The prosodization of neoclassical elements in Brazilian Portuguese: evidence from vowel reduction

Guilherme Duarte Garcia Natália Brambatti Guzzo (McGill University) (Universidade Federal do Rio Grande do Sul)

Neoclassical elements (NCEs), such as *agro* in *agronomy* and *psycho* in *psychology*, have been assigned different morphological classifications: from affixes, to stems, to combining forms (see [2], [6]). Assuming that NCEs belong to any of these categories implies that they present a consistent behavior throughout the language. However, not only do NCEs combine with distinct types of structures (e.g. other NCEs, such as in *psycho-logy*, or independent words, such as in *psycho-linguistics*), but they may also exhibit different phonological aspects according to the element to which they attach. In this paper, we argue that differences in vowel reduction (VR) in the NCE-final /o/ indicate that NCEs in Brazilian Portuguese (BP) are prosodized in two ways: as regular prosodic words (PWds) when combined with another NCE (1a), and as compounds (recursive PWds) when combined with an independent PWd (1b).

- (1) NCE + NCE (a), and NCE + PWd (b) sequences
 - a. 'agr-o-nomia' (agro-nomy), 'psic-o-logia' (psycho-logy)
 - b. 'agr-o-negócio' (agribusiness), 'psic-o-terapira (psycho-therapy)

Our hypothesis is that BP speakers recognize the PWd boundary in constructions such as those in (1b). In this case, the NCE-final vowel would correspond to a post-tonic vowel, thus being more subject to reduction ([5],[7]). The NCE-final vowel in constructions such as (1a), on the other hand, would correspond to a pre-tonic vowel, which is less susceptible to reduction.

Methods

Two independent preliminary tests were conducted to investigate whether morphological construction had the predicted effect on VR in the NCE-final vowel /o/. The production test involved carrier sentences containing constructions from both groups (1a) and (1b). Target (n=32) and filler (n=32) sentences were randomly presented to BP speakers (n=5) in both focus and non-focus positions. Speakers' production of target items (n=320) was analyzed in terms of formant values (F1, F2) of the NCE-final vowel. The experiment also controlled for duration, preceding and following vowel and consonant, focus/non-focus position, and distance from target syllable to stressed syllable in the construction.

The perception test was developed on Praat [3] and involved an almost identical set of target words (n=30), which were recorded by a native speaker of BP—production data were not used in the perception test due to the subtle differences in F values involved. Each construction had reduced and unreduced versions, and was replicated twice during the test. Speakers (n=10) judged items on a 10-point scale, based on what sounded more frequent/natural to them. A pretest containing common and unattested reductions (n=10) was used to verify speakers' understanding of the task. Each subject judged a total of 402 items (272 fillers). Perception and production data were analyzed in R and modelled with Ordinal Regression and Linear Mixed-Effects Regression, respectively.

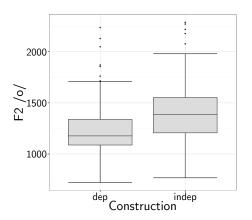
Results

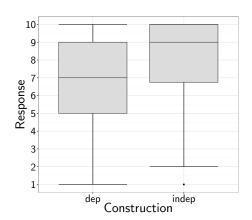
In the production test, only F2 values of the NCE-final /o/ were significantly affected by morphological construction. As predicted, NCE + PWd sequences (1b) yielded more vowel reduction in terms of F2 ($\hat{\beta} = 105$, p < 0.01, with by-speaker and by-item random effects). These results are consistent with what has been cross-linguistically observed ([4],[1]).

In the perception test, VR in NCE + PWd sequences was judged significantly better than in NCE + NCE constructions ($\hat{\beta} = 1.18$, p = 0.004, with by-speaker and by-item random effects). In other words, speakers judged VR in PWd-boundary position as significantly more natural, which follows from our predictions. Results of both tests are shown in Fig. 1—perception test results refer to items with VR.

Figure 1: Production and perception tests

Production test: F2/construction Perception test: response/construction





The preliminary results confirm the hypothesis that speakers do seem to identify a prosodic boundary between an NCE and the following form in NCE + PWd constructions. Thus, we argue that distinct prosodic representations are empirically motivated for NCEs in BP: $NCE+NCE \rightarrow PWd$, whereas $NCE+PWd \rightarrow compound$ (recursive PWd).

References

- [1] Albano Leoni, F., Cutugno, F., and Savy, R. (1995). The vowel system of Italian connected speech. In *Proceedings of the XIII International Congress of Phonetic Sciences*, Stockholm, volume 4, pages 396–399.
- [2] Bauer, L. (1998). Is there a class of neoclassical compounds, and if so is it productive? *Linguistics*, 36(3):403–422.
- [3] Boersma, P. and Weenink, D. (2001). Praat, a system for doing phonetics by computer. *Glot International*, 5(9/10):341–345.
- [4] Bolinger, D. (1989). Intonation and its uses: Melody in grammar and discourse. Palo Alto: Stanford University Press.
- [5] Câmara, J. M. (1970). Estrutura da língua portuguesa. Petrópolis: Editora Vozes.
- [6] Lüdeling, A. (2005). Neoclassical word-formation. Unpublished manuscript.
- [7] Wetzels, W. L. (1992). Mid vowel neutralization in Brazilian Portuguese. Cadernos de Estudos Linguísticos, 23.