Phonological vowel length interacts with final lengthening

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Introduction

Research question and aim of the study

- Is final lengthening (FL) sensitive to phonological length?
- Do languages preserve length contrasts in final (pre-pausal) syllables? Can FL neutralize a length contrast?
- How do languages with a length contrast differ from languages without such a contrast?

The aim of this paper is to provide a cross-linguistic overview of FL in languages with and without a phonological quantity opposition.

Methodology

Speech corpus data from 15 languages

- 15 languages from the DoReCo corpus (Seifart et al. 2022)
- Ca. 10K hand-aligned word tokens per language
- Exclusion of disfluencies, code-switching and filled pauses
- Segmental alignments added with MAUS (Schwarwel 2004), using the language-independent model with a minimum segment duration of 30 ms

Measurements

- Duration of Vs in final syllable followed by a pause vs. duration of Vs in non-final positions; excluded disfluencies (filled pauses, false starts), code-switching, as well as segments adjacent to disfluencies
- Statistical analysis using R (3.6.2), libraries: ggplot2 (graphics), lme4 for Linear Mixed Effect Models with Length (long versus short)*Category (final vs. non-final) for each language as fixed effects; speaker code, right phonemic context, left phonemic context as random effects

The 15 languages investigated

<table>
<thead>
<tr>
<th>Language</th>
<th>Family/Phylum</th>
<th>V length?</th>
<th>Language</th>
<th>Family/Phylum</th>
<th>V length?</th>
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</thead>
<tbody>
<tr>
<td>Arapaho</td>
<td>Algonquian</td>
<td>yes</td>
<td>Lower Sorbian</td>
<td>Indo-European</td>
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<tr>
<td>Beja</td>
<td>Afro-Asiatic</td>
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<td>Sino-Tibetan</td>
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<td>Bora</td>
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<td>yes</td>
<td>Sanh-Dargwa</td>
<td>Nahe-Dagastanian</td>
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<tr>
<td>Fandbak</td>
<td>Australianian</td>
<td>yes</td>
<td>Urum</td>
<td>Turkic</td>
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<tr>
<td>Kamas</td>
<td>Uralic</td>
<td>yes</td>
<td>Yali</td>
<td>Nuclear Trans New Guinea</td>
<td>no</td>
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<td>Mojeno</td>
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<td>yes</td>
<td>Yongning Na</td>
<td>Sino-Tibetan</td>
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<tr>
<td>Movima</td>
<td>isolate</td>
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<td>Resigaro</td>
<td>Arawak</td>
<td>yes</td>
<td>15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Svan</td>
<td>Kartvelian</td>
<td>yes</td>
<td>9)</td>
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</tbody>
</table>

All data originally come from documentation projects of small or endangered languages. Within DoReCo, these datasets undergo consistency checks and standardization procedures and receive additional alignments at the word and segment level.

Results

FL in lang. without length contrast

Final lengthening in Beja: The initial /i/ in this word [mif] is half as long as the pre-pausal /i/ (100 ms vs. 200 ms).

FL in lang. with length contrast

Kamas, Mojeno Trinitario: no VV in final position (phonactics)

Resigaro: Length effect, small but not significant category effect

Fanbyak, Svan: Length effect, category effect, interaction effect, FL inhibited in long vowels compared to short vowels.

Discussion and future work

- The presence and degree of FL heavily depend on whether a language has a phonological vowel length contrast
- All languages without a vowel length contact showed strong and consistent effects of FL
- Languages with a length contrast showed a remarkably complex picture, from no interaction (Arapaho, Bora, Movima) or suppression of FL (Beja) to small category effects (Resigaro) or contrast enhancement (Fanbyak, Svan)
- It was never the case that a short V in final position was lengthened to the extent that its mid duration exceeded that of a long V
- Future directions: Disentangle final and pre-final lengthening, in particular for languages with known processes of pre-final lengthening and/or iambic stress

References:


Background

- Final lengthening is hypothesised to be a universal property of languages (Fletcher 2010)
- FL may possibly be grounded in motor constraints, deceleration of motor activity (e.g. Berkovits 1994, Weiimer & Ingrisano, 1979)
- On the other hand, linguistic constraints may also affect lengthening, as shown for languages with a phonological vowel length contrast: Finnish, Hungarian and Estonian (Nakai et al. 2012, Krull 1997, White et al. 2020)
- Word-final syllables seem to be particularly prone to neutralization of phonological quantity opposition (Myers and Hansen, 2007)
- Besides neutralization, other scenarios might be conceivable, such as e.g. enhancement of the quantity contrast in FL

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