Prosodic independence of affixes in Brazilian Portuguese: an experimental approach

In this work we revisit our analysis on the prosodic independence of affixes in Brazilian Portuguese (BP), enriching the phonological and morphological analysis with phonetic-based evidence (cf. AUTHOR).

BP presents at least two classes of prefixes and suffixes depending on its degree of semantic and morphosyntactic autonomy and on the fact of being subject to phonological processes typical to the root or word level – in derivational terms. The main focus of this study are prosodically free affixes, which we designate as compositional.

Concerning the left edge of the base, some arguments for two classes of prefixes in BP are: i) when two prefixes are attached to the base, the compositional prefix is always more peripheral, as in *ex-corresponsável* (*former co-responsible*), where the prefix ex- is more external than the prefix co-; ii) some prefixes can occur independently in the sentence (in certain contexts), as it occurs with *pré-*, replacing *pré-escola* (*pre-school*) or vice-, replacing *vice-presidente* (*vice-president*), but not with in- for *infeliz* (*unhappy*), for instance.

For the right edge of the word, there are even more reasons to differentiate classes of affixes in BP: i) when two suffixes are attached to the base, the compositional suffix is always more peripheral, as in *adoravelmente* (*adorably*), where the suffix -mente is more external than the suffix -vel; ii) the word seems to be the morphological base for the compositional affixation, since some suffixes are attached to inflected forms, as -mente to the feminine base $linda_{\text{FEM}} \rightarrow$ *lindamente* (*beautifully*) or -zinho to the plural base $corações_{\text{PL}} \rightarrow$ *coraçõezinhos* (*hearts*, diminutive); iii) the suffix -mente permits the coordination of two different adjectival bases, as in *tranquila~~mente~~ e calmamente* (*quiet~~ly~~ and calmly*); iv) some phonological processes, like variable vowel harmony, assibilation and velar softening (cf. BISOL, 1981; LEE, 1995) are blocked in derived words with compositional suffixes, despite of presenting the ideal context to apply, as in *m[e]dinho* ~ **m[i]dinho* (*fear*, diminutive), *pacien[t]e* / *pacien[t]inho* / **pacien[s]inho* (*patient*, adj. diminutive), *fonólo[g]o* / *fonolo[g]inho* / **fonolo[ʒ]inho* (*phonologist*, diminutive).

The strongest argument, however, – which includes both prefixes and suffixes – is the fact that words formed by these compositional affixes present two main stresses. This can be proven by the fact that these words are not subject to effects of pretonic vowel neutralization. In Portuguese, a system of 7 distinctive vowels in stressed position is reduced to 5 in pre-stressed position. In many dialects of BP, the opposition between upper and lower mid vowels /e/, /ɛ/ and /o/, /ɔ/ is neutralized in favor of upper-mid, what leads us to interpret words like *pr[ɛ]-conc[é]ito* (*pre-concept*), *p[ɔ]s-voc[á]lico* (*post-vocalic*), *b[ɛ]l[í]nho (beautiful*, diminutive*)*, and *n[ɔ]vam[é]nte* (*again*) as constituted by two prosodic words (possibly in a recursive structure), since they show stressed affixes in addition to stressed bases.

In view of the characterization above, we propose to classify the BP affixes as true (eg. prefixes, re-/des-/co-; suffixes, -al/-ção/-mento) and compositional (eg. prefixes, pré-/pós-/ex-; suffixes, -(z)inho/-mente/-íssimo).

Assuming that (i) phonologically, these affixes are considered prosodic words, (ii) prosodic words are characterized by bearing primary stress, and (iii) primary stress is manifested phonetically, in this work we seek acoustic evidence to support our hypothesis.

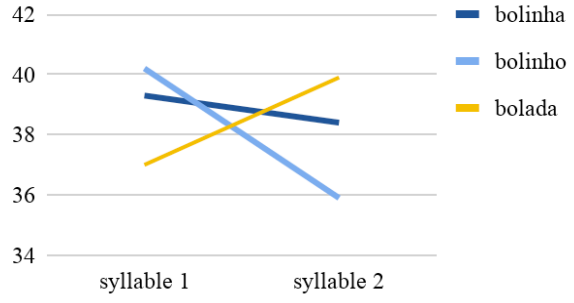
In BP primary stress is identified acoustically mainly by a longer duration (MASSINI, 1991; CANTONI, 2013), as it happens in Italian (ERIKSSON et al., 2016), Swedish (BARBOSA et al., 2013) and English (OKOBI, 1999). In addition, there are decreasing of intensity in post-tonic syllables (FERNANDES, 1976; FERNANDES-SVARTMAN et al., 2008)

and centralization of vowel quality (MORAES, 1986; MIRANDA, 2017) in non-stressed positions.

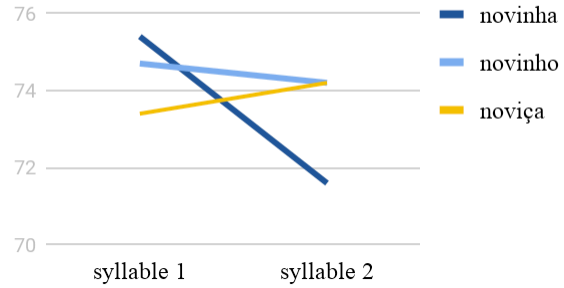
We applied a speech experiment to 5 native BP speakers, males, ranged in age from 20–30, undergraduate-level education. The speakers were asked to read the frame *Diga X pra mim* (*Tell me X*), where X was a simple or complex word of the language. The list was repeated twice. The words investigated were predominantly formed by a root with lower or upper mid-vowel, as in *n[o]vo*, *n[ɔ]va* (*new*, masc. and femin.), in stressed position, and its suffixed counterparts (e.g. *n[o]vinho, n[ɔ]vinha* (*new*, masc. and femin., diminutive), since we intended to verify the effects of stress in this context (BISOL, 1992).

Our preliminary results confirm, at least partially, our hypothesis, as we see in the graphics below.

Graphic 1 - relative duration



Graphic 2 - maximum intensity



Graphics 1 and 2 show a comparison between the first and the second syllables of the trisyllabic words with similar bases. The first syllable is that which was stressed in the base and the second syllable is the stressed in the derived form. In our hypothesis of existence of two prosodic words, we expect these contexts behaving similarly in acoustic terms.

In Graphic 1, we see that the relative duration (in %) between the pretonic and the stressed syllables of words with compositional suffixes (e.g. /bo/ in *bolinho*) is close or the pretonic is larger than the stressed syllable; in the word with true suffix (e.g. /bo/ em *bolada*), there is an increase of duration towards the stressed syllable. The same pattern is found in the second graphic: pretonic syllables of words with compositional suffixes (e.g. /no/ in *novinho*) show higher or similar rates (in dB) of maximum intensity (in comparison with the stressed syllable) if contrasted to the pretonic syllable of the word with true suffix (e.g. /no/ em *noviça*).

In cases where we assume there is only one prosodic word, we may observe an increase in duration and in maximum intensity towards the stressed position. Other comparisons show similar values between the different words, but we can highlight that, when an initial syllable is stronger, it happens in presence of compositional suffixes, not true ones.

In the continuity of this research, we are investigating these correlates in both prefixed and suffixed words. Some data are being recollected and will be analyzed for duration, spectral emphasis and formant values. The difference between compositional and true affixes will also be analyzed in relation to its morphological processing in an eye tracking experiment.