

Phonetic cues in the production of aspectual periphrases
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This paper focuses on two distinct interpretations of the sequence *viver* ‘to live’ + gerund in Brazilian Portuguese (BP), depending on whether it constitutes a biclausal construction, exemplified in (1), or a frequentative aspectual periphrasis which is monoclausal, as in (2). In particular, we investigate whether there are phonetic cues related to the syntactic and semantic differences between both constructions.

- (1) Ele **viveu** **trabalhando** com recicláveis.
 he live-SPAST-3SG work-GER with recyclables
 ‘He lived working with recyclables.’
- (2) Meu carburador **vive** **entupindo**.
 my carburator live-PRES-3SG get_stuck-GER
 ‘My carburator keeps getting stuck.’

Like other complex predicates in Ibero-Romance (Laca, 2005; Abeillé and Godard, 2010), the construction in (2) does not allow extraction of the gerund or constituent interpolation, while the biclausal construction does, and furthermore it allows for inanimate subjects (Amaral, 2013). However, Squartini (1998) claims that the aspectual periphrasis formed by *viver* + gerund is at an initial stage of grammaticalization. There is a great deal of evidence that the development of aspectual constructions involves phonetic reduction (Lehmann, 1985; Bybee et al., 1994). We asked then, whether tensed forms of the verb *viver* would show any evidence for phonetic distinctions between the biclausal and the more innovative aspectual uses. This was tested in the production study described below.

Nine speakers of BP were recorded with a Shure (Beta 58A) microphone. Participants pretended they were on a television show, interviewing famous Brazilians. They were presented with “fan letters”. Each subject read the “letter” out loud, and then read the target question, as in (3):

- (3) É verdade que você **vive** **pregando** na favela?
 be-PRES-3SG truth that you live-PRES-3SG preach-GER in-the shantytown
 ‘Is it true that you live preaching in the shantytown?’

Each subject produced 4 pairs of identical segmental strings: the “fan letters” provided context to disambiguate them as either the biclausal or aspectual interpretation. 12 fillers were included for a total of 20 trials. All target utterances included the 3rd person singular present form of the verb *viver*, i.e. *vive* ([‘vivi]). We hypothesized that if there were prosodic reduction, this could be identified by looking at the duration of the stressed vowel [i] in the word that was constant for all trials (*vive*). In addition to measuring the duration of the stressed vowel in [‘vi.vi], we measured v-v duration, i.e. the duration from the onset of the vowel to the onset of the following vowel. This latter measure is known to be relevant for both speech production and perception (Barbosa, 2007) and we include this measure since it allows us consider vowel flow for speech production.

T-tests revealed a significant effect of interpretation (bicausal vs. aspectual) on the stressed vowel's duration. The stressed vowel in [vi.vi] was significantly *shorter* when produced for the biclausal interpretation, and showed little variation (1ms s.d. for the biclausal interpretation vs. 6ms for the aspectual interpretation) ($t = -2.03$, $df = 60$, $p > 0.04$). Thus the duration of the lexically stressed vowel in the more innovative, aspectual interpretation tended to be longer, and showed more variability. Interestingly, the v-v measure revealed no significant differences for the production of the two interpretations ($t = -0.52$, $df = 62$, $p > 0.06$). Considering that the stressed vowel was significantly longer for the aspectual interpretation, this means that the onset of the second syllable was produced with a shorter duration, i.e. the second voiced labiodental fricative consonant in [vi.vi] tended to be produced with a shorter duration for the aspectual interpretation vs. the biclausal interpretation. This means that speakers maintain similar durations for v-v units when producing [vi.vi] for both interpretations, but make durational adjustments *within* the v-v unit, while still making a prosodic (durational) distinction between the two interpretations. It is possible that this strategy is used to preserve BP's rhythmic template.

Our results show that the two constructions are distinct at the phonetic level. We argue that such a fine-grained distinction is used to guide the hearer to the innovative, aspectual interpretation. For instance, Tomlinson & Foxtree (2011), in their discussion of backward-looking versus the uncertainty functions of uptalk (rising pitch on declaratives), show evidence that whether the rise in pitch is prolonged or not helps listeners to disambiguate between the two interpretations. Similarly, the durational modifications in our study (a longer stressed vowel and shorter onset in the following syllable) would provide the speaker with additional cues for arriving at the intended interpretation of *vive* when it precedes a gerund. This work makes clear that it is crucial to investigate how fine-grained phonetic modifications are used to signal a distinction between possible interpretations. While our work examines this from a speaker-oriented point of view, future work should also examine how these cues are used by listeners.

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