

## Comparing phrase-final patterns across speech styles and age groups in European Portuguese

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### Résumé

*Le présent travail se propose d'étudier les effets phonétiques-phonologiques et les types de tons présents à la frontière d'unités intonatives majeures et mineures (indices de rupture 4 et 3 du système ToBI), en comparant la parole spontanée et la parole préparée (non lue) produites par des adolescents et par des adultes à l'école. Le corpus analysé est constitué d'un relevé de 1041 unités intonatives extraites de 18 présentations orales faites par 6 élèves (14-15 ans) et 3 professeurs (un sous-ensemble du corpus CPE-FACES). Les résultats montrent que les indices phonétiques et prosodiques en fin d'unités intonatives varient en fonction (i) du style de parole et (ii) de l'âge/statut des locuteurs.*

**Keywords:** *speech styles, phrase-final patterns, teenagers vs. adults*

### 1. Introduction

Previous works on speaking style variation have shown that both segmental and prosodic aspects can be linked with style changes along the spontaneous-read continuum (see Eskénazi 1993, Barry 1995 & Hirschberg 2000, for an overview and discussion). Such works were largely based on adult speech. References to teenagers are sparse and cross-analyses of speech types comparing teenagers and adults are rare.

Exploring a subset of spontaneous and prepared presentations from a corpus of European Portuguese spoken by teenagers and adults at school (CPE-FACES), our previous work shows that the distribution of final intonation contours – i.e. fluent final intonation contours in declarative utterances – can differentiate spontaneous and prepared unscripted speech from teenagers and adults (Mata et al. submitted; Mata et al., 2014). There is a significant correlation between speech type and low / falling vs. high / rising tones, for both adults and teenagers. Unlike adults (the teachers), teenagers (the students) increase non-low patterns – mainly (L+)H\* H – across phrase levels in prepared speech; adults differ from teenagers by using more non-low patterns in spontaneous speech. Mata et al. (2014) also show that

several phonetic-phonological effects frequent in EP are common in phrase-final position – namely vowel devoicing/deletion in post-stressed position, frication of plosives and vowel epenthesis (see Mateus & d’Andrade 2000 and references therein), as well as final creaky voice effects and aspiration cues (seen as phrase boundary cues in other languages). Moreover, these effects have a negative impact on the automatic segmentation of oral presentations, particularly in teenagers’ data.

This paper analyzes the distribution of phonetic-phonological effects at the end of fluent intonational phrases and minor phrases (ToBI breaks 4 and 3), as well as the edge tone types used with these boundaries, in the same corpus subset. Our main goal is to examine to what extent such patterns vary depending on (i) the speech situation and (ii) the speaker’s status/age.

## 2. Methodology

Our study uses a subset of CPE-FACES, a corpus of European Portuguese spoken by teenagers and adults in school context (16h). This subset comprises 9 spontaneous presentations and 9 prepared unscripted presentations, from 6 students (14-15 years old, balanced by gender) and 3 teachers (2 women and 1 man), all speakers of standard European Portuguese (Lisbon region). In the spontaneous situation, students and teachers were unexpectedly asked to relate a (un)pleasant personal experience. The prepared situation corresponds to typical school presentations, about a book the students must read following specific programmatic guidelines (for more detailed information on CPE-FACES, vide Mata et al. 2014).

Corpus annotation (manual and automatic) includes the following time-linked levels: phone, syllable and word level transcriptions (including co-articulation effects); disfluency and paralinguistic events (clicks, breathing, cough, laughs, ...). The subset used was recently annotated for prosodic prominence and phrasing with the ToBI prosodic system adapted to European Portuguese – Towards a P\_ToBI by Viana et al. 2007 (for detailed information on inter-annotator agreement in terms of tonal events and break levels, vide Mata et al. 2014).

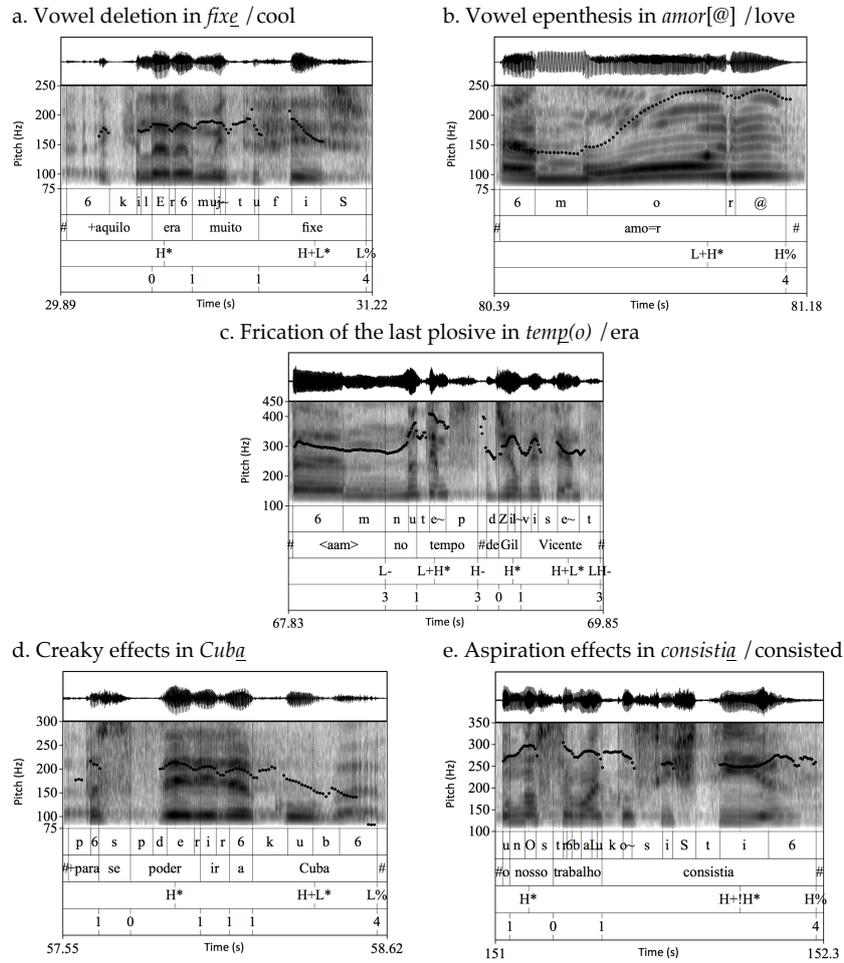


Figure 1: Examples of phonetic-phonological effects in phrase-final position (transcriptions in SAMPA)

Along with the prosodic annotation, phonetic-phonological effects were further annotated in phrase-final syllables (pitch accented/post-stressed). Vowel devoicing/deletion and vowel epenthesis ([@]) in post-stressed position, frication of plosives (preceding deleted post-stressed vowels), final creaky voice and aspiration effects are common in the data. Examples above illustrate these effects.

In the 18 oral presentations, a total of 1871 phrase boundaries was analyzed: 47.7% in the spontaneous situation (phrasing rate: 30.7%)

and 52.3% in the prepared situation (phrasing rate: 33.2%). As speech is edited online in both situations, both spontaneous and prepared data display disfluent phrase breaks (marked with 'p', following ToBI). For the present study, we selected all the fluent phrase breaks in declarative utterances occurring with unstressed syllables in final boundary position: we analyze 1041 fluent phrase breaks (marked with ToBI break indices 4 and 3, corresponding to two levels of intonational phrasing in European Portuguese: the intonational phrase and the minor phrase, respectively): 487 in the spontaneous subset and 554 in the prepared subset. In all the phrases selected, the final word carries a pitch accent.

### 3. Results

Taken together, vowel devoicing/deletion and [@] epenthesis in post-stressed position, frication of plosives, creaky voice and aspiration effects occur phrase-finally in about 49% (505) of the 1041 fluent phrase breaks (spontaneous: 51.7% / prepared: 45.7%; adults: 44.3% / teenagers: 55.9%). On the other 51% (536), none of these effects were observed. Comparing both cases (with/without phrase-final processes), results show a significant correlation with edge tone types ( $p < .0005$ ): in most boundaries with a H(igh) tone (313/60.3% out of 519) final processes are not observed; final processes mostly occur in intonational phrase boundaries (break 4) with a L(ow) boundary tone (break 4: 227/62.4% out of 364; break 3: 72/45.6% out of 158). Furthermore, final processes are overall more frequent for students than for teachers ( $p < .0005$ ), and more frequent in spontaneous than in prepared speech; fluent phrase-breaks without final processes tend to increase in prepared speech, and this is more evident in teachers' data than in students' data ( $p < .01$ ).

Focusing on the 505 fluent phrases that were realized with a phonetic-phonological effect in final position (V devoicing/deletion: 42.5%; creaky: 21.4%; frication: 17%; V epenthesis: 10.3%; aspiration: 8.8%), there is a clear difference regarding phrase levels ( $p < .001$ ) and edge tone types ( $p < .03$ ). Intonational phrase boundaries display a higher percentage of phrase-final effects (break 4: 65%; break 3: 35%). Vowel devoicing/deletion, frication of plosives, creaky voice and aspiration effects are more frequent with L boundaries; vowel epenthesis ([@]) is more frequent with H boundaries – associated to continuation marking. Thus, considering the differences between intonational phrases and minor phrases, as well as the general interpretation of final highs and lows as a signal of continuation/finality, the data suggest a stronger association of (most) phrase-final phonetic effects with the expression of finality.

Furthermore, across phrase levels, vowel devoicing/deletion and creaky voice – the main effects in our data - are in general more common in spontaneous speech (spontaneous: 54.1% V devoicing/deletion / 59% creaky effects). Frication, aspiration and [ə] insertion occur most frequently in prepared speech (prepared: 57% frication / 65.9% aspiration / 63.5% [ə] insertion), for both adults and teenagers ( $p < .01$ ). European Portuguese is a language known to extremely reduce and frequently delete post-stressed vowels, particularly in phrase-final position. Comparing teenagers (the students) vs. adults (the teachers), the data shows that there is a clear difference between both groups of speakers regarding the frequency of final post-stressed vowels devoicing/deletion processes in spontaneous speech (higher for teenagers than for adults -  $p < .0005$ ), although not in prepared speech. Their frequency decreases significantly ( $p < .0005$ ) in teenagers' prepared presentations, and the opposite is true for adults ( $p < .01$ ). This usage of contrastive strategies is consistent with the distributional patterns observed for edge tones across phrase levels: globally teenagers increase H in the prepared presentation ( $p < .01$ ); adults increase L ( $p < .04$ ). These changes may be interpreted as indicators of how speakers adapt to the speaking styles required at school, adopting different strategies in an attempt to reach a similar final effect. Basically, spontaneous and prepared presentations differ in the degree of planning involved, the type of information communicated, the speakers' attention to the speech task, and effort to speak clearly and to keep the listeners attention. These differences are interpretable as differences in intelligibility between styles (cf. Eskénazi 1993).

#### **4. Conclusions**

In this paper we have presented a brief analysis of phrase-final patterns, comparing teenagers vs. adults' spontaneous and prepared unscripted speech at school. Taken together, the results described in the present study indicate significant effects of speech style and status/age group on the distribution of phonetic-phonological processes and edge tone types associated with phrase boundaries. These results are consistent with those reported in previous studies on intonational variation and speaking style changes in European Portuguese, including nuclear contours, phrase levels, acoustic features. They allow us to discover more about phrase-final patterns in spontaneous speech and in teenage speech, in particular. Further research is needed to extend the study to other patterns, including timing patterns and phrase-initial patterns, and other speaking styles, including dialogue.

### 5. Acknowledgments

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