RHYTHMIC VS. DEMARCATIONAL STRESS IN MAPUDUNGAN

Benjamin Molineaux

THE UNIVERSITY OF EDINBURGH

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THE UNIVERSITY of EDINBURGH
School of Philosophy, Psychology and Language Sciences
What I will be doing

- Telling you about Mapudungun, aka ‘Araucanian’ and how the literature has got its stress system wrong
- Providing new data on Mapudungun stress
- Claiming Mapudungun’s stress system is not purely phonological, but is actually conditioned by morphology
- Comparing Mapudungun to other languages that seem to be ‘less phonological’ in their stress assignment
- Drawing attention to an underexplored function of stress systems, namely demarcation, and its relation to morpho-syntactic structure
Introduction – what is stress for?

- Contemporary (generative) theories focus on structural properties of stress placement:
  - phonological goal
  - based on phonological units
  - parameteric
  - alternation: rhythm; hierarchical organisation: culminativity

- Some interaction with morphology is acknowledged, but is seen as external to the system itself (cf. Hayes 1995: 32).

- Earlier theories (Prague School – Grade, 1967, Martinet, 1964) focus on stress’ functional properties.
  - morphological goal
  - parsing words and phrases demarcational role
Mapudungun and the Mapuche

- Mapudungun is the ancestral tongue of the Mapuche people
  - Chile: c. 144,000 speakers (Zúñiga 2007)
  - Argentina: c. 8,400 (INEC, 2005)
- It is considered endangered, due to poor transmission
- Monolingualism is vanishingly rare
- Most speakers are elderly and live in traditional, rural communities
- It is presumed to be an isolate
- Polysynthetic, agglutinating and head-marking
The literature on Mapudungun stress

- Mapudungun-specific literature presents stress as trochaic, quantity sensitive and right-left (cf. Valdivia 1606; Febrés 1765; Lenz 1895-1897; Augusta 1903; Salas 2006; Zúñiga 2006; Sadowsky et al. 2013)

Right-edge stress (from Salas, 1976, 2006):

- a. [wa.ŋi.'len] ‘star’
- b. [we.jul.-ki.'le-j] ‘swim-PROG-IND.3’
- c. [ma.'wi.θa] ‘woodland’
- d. [le.li.-'fi.-m-i] ‘watch-INV.3SP.IND-2-S’

- None of these studies is specifically focused on stress
- No phonetic data or formal analysis available
The literature on Mapudungun stress

- Typological studies take Mapudungun to be iambic, quantity insensitive and left-right (cf. Hyman 1977; Kager 1993; Hayes 1995; Gordon 2002; Tesar 2004; Martínez-Paricio & Kager 2015)
- All based on Echeverría & Contreras (1965)

Presumed Quantity Insensitive Iamb

<table>
<thead>
<tr>
<th>a.</th>
<th>[wu.'le]</th>
<th>tomorrow</th>
<th>‘tomorrow’</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>[tsi.'pan.to]</td>
<td>year</td>
<td>‘year’</td>
</tr>
<tr>
<td>c.</td>
<td>[e.'lu.-mu.-j-u]</td>
<td>give-INV.2-IND.1-D</td>
<td>‘you give us (both)’</td>
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<tr>
<td>d.</td>
<td>[e.'lu.-a-.e-.n-ew]</td>
<td>give-FUT-INV-1-3</td>
<td>‘s/he will give me x’</td>
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<tr>
<td>f.</td>
<td>[ki.'mu.-fa.,lu.-wu-,.la-j]</td>
<td>know-SIM-RFX-NEG-IND.3</td>
<td>‘s/he (her/himself) pretended not to know’</td>
</tr>
</tbody>
</table>

- Paul de Lacy (2014) has thoroughly critiqued this evidence
Language-specific and typological approach differ in all parameters (e.g. Salas vs. Martínez-Paricio & Kager)!

<table>
<thead>
<tr>
<th>LANG-SPECIFIC</th>
<th>FOOT</th>
<th>WEIGHT</th>
<th>DIRECTION</th>
<th>ITERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trochaic</td>
<td>Sensitive</td>
<td>Right-Left</td>
<td>No</td>
</tr>
<tr>
<td>TYPOLOGICAL</td>
<td>Iambic</td>
<td>Insensitive</td>
<td>Left-Right</td>
<td>Yes</td>
</tr>
</tbody>
</table>

We might need a fresh look...
New Data

- Gathered near Cholchol, in Chile’s Araucanía Region
- Seven native speakers interviewed
- Words recorded in context and isolation
- Native intuitions elicited

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Rhythmic vs. demarcational stress in Mapudungun
Acoustics and perception of stress

- Acoustic analysis of stress cues (in monomorphemes):
  - duration, intensity and pitch maxima were analysed.
  - only F0 significantly related to stress (Molineaux 2014)

- Additional study on native and non-native stress perception (Molineaux 2016)
## Stress patterns: morphologically simplex words

### Mono-, di- and trisyllabic nouns:

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<table>
<thead>
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<tbody>
<tr>
<td>a.</td>
<td>['fiŋ]</td>
<td>'seed'</td>
</tr>
<tr>
<td>b.</td>
<td>['we]</td>
<td>'young'</td>
</tr>
<tr>
<td>c.</td>
<td>[ŋa.'miŋ]</td>
<td>'foot'</td>
</tr>
<tr>
<td>d.</td>
<td>['ma.pu] ~ [ma.'pu]</td>
<td>'land'</td>
</tr>
<tr>
<td>e.</td>
<td>[läf.'keŋ]</td>
<td>'sea'</td>
</tr>
<tr>
<td>f.</td>
<td>['piw.ke] ~ [piw.'ke]</td>
<td>'heart'</td>
</tr>
<tr>
<td>g.</td>
<td>[wa.ŋi.'len]</td>
<td>'star'</td>
</tr>
<tr>
<td>h.</td>
<td>[ma.'wi.θa]</td>
<td>'woodland'</td>
</tr>
<tr>
<td>i.</td>
<td>[a.tʃuŋ.'peŋ]</td>
<td>'floating ash'</td>
</tr>
<tr>
<td>j.</td>
<td>[puŋ.'pu.ja]</td>
<td>'armpit'</td>
</tr>
</tbody>
</table>

- Final closed syllables are stressed (a, c, e, g, i)
- Otherwise, the penult (h,j) or the sole syllable (b) is stressed
- Sounds like a right-aligned moraic trochee!
  - ([µµ]); ([µµ] µ); ([µ] µ)
- But: Vowel-final disyllables alternate stress position (d, f)
- No evidence for secondary stress

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Rhythmic vs. demarcational stress in Mapudungun
Stress patterns: multi-suffix verbs

- Complex words may have two stresses
- Stress falls on:
  - word-final (ω) moraic trochee ([µµ]); ([µµ] µ); ([µ] µ)
  - stem-final (s) syllable

No clash:

a. [[tše.'ka.]-ja.'w-a-j]ω
   walk-AMB-FUT-IND.3
   ‘s/he will walk around’

b. [[i.'tšif.]-tu.-pu.-ke.'la-j.-m-i]ω
   throw-REST-TRLOC-HAB-NEG-IND-2-S
   ‘You don’t usually throw x back here’

c. [['lef.]-pu.'le-j]ω
   run-TRSLOC-PROG-IND.3
   ‘s/he is running here’

d. [[tši.'pa.]-ke.'la-n.-m-i]ω
   exit-HABIT-NEG-IND-1S
   ‘I don’t usually go out’

- No clear word-level stress hierarchy (no culminativity)
Stress patterns: multi-suffix verbs

Clash:

a. [[a.mu]s-'la-j.-m-i]ω
go-NEG-IND-2-S
‘You didn’t go’
b. [[le.li.]-'fi.-m-i]ω
look-DIR.3SP-IND-2-S
‘you looked at him/her/it’
c. [[e.lu-'n'ma.]-fi-j.-m-i]ω
give-APPL-3.OBJ-IND-2-S
‘You give him/her/it x for y’
d. [[a.'n-im]-fi-j]ω
die-CAUSE-3SP-IND.3
‘s/he killed him/her/it’

- In most cases, stem stress is demoted, and only the ω-final trochee is stressed (a, b)
- ‘Extended’ stems (c, d), take stress, while the ω-final stress is lost
  - Extended stems have a valency-changing suffix such as:
    - -ŋe ‘PASS’; -ŋma ‘APPL’; -(l)el ‘APPL’; -(i)m ‘CAUSE’; (i)l ‘CAUSE’
Stress patterns: Nominal compounds

- Stress is on the final syllable of the first root, and on the final moraic trochee of the second

No Clash:

<p>| | |</p>
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<tbody>
<tr>
<td>a.</td>
<td>[tʃa.'fo]_D-[ku.'tʃan]_H</td>
</tr>
<tr>
<td></td>
<td>[tʃa.'ŋuŋ]_H-[ŋa.'munŋ]_D</td>
</tr>
<tr>
<td></td>
<td>‘cough-disease’(a cold)</td>
</tr>
<tr>
<td></td>
<td>‘finger-foot’(toe)</td>
</tr>
</tbody>
</table>

- In clash, the head of the compound retains stress
- Head (H) and dependant (D) roots bracketed

Clash:

<p>| | |</p>
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<tbody>
<tr>
<td>a.</td>
<td>[ku.θi]_D-[’fo.ro]_H</td>
</tr>
<tr>
<td>b.</td>
<td>[fo.'ro]_H-[tʃaŋ.wa]_D</td>
</tr>
<tr>
<td></td>
<td>‘morter-bone’(spine)</td>
</tr>
<tr>
<td></td>
<td>‘bone-fish’(fishbone)</td>
</tr>
<tr>
<td>c.</td>
<td>[we.nu]_D-[’ma.pu]_H</td>
</tr>
<tr>
<td>d.</td>
<td>[i.'lo-]_H-[tʃe.wa]_D</td>
</tr>
<tr>
<td></td>
<td>‘morter-bone’(spine)</td>
</tr>
<tr>
<td></td>
<td>’meat-dog’ (dog-meat)</td>
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</tbody>
</table>
Accounting for previous accounts

- Echeverría & Contreras (1965) and the typologists:
  - Focus on the first morpheme, usually a disyllable
  - Initial stress (stem-stress) seems quantity insensitive
  - NO-CLASH means at least one syllable intervenes between stem- and word-stress:

- Language-specific literature
  - Focuses on the right-edge, trochaic
  - Allows for a ‘two-syllable stress window’ on left edge of verb
  - Salas (2006); Zúñiga (2006)

Both analyses overlook the morphology
Phonology of Mapudungun stress

- Stress refers to prosodic units:
  - morae (weight), feet, PRWDS
- NOCLASH plays a role at the morpheme boundary
  - Possibly a rhythmic constraint
- But,
- Native speakers have no intuitions as to stress hierarchy
  - culminativity is not definitional (at the PRWD-level)
- Stress is signalled by pitch alone, not lengthening
- No evidence for vocalic reduction in unstressed position (Sadowsky et al. 2013)
- No stress-based phonotactic asymmetries (Salas 2006; Zúñiga 2006)
- No attested stress-based processes in Mapudungun’s synchronic or diachronic phonology (Molineaux 2014)
Stress and the morphology

- Barring clash, stress is a reliable cue for the stem edge
- In clash, it signals compound heads, and valency changes
- It signals the word’s right edge as coextensive with a foot

Stress-based **demarcation** helps disambiguate Mapudungun stems among abundant, highly agglutinating morphology

```
[[ke.'ʌu.]s-pu.-tu.-ke.-'fu-n]
help-TRLOC-REST-HABIT-BI-IND.1S
‘I used to go back there to help’
```

Rhythm (clash avoidance) is subordinate to the morphology
Paucity of stress-based phonological asymmetries is advantageous to parsing of agglutinative morphology:

a. [θu.'ŋu.-ke.-'lα.-j.-m-i] ‘speak-HABIT-NEG-IND-2-S’
b. [θu.'ŋu.-ke.-'lε.-j.-m-i] ‘speak-HABIT-PROG-IND-2-S’
c. [θu.'ŋu.-ke.-lα.-'j-i-ŋ] ‘speak-HABIT-NEG-IND-1-P’
d. [θu.'ŋu.-ke.-lε.-'j-i-ŋ] ‘speak-HABIT-PROG-IND-1-P’

Productive agglutinating morphology means the target morpheme for stress changes dynamically

Computing enhancement and reductions online could create processing difficulties

* [θu.'ŋu.-ke.-lə.-'j-i-ŋ] ‘speak-HABIT-???-IND-1-P’
Mapudungun phonology seems to ‘care’ very little about stress.

According to (Hyman 2014: 59):

‘Languages which exploit metrical structure for multiple purposes... will exhibit the kind of “metrical coherence” found in Germanic (Dresher & Lahiri 1991) ... Languages such as Hungarian or Turkish ... seem different because their metrical structure has little or no relevance outside the stress system itself. The contrast with English, whose phonology cares so much about stress, is quite striking.’

The morphology of Mapudungun does appear to ‘care’ about stress.

What about languages like Hungarian and Turkish?
Hungarian main stress is word-initial
Secondary stress is...
- a quantity sensitive feature: (Szinnyei 1912)
- a LR syllabic trochee: Kerek (1971); Varga (2002)
- in alternation with tertiary stress: Hammond (1987)
Blaho & Szeredi (2011) and Vogel et al. (in press) find no phonetic evidence for (impressionistic) secondary stress
F0 cues primary stress, but is weak outside focus position
Phonological correlates to stress are conspicuously absent (Kálmán & Nádasdy 1994; Blaho & Szeredi 2011)
- “this putative rhythmic intensity alternation is phonologically irrelevant as it does not interact in any way with the rest of the phonology”(Siptár & Tökenczy 2000: 22)
Hungarian is predominantly suffixing (Kenesei et al. 1998): so main stress does not interact with morphology

Exception: some compounds with stress on the first syllable of second element (Varga 2012)

- ütött-kopott ‘beaten-worn (battered)’
- tizen-egy ‘one-on-ten (eleven)’

Functionally, Hungarian stress demarcates the word level very clearly, and occasionally also the structure of compounds as well
Does Turkish care about stress?

- Default stress is claimed to be on a word-final syllable
  - Its cueing is extremely subtle (F0) (Levi 2005)
  - May be epiphenomenal (boundary tone?) (Vogel et al. in press)
  - Predictability of the pattern may result in a degree of deafness to it (Domahs et al. 2013)
- Nevertheless, the default prominence seems to have a word-demarcative function (Kabak & Vogel 2001)
- Non-final stress is lexically specified, relating to borrowed nouns, pre-stressed or stressed suffixes
- Cues for these lexical stresses are more robust (Levi 2005; Vogel et al. in press)
- There is no evidence for secondary stress overall
- Neither final nor non-final stress show any broader phonological effects
Conclusions: General

- In Mapudungun, Hungarian and Turkish, stress has little structural value (rhythm, phonology)
- The three languages, however, show a clear functional role for stress (demarcation, morphology)
- They all signal default stress via F0 only, with little phonological involvement
- Evidence for rhythmic, secondary stress is scanty if not altogether absent
- The three languages are also highly agglutinating
  - Morphemes don’t have a pre-established prosodic structure/position
  - Stress-based asymmetries would make morphological parsing sub-optimal
- More typological work needed to assess the relation between function/acoustics of stress and morphological agglutination/fusion
Conclusions: Mapudungun

- The default stress pattern for Mapudungun seems to be a word-level right-aligned trochee.
- A second main stress marks the right edge of the first morpheme.
- Previous accounts fail to consider the role of morphology in stress-assignment.
- Evidence for rhythmic, secondary stress is lacking altogether.
- Lack of major stress-based phonological asymmetries conspires to maintain agglutinating morphology transparent.
- Demarcation is a valuable feature of stress which in this case trumps rhythm and culminativity.
Augusta, Félix José (1903) *Gramática Araucana*. Valdivia: Imprenta Central J. Lampert.


Lenz, Rodolfo (1895-1897) *Estudios Araucanos*, vol. XCVII. Santiago: Anales de la Universidad de Chile.


Valdivia, Luis de (1606) Arte, y Gramatica General de la Lengua que Corre en Todo el Reyno de Chile, con un Vocabulario y Confessionario. Seville: Thomás López de Haro.


Thank You!

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Stress or accent?

Is it even stress? Could it just be a pitch-accent system?

- F0 is the key cue for Mapudungun stress
- Here we follow Hyman (2009) in characterizing Mapudungun within a property-driven prosodic typology.
- Mapudungun prominence is obligatory (i.e., every lexical word must have at least one stressed syllable)
- It is clearly assigned at the level of the output lexical word, and not at the input morpheme level.
- These two key traits place Mapudungun firmly within the spectrum of stressed languages.
Disyllables, again

But what about those pesky vowel-final disyllables?

- It’s really only the nouns that alternate
  - N: ['ru.ka] ~ [ru.'ka] ‘house’
- Other word categories stress a final open syllable
  - Adj: [fi.'t̪̬a] ‘old/large’; [pi.'t̪̬i] ‘young/small’
  - Adv: [we.'lu] ‘tomorrow’, [pe.'tu] ‘still/yet’
- Adjs. and Advs. appear mostly as first elements in a phrase, since Mapudungun tends to pre-specify:
  - cf. [fi.'t̪̬a ma.'wi.θa] ‘old woodland’
  - cf. [pe.'tu kî.'pa-j] ‘s/he is still coming’
- In isolation they behave like nouns: [fi.'t̪̬a]~[fi.'t̪̬a]
- Nouns don’t alternate within larger PRWDS (compounds)
- Adj.+N and Adv.+V look a lot like N+N compounds
- Phrasal and word levels are somewhat blurred here
Stress patterns: multi-suffix verbs

Conflation:

a. \([[['pe]_s-j]_\omega\)  
   see-IND.3  
   's/he sees'

b. \([[[je-ñ.'ma]_s-j]_\omega\)  
   carry-APPL-IND.3  
   's/he watches x'

Patterns of stem- and word-level stress interaction (n=282)

<table>
<thead>
<tr>
<th>Structure</th>
<th>Pattern</th>
<th>n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ([[(\sigma) \underline{\sigma}]<em>s \sigma_1 \underline{\sigma(\sigma)}]</em>\omega)</td>
<td>No interaction</td>
<td>114</td>
<td>(40.4%)</td>
</tr>
<tr>
<td>b. ([[(\sigma) \underline{\sigma}]<em>s (\sigma)]</em>\omega)</td>
<td>Conflation</td>
<td>68</td>
<td>(24.1%)</td>
</tr>
<tr>
<td>c. ([[(\sigma) \underline{\sigma}]<em>s \underline{\sigma(\sigma)}]</em>\omega)</td>
<td>STEM de-stress</td>
<td>52</td>
<td>(18.4%)</td>
</tr>
<tr>
<td>d. ([[(\sigma) \underline{\sigma}]<em>s \underline{\sigma(\sigma)}]</em>\omega)</td>
<td>WORD de-stress</td>
<td>38</td>
<td>(13.5%)</td>
</tr>
<tr>
<td>e. ([[(\sigma) \underline{\sigma}]<em>s \underline{\sigma(\sigma)}]</em>\omega)</td>
<td>Clash tolerated</td>
<td>10</td>
<td>(3.5%)</td>
</tr>
</tbody>
</table>

- Stem-level stress faithful: 81.6%
- Word-level stress faithful: 86.5%