MORPHOLOGICAL AND PHONOLOGICAL PATTERNS IN MAPUDUNGAN STRESS ASSIGNMENT

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P-WORKSHOP

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Mapudungun (a.k.a. Araucanian) has been presented in the literature as a classic example of a rhythmic stress system. It is not.

I will review previous accounts of Mapudungun stress, and propose a new one.

Morphology plays an important role — phonology, not so much.

Mapudungun is not alone in assigning little phonological value to stress assignment.
What exactly is stress?

- Stress is primarily a perceptual or mental instantiation of prominence, rather than a uniform physical trait of syllables.
- It creates syntagmatic contrasts within a domain (Martinet 1954).
- It is instantiated on a syllable and does not spread.
- There is no single tell-tale sign of its location:
  - “The definition of stress is one of the perennially debated and unsolved problems of phonetics” (Hayes 1995: 5).
  - Acoustic and phonological correlates to the percept of stress must be established, *a posteriori*, on the basis of speaker intuitions.
What is stress for?

**Distinction** (i.e. lexical contrast) A feature of so-called ‘free stress’ languages, creates minimal pairs based on the position of stress. A marginal pattern for most languages, often attributable to morphology.

**Rhythm** In so-called ‘fixed stress’ languages ‘stress is the linguistic manifestation of rhythmic structure’ (Hayes 1995:1, see also Liberman 1975, Liberman & Prince 1977, etc.)

**Culminativity** Usually associated to the word-level: one main stress per word. Hence, stress defines the prosodic word domain.

**Demarcation** The signalling of domain edges — usually the word — via stress.
How is stress studied?

**Phonetic realisation:** The acoustic and perceptual cues of stress have been studied extensively for some languages, focusing on duration, intensity and pitch (Fry 1955; Lehiste 1970; Beckman 1986; Gordon & Nafi 2012).

**Functional role:** Work in the Prague School tradition (Trubetzkoy 1939; Martinet 1964; Garde 1967) considers stress to actively mark word and/or morphological boundaries placing emphasis on stress’ ‘demarcative’ function.

**Structural properties:** The core idea is that stress conveys rhythm through regularly spaced prominences first at the word level, but also at the phrase and utterance level (Liberman & Prince 1977; Hayes 1980, 1985, 1995; Kager 1989, 1997, 2007; etc.).
The Generative approach

- ‘[S]tress is the linguistic manifestation of rhythmic structure. . . . the special phonological properties of stress can be explicated on this basis’ (1)

- Rhythmic structure can be accounted for with parameters: foot type, quantity sensitivity, direction of parsing, end rules, etc.

- There is a universal set of restrictions on the placement of stress

- Interaction with morphology is non-essential
How important is stress?

- English/Germanic languages: pretty key
  - ‘it has become clear that English enjoys a remarkable prosodic organization that plays a role in virtually every aspect of its phonological system’ (Hammond 2006: 411)
  - Hyman ‘it would be folly to attempt to analyse English without stress’ (2014: 58)

- Speakers of some languages have been considered “stress-deaf”

- Other languages seem to find little role for stress outside the stress-assignment system itself: Hungarian, Turkish

- While others still are claimed to have no stress/accent at all: Nuxalk (a.k.a. Bella Coola, Salishan)
Different languages might have different levels of phonological activation for a given feature (Clements 2001).

This should also be the case for stress (Hyman 2014).

English seems to have a highly activated stress system, which participates at all levels of the phonology.

In some languages stress might not be activated at all.

Most languages lie somewhere in between.
As in the case of the phonology, can we say that languages may have different degrees of morphological activation for stress?

What types of features of the stress system would a ‘canonical’ morphologically active stress system have?

Mapudungun is a good case study for the tension between phonological activation and morphological role of stress.
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 tradition: ‘Araucanian’ stress

Echeverría & Contreras (1965)

- The main source for most typological accounts of Mapudungun stress
- A three-page article on the entire segmental and suprasegmental system of Mapudungun
- No reference to the sources of the data: n° of speakers, provenance, linguistic competence, etc.
- No mention of methods
Echeverría & Contreras (1965)

“General rule: A phonological word has main stress on the second syllable and, if applicable, secondary stress on the fourth and sixth syllables” (134).

- **a.** [wu.'le]
  tomorrow
  ‘tomorrow’

- **b.** [tʃi.'pan.to]
  year
  ‘year’

- **c.** [e.'lu.-mu.-j-u]
  give-INV.2-IND.1-D
  ‘you give us (both)’

- **d.** [e.'lu.-a-،e-.n-ew]
  give-FUT-INV-1-3
  ‘s/he will give me x’

- **e.** [ki.'mu.-fa.,lu.-wu-،la-j]
  know-SIM-RFX-NEG-IND.3
  ‘s/he (her/himself) pretended not to know’
Under the name Araucanian, and the analysis of E&C, Mapudungun is discussed within the following publications on stress:

- Hyman (1977); Kager (1993, 2005); Hung (1993); Kenstowicz (1994); Hayes (1995); Revithiadou (1999); Gordon (2002, 2011); Hyde (2002); McGarrity (2003); Tesar (2004); Hermans (2011); Goedemans et al. (2014); Martínez-Paricio & Kager (2015)

...to name but a few

The analysis tends to be that of a ‘perfect grid’, sometimes interpreted as a quantity insensitive iambic pattern.

For example, (Hyde 2002) gives the following representations:

\[
\begin{align*}
(9) \text{ a. Nengone} & \quad \text{b. Araucanian} & \quad \text{c. Maranungku} & \quad \text{d. Suruwaha} \\
\begin{array}{cccccc}
\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
\end{array} & \begin{array}{cccccc}
\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
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\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
\end{array} & \begin{array}{cccccc}
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\end{array} & \begin{array}{cccccc}
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\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
\sigma & \sigma & \sigma & \sigma & \sigma & \sigma \\
\end{array}
\end{align*}
\]
de Lacy (2014) discusses the empirical conditions on stress data for generative analyses. He finds E&C lacking on several counts:

- Not enough fine-grained data
  - No account of word categories
  - Possible lexical/morphological biases
  - Not enough examples!
- Not enough background
  - Methods: tasks, diagnostics, word-contexts
  - Speakers: number, competence, origin, background, age, sex
The other literature on Mapudungun stress

- Mapudungun-specific literature tends to present stress as final if the syllable is closed, otherwise, as penultimate (cf. Lenz 1895-1897; Augusta 1903; Suárez 1959; Echeverría 1964; Salas 1976, 1992; Zúñiga 2006; Smeets 2008; Sadowsky et al. 2013)

Right-edge stress (from Salas (1976, 1992)):

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>a.</td>
<td>[wa.ŋi.'len]</td>
<td>‘star’</td>
</tr>
<tr>
<td>b.</td>
<td>[we.jul.-kì.'le-j]</td>
<td>‘swim-PROG-IND.3’</td>
</tr>
<tr>
<td>c.</td>
<td>[ma.'wi.θa]</td>
<td>‘woodland’</td>
</tr>
<tr>
<td>d.</td>
<td>[le.li.-'fi.-m-i]</td>
<td>‘watch-INV.3SP.IND-2-S’</td>
</tr>
</tbody>
</table>

- None of these studies is specifically focused on stress
- No phonetic data or formal analysis available
- This does look like a right-aligned moraic trochee...
- Most accounts also place an additional stress on the first or second syllable of longer words
The literature on Mapudungun stress

Language-specific and typological approach differ in all parameters (e.g. Salas (1992) vs. Martínez-Paricio & Kager (2015))!

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

We might need a fresh look...
New Data

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

- Based on native intuition (matches pitch peaks)

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

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>a.</td>
<td>['fĩŋ]</td>
<td>‘seed’</td>
</tr>
<tr>
<td>b.</td>
<td>['ko]</td>
<td>‘water’</td>
</tr>
<tr>
<td>c.</td>
<td>[ŋa.'mĩŋ]</td>
<td>‘foot’</td>
</tr>
<tr>
<td>d.</td>
<td>[laf.'ken]</td>
<td>‘sea’</td>
</tr>
<tr>
<td>e.</td>
<td>[wa.ŋi.'len]</td>
<td>‘star’</td>
</tr>
<tr>
<td>f.</td>
<td>[ma.'wi.θa]</td>
<td>‘woodland’</td>
</tr>
<tr>
<td>g.</td>
<td>[a.ta.&quot;pen]</td>
<td>‘floating ash’</td>
</tr>
<tr>
<td>h.</td>
<td>[puŋ.'pu.ja]</td>
<td>‘armpit’</td>
</tr>
</tbody>
</table>

- Final closed syllables are stressed, elsewhere, the penult
- No evidence for secondary stress
- A single, right-aligned moraic trochee? ([µµ]); ([µµ] µ); ([µ] µ)
- However: Vowel-final disyllables alternate stress position (i, j)

### Vowel-final disyllables:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>['ma.pu] ~ [ma.'pu]</td>
<td>‘land’</td>
</tr>
<tr>
<td>j.</td>
<td>['piw.ke] ~ [piw.'ke]</td>
<td>‘heart’</td>
</tr>
</tbody>
</table>
Stress patterns: multi-suffix verbs

- Complex words may have two stresses
- Stress falls on:
  - word-final ($\omega$) moraic trochee ([µµ]); ([µµ] µ); ([µ] µ)
  - stem-final (s) syllable (here, root-final)

No clash:

(a) [[tse.'ka.]s-ja.'w-a-j]$\omega$
walk-AMB-FUT-IND.3
‘s/he will walk around’

(b) [[i.'tsif.]s-tu.-pu.-ke.'la-j.-m-i]$\omega$
throw-REST-TRLOC-HAB-NEG-IND-2-S
‘You don’t usually throw x back here’

(c) [['lef.]s-pu.'le-j]$\omega$
run-TRSLOC-PROG-IND.3
‘s/he is running here’

(d) [[t'si.'pa.]s-ke.'la-j.-m-i]$\omega$
exit-HABIT-NEG-IND-1S
‘I don’t usually go out’

(a)(b)(c)(d)

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

Clash:

a. \([a.mu]_s-'la-j.-m-i]_\omega\)
   go-NEG-IND-2-S
   ‘You didn’t go’

b. \([le.li.]_s-'fi.-m-i]_\omega\)
   look-DIR.3SP-IND-2-S
   ‘you looked at him/her/it’

c. \([e.lu-\eta.'ma.]_s-fi-j.-m-i]_\omega\)
   give-APPL-3.OBJ-IND-2-S
   ‘You give him/her/it x for y’

d. \([la.'\eta-im]_s-fi-j]_\omega\)
   die-CAUSE-3SP-IND.3
   ‘s/he killed him/her/it’

- In most cases, root stress is demoted, and only the \(\omega\)-final trochee is stressed (a, b)
- ‘Extended’ roots (i.e stems, as in c, d), take stress, while the \(\omega\)-final stress is lost
  - Extended roots have a valency-changing suffix such as:
    - \(\eta e\) ‘PASS’; \(\eta ma\) ‘APPL’; \(-(l)e\) ‘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:**

<table>
<thead>
<tr>
<th>a. [tʃa.ˈfo]_D-[ku.ˈtʃan]_H</th>
<th>b. [tʃa.ˈnuʌ]-[na.ˈmuŋ]_D</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘cough-disease’ (a cold)</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:**

<table>
<thead>
<tr>
<th>a. [ku.θi]_D-[ˈfo.ro]_H</th>
<th>b. [fo.ˈro]_H-[tʃaʌ.wa]_D</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘morter-bone’ (spine)</td>
<td>‘bone-fish’ (fishbone)</td>
</tr>
<tr>
<td>c. [we nu]_D-[ˈma pu]_H</td>
<td>d. [i.ˈlo]_H-[tʃe wa]_D</td>
</tr>
<tr>
<td>‘high-land’ (heaven)</td>
<td>‘meat-dog’ (dog-meat)</td>
</tr>
</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/neutralisation 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.'u.]-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
Stress and the morphology II

Paucity of stress-based phonological asymmetries is advantageous to parsing of agglutinative morphology:

a. [θu.ŋu.-ke.-'la.-j.-m-i] ‘speak-HABIT-NEG-IND-2-S’
b. [θu.ŋu.-ke.-'le.-j.-m-i] ‘speak-HABIT-PROG-IND-2-S’
c. [θu.ŋu.-ke.-la.-'j-i-ŋ] ‘speak-HABIT-NEG-IND-1-P’
d. [θu.ŋu.-ke.-le.-'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 and stress typology

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?
Does Hungarian phonology care about stress?

Hungarian main stress is word-initial (Varga 1994)

- 'iskola 'school'
- 'forrósodik 'grows hot'
- 'szénanátha 'hay fever'

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 & Tókenczy 2000: 22)
Does Hungarian morphology care about stress?

- 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, the structure of compounds as well
Does Turkish phonology care about stress?

Default stress is claimed to be on a word-final syllable

Turkish stress (from Göksel & Kerslake, 2005: 29)

a. ki'tap  "book"
b. kitap-'lar  "books"
c. kitaplar-'ım  "my books"
d. kitaplarım-'da  "in my books"
e. kitaplarımda-'kı  "the one in my books"
f. kitaplarımdaki-'ler  "the ones in my books"
g. kitaplarımdakiler-'e  "to the ones in my books"

Stress 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)
Does Turkish morphology care about stress?

- 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.
- If there are languages where stress is morphologically activated to a higher degree: Mapudungun would probably be a good example: marks lexical and sub-lexical boundaries, headedness, complexity of the stem, etc.
Further work

- A closer look at phrasal prosodic phenomena in Mapudungun
- The effects of contact on the stress system
- A diachronic view of the stress system: How does it arise?
- Dialectal variation in the assignment/realisation of stress
- Other potential metrical phenomena: epenthesis
Augusta, Félix José (1903) *Gramática Araucana*. Valdivia: Imprenta Central J. Lampert.


Selected references II


Selected references III


Thank You!
Stress or accent?

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

- F0 is the key cue for Mapudungan stress
- Here we follow Hyman (2009) in characterizing Mapudungan within a property-driven prosodic typology.
- Mapudungan 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 Mapudungan 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.’tśa] ‘old/large’; [pi.’tʃi] ‘young/small’
- Adjs. and Advs. appear mostly as first elements in a phrase, since Mapudungun tends to pre-specify:
  - cf. [fi.’tśa ma.’wi.θa] ‘old wodland’
  - cf. [pe.’tu kī.’pa-j] ‘s/he is still coming’
- In isolation they behave like nouns: [fi.’tśa] ~ [‘fi.’tśa]
- 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. \([['pe]_s-j]_ω\) see-IND.3 ‘s/he sees’
b. \([jε-n.'ma]_s-j]_ω\) 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.</td>
<td>([[(σ) \underline{σ}]_s \underline{σ}_1 \underline{σ}(σ)]_ω)</td>
<td>114</td>
<td>(40.4%)</td>
</tr>
<tr>
<td>b.</td>
<td>([[(σ) \underline{σ}]_s(σ)]_ω)</td>
<td>68</td>
<td>(24.1%)</td>
</tr>
<tr>
<td>c.</td>
<td>([[(σ) \underline{σ}]_s \underline{σ}(σ)]_ω) STEM de-stress</td>
<td>52</td>
<td>(18.4%)</td>
</tr>
<tr>
<td>d.</td>
<td>([[(σ) \underline{σ}]_s σ(σ)]_ω) WORD de-stress</td>
<td>38</td>
<td>(13.5%)</td>
</tr>
<tr>
<td>e.</td>
<td>([[(σ) \underline{σ}]_s σ(σ)]_ω) 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%