’ ‘milk\1SG’
- **ŋ̥aaac’ ‘milk\AP\NF’

- **gw̥or** ‘adjacent.siblings’
- **gw̥oor’ ‘follow\3PL’
- **gw̥oor’ ‘elephant\SG’

- **kw̥ot** ‘rain\SG’
- **kw̥oot’ ‘blow\AP\NF’
- **kw̥oot’ ‘blow\3SG’

- **b̥ul** ‘drum\SG’
- **b̥ul’ ‘roast\3SG’
- **b̥uul’ ‘roast\AP\3SG’
Vowel length: duration measurements

- Means (dots) and standard deviations (whiskers) for durations of Thok Reel vowels

- $V = \text{short vowel}$ 77ms
- $VV = \text{mid vowel}$ 123ms
- $VVV = \text{long vowel}$ 205ms
Tone: inventory

- Three tonemes: High (H), Low (L) and High-Low (HL)

<table>
<thead>
<tr>
<th>Tone</th>
<th>Lexeme</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>còw</td>
<td>‘husband\SG’</td>
</tr>
<tr>
<td>L</td>
<td>còw</td>
<td>‘husband\PL’</td>
</tr>
<tr>
<td>H</td>
<td>wêeër</td>
<td>‘night\SG’</td>
</tr>
<tr>
<td>HL</td>
<td>wêeër</td>
<td>‘dung\SG’</td>
</tr>
<tr>
<td>L</td>
<td>têeet</td>
<td>‘hand\SG’</td>
</tr>
<tr>
<td>HL</td>
<td>têeet</td>
<td>‘hand\SG\ACC’</td>
</tr>
</tbody>
</table>

- Tone is used to distinguish lexical items and to signal morphological distinctions
Tone: phonetics

- Narrow frequency range in which the highs and the lows are realised ('speaking in the middle'), esp. Luac speakers.

- Narrow frequency range = considerable overlap between the tonemes in certain contexts.

- The averaged frequencies across a H toned and a L toned syllables in a minimal pair ców ‘husband\SG’ ~ còw ‘husband\PL’ uttered in isolation by a male Luac speaker are 115 Hz and 106 Hz, respectively.

- The distinction between the phonetic realisation of the tonemes is mainly in terms of f0 alignment.

- Alignment refers to the way in which pitch movements map onto the segmental string (Ladd 2008:169).
Tone: f0 alignment H and L

F0 alignment in a minimal pair for tone uttered in isolation:
ców ‘husband\SG’ H (solid line) vs. ców ‘husband\PL’ (dotted line)

- The difference is in f0 alignment at the end of voicing for the syllable (=end of f0 tracks) which roughly corresponds to the glide portion.
Tone: f0 height and voice quality

- F0 is much lower in syllables with breathy vowels than in syllables with modal vowels.
- The perceived difference in pitch in a H toned minimal pair for voice quality cáaar ‘to.aim’ vs. cáaar ‘black’ can lure us into thinking that we are dealing with different tonemes (H and L).
- Again, f0 alignment helps us to determine that we are dealing with H tone (L is realised with a falling trajectory in phrase-final context).

 cáaar ‘to.aim’ (dotted line)
cáaar ‘black’ (solid line)
The difference between the three tonemes is most salient in phrase-final position following a L tone.

- H (solid line) somewhat rising f0 trajectory
- L (dotted line) small rise followed by a fall (small rise is not perceptually salient)
- HL (broken line) rise-then-fall (perceptually salient)

It has been brought.

It has been put into the mouth.

It has been liked.
Summary

- Predominantly monosyllabic language
- Typical Western Nilotic consonant inventory
- Seven vowel phonemes
- Two-way voice quality distinction
  - The distinction between breathy and modal vowels is in terms of energy distribution
  - /ɛ/ and /a/ a vowel merger on its way?
  - Three-way vowel length distinction
- Three tonemes H, L, HL
  - Narrow frequency range in which the contrastive pitch levels are realised
  - The tonemes differ in f0 alignment
Bibliography


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