

Stress and Morphological Complexity in Brazilian Portuguese

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I. Overview

- Interaction between stress and morphology** in Brazilian Portuguese
 - Three special suffixes: diminutive (*-inho/zinho*), superlative (*-issimo*), adverbial (*-mente*)
 - Phonologically special: block phonological processes in the base (e.g. mid-vowel neutralization, denasalization) and maintain a secondary stress in same location as in freestanding base
 - Morphologically special: argued to be compounds or independent prosodic words (Bachrach & Wagner 2007; Collischonn 1994; Schwindt 2013; Ulrich 2016)
 - Do not form a morphologically homogeneous class (Ulrich 2016)

- Primary stress:** weight-sensitive, falls within trisyllabic window at right edge of word (Garcia 2017)
 - Main correlate: duration (Major 1985)
 - Lack of vowel reduction in stressed syllables (Dukes 1993; Gama-Rossi 1998)
- Secondary Stress:** traditional phonological accounts allow two patterns of secondary stress (Collischonn 1994)

Number of Pretonics	Patterns
Even	Binary: (,σ σ) (,σ σ) ('σ σ)
Odd	Binary: σ (,σ σ) ('σ σ) or Initial: (,σ σ) σ ('σ σ)

- Little conclusive experimental evidence of regular secondary stress (Arantes & Barbosa 2006; Keller 2004; Moraes 2003)
- Little empirical work to test theoretical claims of stress maintenance (see e.g. Ulrich 2016)
- Question:** Is there acoustic evidence for stress maintenance in **special suffix words** as compared to **normal suffix words**?

- Stress & Morphology:** special suffixes maintain stress on the vowel stressed in the independent base (Collischonn 1994; Lee 2002; Ulrich 2016)

Base + normal suffix: [ʒeneroza] + [dadʒi]
Expected/actual [,ʒene,rozi'dadʒi]
 ('generosity')

Base + DIM: [e'zɛksitu] + [zĩɲu]
Expected: *[,ezɛx,situ'zĩɲu]
Actual: [e,zɛksitu'zĩɲu]
 ('army-DIM')

II. Methodology

- Production study to address interaction between stress and special suffixes
- Self-paced sentence reading task completed by 14 native speakers of Brazilian Portuguese (5M/9F)
- Stimuli: 90 target words: 31 sets, 2-4 words in each set, special and normal suffixes, 4-7 syllables (9937 vowels)
 - Bases with primary stress in three locations: penultimate, antepenultimate, final

Base Type	Base	Special Suffixes	Normal Suffixes
Penultimate	[edu'kada] 'educada' ('well-behaved', 'educated')	[eduka'dʒĩɲa] ('well-behaved-DIM') [eduka'dʒisima] ('very well-behaved') [edukada'mɛtʃi] ('well-behaved-ly')	[eduka'tʃĩva] ('educational')
Antepen.	[me'kaniku] 'mecânico' ('mechanical')	[mekanika'mɛtʃi] ('mechanically')	[mekani'zadu] ('mechanized')
Final	[ka'ʒu] 'cajú' ('cashew')	[kaju'zĩɲu] ('cashew-DIM')	[kaju'zeiru] ('cashew tree')

- Each word inserted into 2 frame types, immediately following verbs (different frames for each word)
 - σ σ + target word O pacote [es'tava] [peza'dʒisimo] ... ('The package was very heavy...')
 - σ' σ + target word O pacote [es'ta] [peza'dʒisimo] ... ('The package is very heavy...')
- Each speaker read each target word once; total of ~180 sentences (~90 words x 2 frames)

- Duration and similar F1 values taken as indications of stress preservation; no effect of intensity
- Ratios (for Duration) and differences (for F1) compare each vowel to itself in the same base with different suffixes (special : normal)
 - Ratios control for (necessarily) unbalanced design

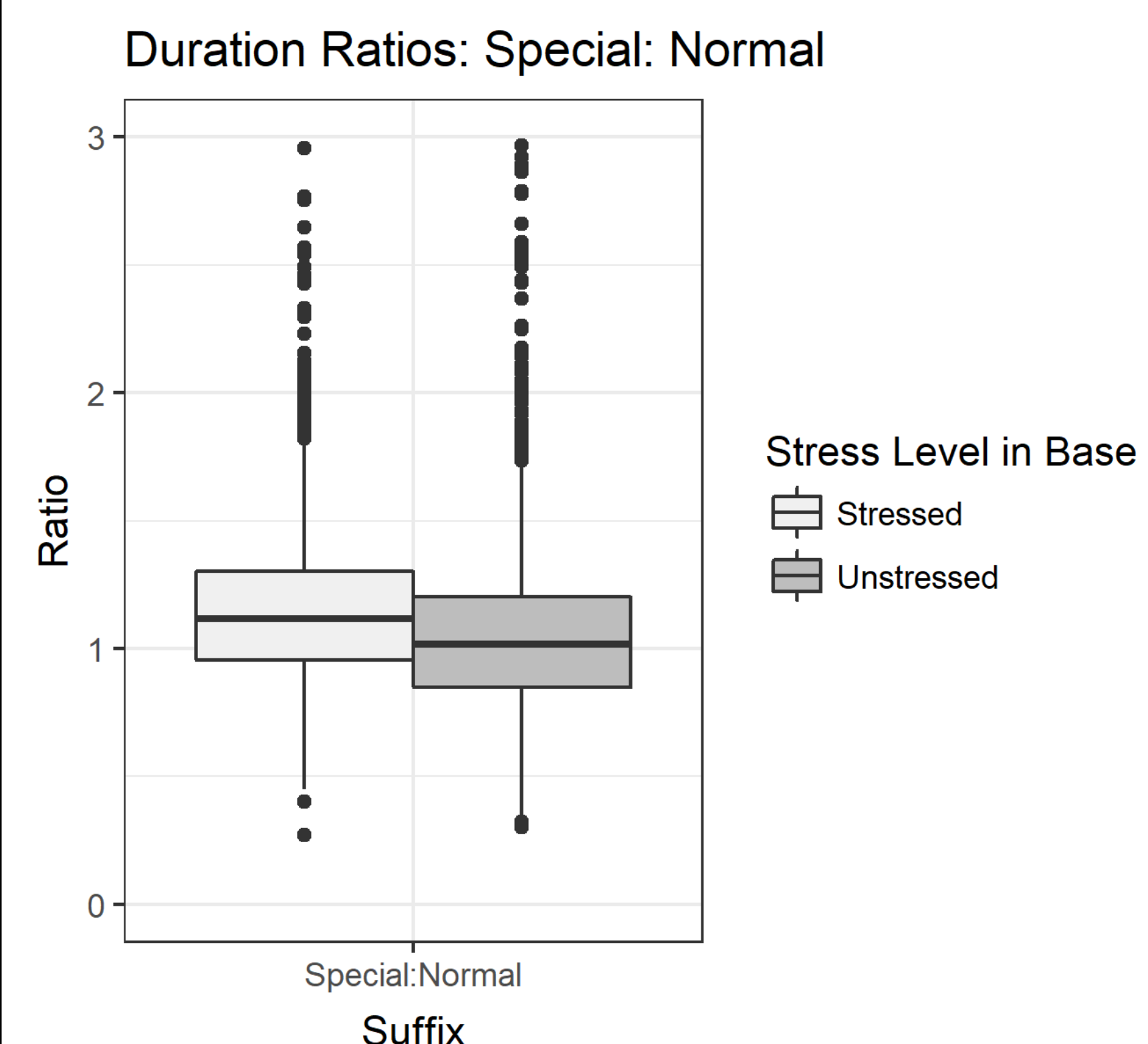
		e	u	a	
Special Suffix	[eduka'dʒĩɲa]	55ms	33ms	55ms	
Normal Suffix	[eduka'tʃĩva]	54ms	29ms	34ms	
		1.02	1.14	1.61	Ratio

III. Results

Duration

- Stressed base vowels are **longer** in special suffix words than in normal suffix words

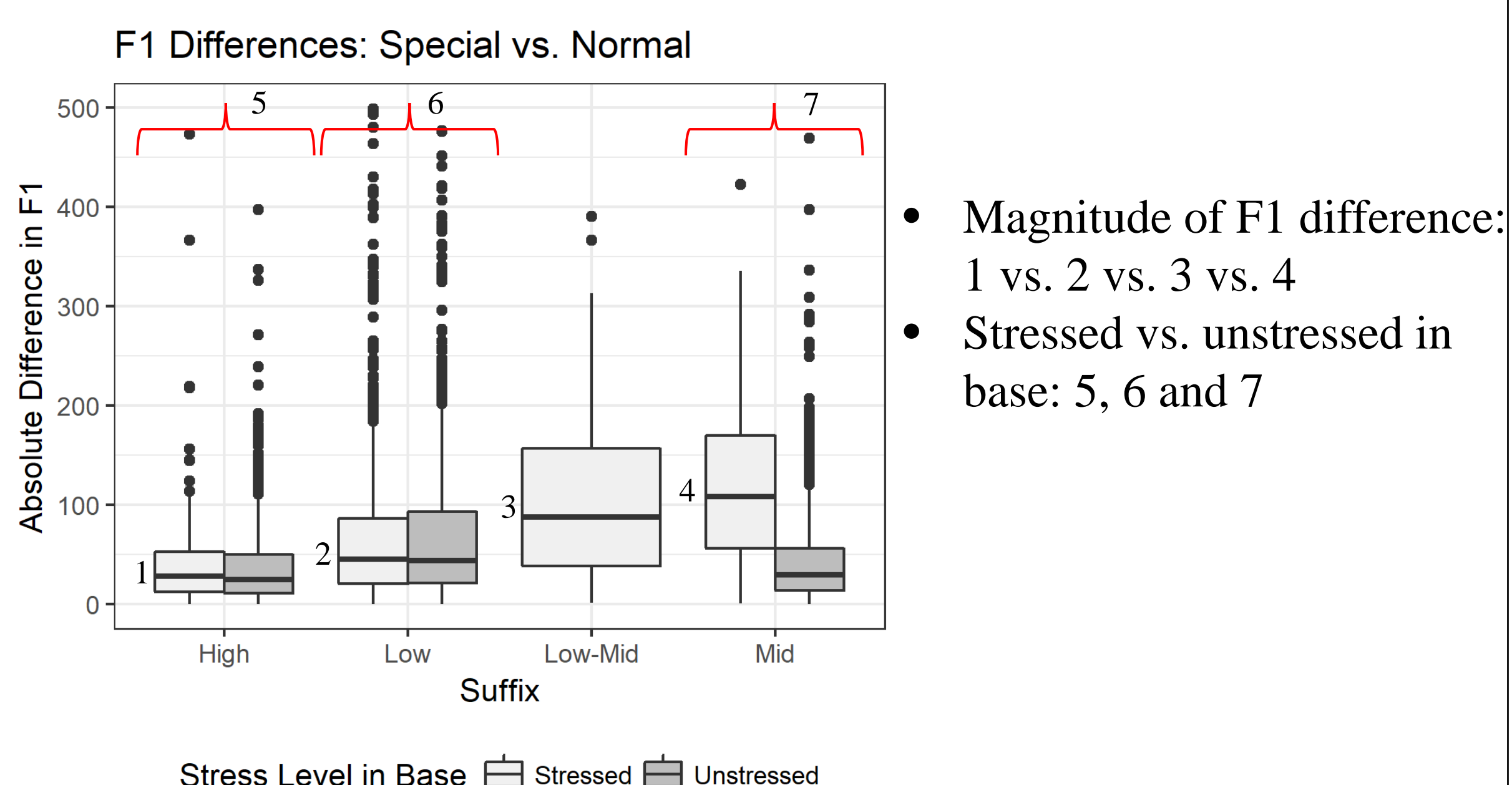
	Special		Normal
Stressed Base Vowel	eduka'dʒĩɲa	>	eduka'tʃĩva
Unstressed Base Vowel	eduka'dʒĩɲa	≈	eduka'tʃĩva



F1

- Stressed base vowels maintain vowel quality in special suffix words as compared to normal suffix words
- Magnitude of F1 difference
 - Mid vowels have **higher F1 difference measures**, reflecting unstressed mid vowel reduction
- Differences between stressed and unstressed base vowels
 - Stressed base vowels have **higher F1 difference measures** than unstressed base vowels for mid vowels

	Low-Mid	Mid	High	Low
Special	kafɛ'zĩɲo	modɛxna'mɛtʃi	pozitʃĩva'mɛtʃi	delika'dʒĩɲa
Normal	kafɛ'teira	modɛxni'dadʒi	pozitʃĩvi'dadʒi	delika'deza
	Difference in F1 >		Difference in F1	



IV. Discussion & Conclusions

- Empirical evidence supporting theoretical claims of stress maintenance
- Serial account of morphological spell-out: base and suffix undergo phonology separately
 - E.g. [ʒenerɔz'isima] spelled out [ʒene'rɔza] before suffix to maintain stress on stressed base [ɔ]
- Are there structural properties that unify the class of special suffixes and distinguish them from normal suffixes?
 - All attach to an already-formed prosodic word
- Special suffixes may maintain stress to differing degrees (contra traditional accounts that treat them the same)
 - (z)inho > -issimo > -mente
- Morphology:** differ from each other (and from normal suffixes) in place and manner of attachment
 - Diminutives** attach outside number and gender marking; **superlatives** attach outside gender, the **adverbial** attaches to a feminine adjective or coordinated adjective phrase
 - Diminutives** (Bachrach & Wagner 2007) and **superlatives** may be modifiers; the **adverbial** assigns category
 - May also differ in *root* vs. *head* status (along the lines of Creemers et al. 2018; Lowenstamm 2014)
 - Different properties may affect spell-out and prosodic word formation

