

## An Evaluation of Secondary Prominence in Spontaneous Brazilian Portuguese

Ricardo Napoleão de Souza & Maria Cantoni

University of Helsinki & Universidade Federal de Minas Gerais

Secondary stress refers to prominences that occur in a word in addition to the main prominence (primary stress). However, not only are solid phonetic parameters to detect secondarily stressed syllables lacking, but there is also disagreement about its role in language-specific phonology (cf. Cutler 2010, Tabain et al. 2003). Whatsmore, methodological and theoretical differences in investigations of secondary stress make it difficult to extract meaningful generalizations. Major unresolved issues include: the role of phrasal prominence, differences between spontaneous and prepared speech, and the role of morphosyntactic processes such as derivation in the phonetic expression of secondarily stressed syllables.

This paper tackles those issues by examining the acoustic properties of unstressed syllables in spontaneously produced Brazilian Portuguese. Four main traits make Portuguese ideal for the investigation secondary prominence: i) the frequency of long uncompound words in the core vocabulary (e.g. *borboleta* /boɦ.bo'le.tɛ/ for 'butterfly'); ii) common derivation processes through affixation (*borbolet-inha* /boɦ.bo.le'tʃi.nɛ/ 'small butterfly'); iii) variable stress location; and iv) widespread unstressed vowel reductions (see Cristófaró-Silva et al. 2019). There is also wide disagreement regarding secondary stress in Portuguese, which may partly derive from methodological issues and different data sources (cf. Abaurre & Galves 1998, Arantes & Barbosa 2006, 2008, Fernandes-Svartman et al. 2019, Magalhães 2019, Moraes 2003). To the best of our knowledge, this is the first study of secondary prominence that examines spontaneous speech.

**Method.** The data analyzed here comes from recordings of 40 Brazilian Portuguese speakers (20 female, mostly from Minas Gerais state), from a preexisting database (Follador Neto et al. 2019). We extracted all polysyllabic words of four or more canonical syllables from the corpus. Main dependent variables were *duration*, intensity, spectral emphasis, F1, F2 and f0. Independent variables included: word size (no. of syllables), location relative to the primarily stressed syllable (pre- or post-stressed), distance to the stressed syllable (in no. of syllables), derivation status (simple or derived). Additionally, for derived words we coded whether the syllable carried main stress in the underived form. Independent control variables included: vowel height (high, mid, or low), nasality (oral or nasal), and position within the Intonational Phrase (pre-boundary, post-boundary, or mid-phrase).

The data were manually segmented and annotated. Praat scripts extracted all the acoustic measurements. A statistical classifier was used to identify patterns based on the most relevant acoustic cues. The results were compared with a classification based on the locations of secondary stress predicted by phonological studies and the comparison was tested for statistical significance in R.

**Results & Discussion.** A preliminary assessment of the data suggests that secondary stress placement is more variable than predicted by phonological studies. It appears to interact with both morphological factors, and with vowel reduction phenomena. While postulated by phonologists, phonetic studies have found little support for the existence of systematic secondary prominence in Portuguese, few of which have examined spontaneous speech. The full analysis of the present data will help resolve some of those issues.

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