

# Prosodic Phrasing in European Portuguese varieties

**ProPro 2017: Processing prosody across languages, varieties,  
and nativeness**

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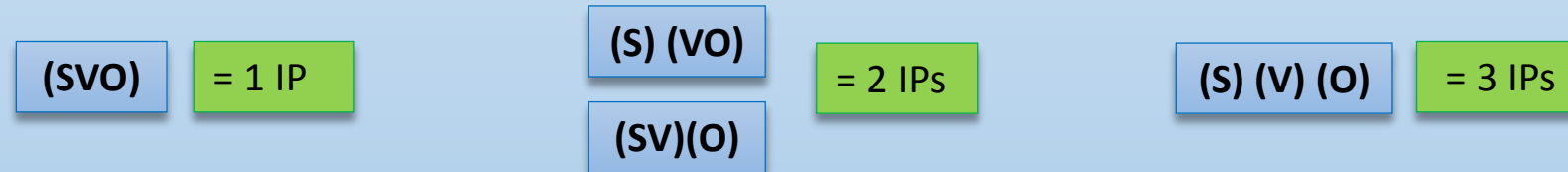
## Overview

- **Prosodic Phrasing**
- **Goal**
- **Methodology**
- **Preliminary Results**
- **Discussion**
- **Future Work**

## Prosodic Phrasing

- Within the Prosodic Phonology framework (e.g., Nespor & Vogel 2007): organization of speech units into constituents, which form phonological domains

- In sentences with Subject (**S**) – Verb (**V**) – Object (**O**) structure, constituents may display different phrasing patterns:



- Syntactic and prosodic factors interact, with a different weight in the different phrasing patterns: prosodic/syntactic constituent branchingness, constituent length (in number of words, syllables) (Avanzi et al. 2014; Elordieta et al. 2003, 2005; D’Imperio et al. 2005; Prieto 2005; among others)

- Cues for prosodic phrasing: boundary tones, pause insertion, F0 pitch range variation, pre-boundary lengthening, sandhi phenomena (Frota 2012, for a review)

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## Prosodic Phrasing

### Prosodic Phrasing

#### Goal

- Studies on prosodic and intonational phrasing across Romance languages and its varieties have shown variation (Intonational phrasing in Romance project; Romance Languages Database <http://rld.lettras.ulisboa.pt>):

#### Methodology

1) different phrasing patterns in sentences with Subject, Verb, and Object structure

#### Preliminary Results

2) differences in the syntactic and prosodic factors that affect these patterns (Cruz, 2013; D'Imperio et al., 2005; Elordieta et al., 2005; Frota, 2000, 2014; among others).

#### Discussion

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- Romance languages: Catalan and Peninsular Spanish (D'Imperio et al. 2005) = **(S)(VO)**
- European Portuguese (EP): Braga (Frota & Vigário 2007; Vigário & Frota 2003) and Alentejo (Cruz 2013) = **(S)(VO)**; Standard European Portuguese (SEP) (Frota 2000, 2014) and Algarve (Cruz 2013) = **(SVO)**

## Goal

### **The current study:**

- Part of a PhD project (funded by the Portuguese Science Foundation - FCT)
- Developed within the InAPoP - Interactive Atlas of the Prosody of Portuguese project  
<http://labfon.lettras.ulisboa.pt/InAPoP/>

### **Understanding phrasing patterns and its variation has impact:**

- In language processing (production and perception)
- Language modeling (speech recognition and synthesis)
- EP teaching/learning as a native or foreign language

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## Goal

Building on previous work on prosodic and intonational phrasing in European Portuguese (Cruz, 2013; Frota, 2000, 2014; Frota & Vigário, 2007; Vigário & Frota, 2003), as well as comparative studies between Portuguese and other Romance languages (D'Imperio et al., 2005; Elordieta et al., 2005; among others), **the main goals of this study:**

(i) Characterize the prosodic phrasing patterns in non-studied varieties of EP (Northern and Central-Southern), using intonational cues (**nuclear pitch accents and boundary tones**) and acoustic cues (**presence/absence of pause**);

(ii) Characterize **prosodic phrasing variation** tendencies in EP.

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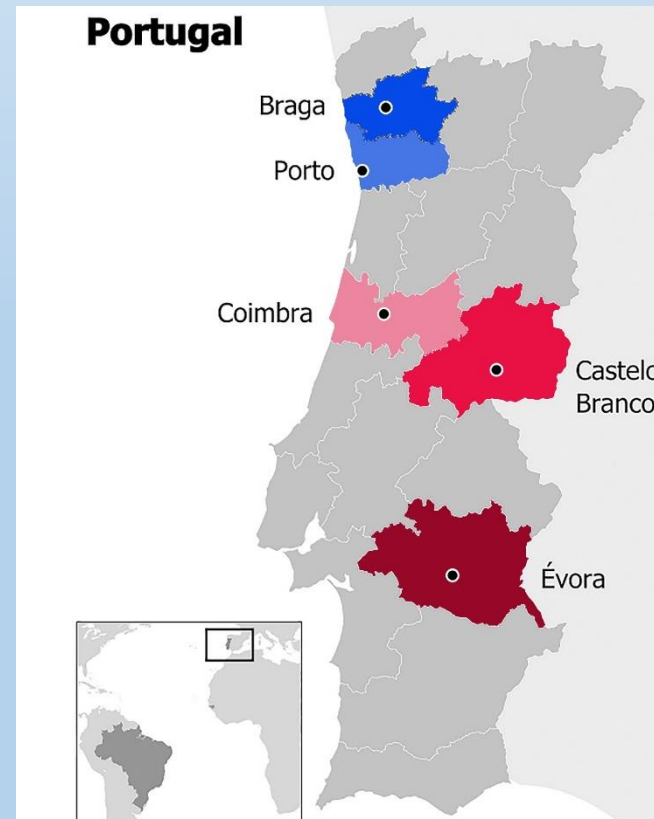
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## Methodology

- Data collected *in loco*, in 5 regions: **Porto** and **Braga** (Northern varieties), **Coimbra**, **Castelo Branco** and **Évora** (Central Southern varieties).



## Methodology

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- InAPoP's reading task:
  - Reading corpus of 76 neutral declarative sentences, previously designed and used to study prosodic phrasing in Romance languages/varieties (Elordieta et al. 2005, D'Imperio et al. 2005)
  - Controlled for syntactic and prosodic complexity: constituent length in number of syllables (short  $\leq 3$  vs. long  $\geq 5$ ) and prosodic words (branching (+1 PW) vs. non-branching (1 PW))

- 2 female native speakers, 20-45 years old, educated; at least 2 renditions per utterance

- 56 out of the 76 sentences: short and long constituents, branching and non-branching constituents

- 56 sentences  $\times$  2 speakers  $\times$  5 regions  $\times$  2 renditions - 54 non-fluent readings)  $\rightarrow$  total of 1066 utterances



## Methodology

- Short non-branching Subject (= 3 syllables), short non-branching Object (= 3 syllables):

*A loura mirava morenos.*

'The blond girl looked at dark-haired boys.'

- Long non-branching Subject (= 6 syllables), long non-branching Object (= 6 syllables):

*A boliviana memorizava uma melodia.*

'The Bolivian girl memorized a melody.'

- Short branching Subject (= 5 syllables), short non-branching Object (= 3 syllables):

*A nora loura mimava meninos.*

'The blond daughter-in-law spoiled small children.'

- Long branching Subject (= 10 syllables), short non-branching Object (= 3 syllables):

*O boliviano mulherengo mirava morenas.*

'The Bolivian ladies' man looked at dark-haired girls.'

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## Methodology

- Prosodic and intonational analysis was made within the Prosodic Phonology and the Autosegmental Metrical approach to Intonational Phonology (e.g., Nespor & Vogel, 2007; Ladd, 2008; Frota, 2000, 2014)

- Data were annotated and analysed in *Praat* (Boersma & Weenink, 2013), where nuclear contours and prosodic breaks were annotated according to P-ToBI (Frota et al., 2015)
- Presence/absence of pause between constituents was also annotated

- 3 tiers: **1) tones:** annotation of nuclear pitch accents and boundary tones; **2) Orthography:** orthographic transcription, word by word, aligned with the spectrogram; **3) Break Indices:** annotation of boundaries of prosodic constituents

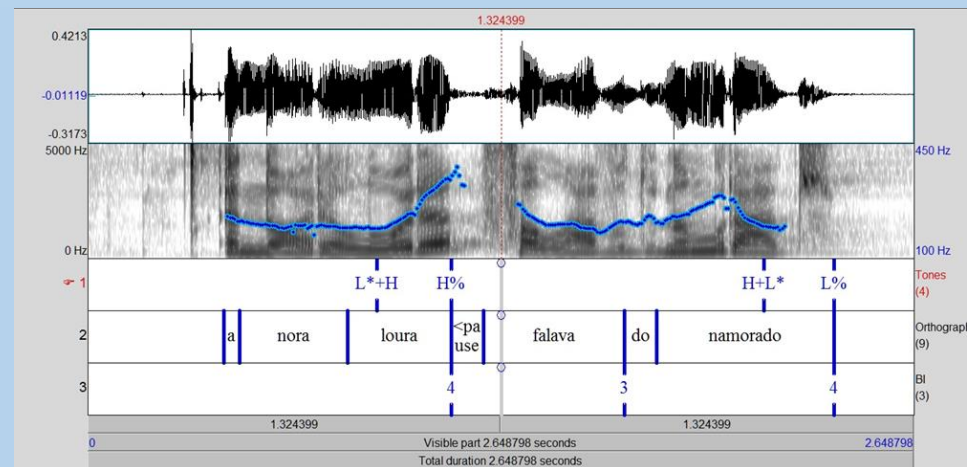


Figure 1. Example of annotation of nuclear contours, boundary tones, orthographic transcription and prosodic constituents in *Praat*.

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## Preliminary Results

- (S)(VO) is the most frequent phrasing pattern in all 5 regions, in all conditions, except for Porto

**but**

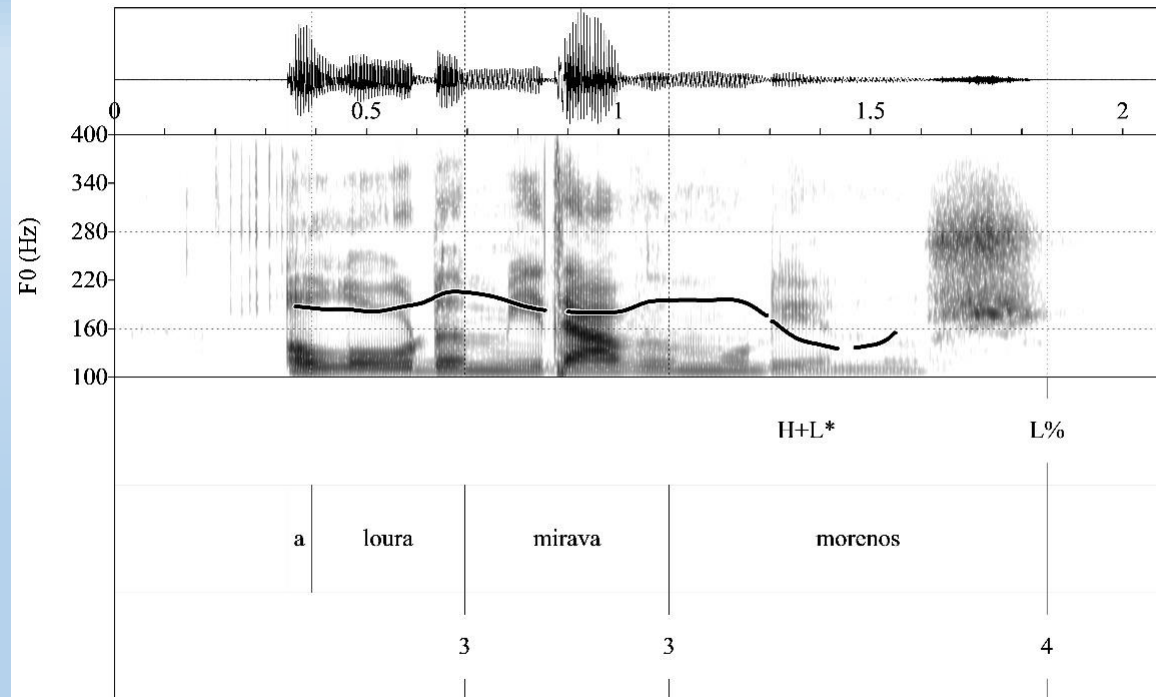
- Branching subjects = (S)(VO) also in Porto (Fig. 4)

	Por		Bra		CtB		Cob		Eva	
	(S)(VO)	(SVO)	(S)(VO)	(SVO)	(S)(VO)	(SVO)	(S)(VO)	(SVO)	(S)(VO)	(SVO)
<b>Phrasing pattern</b>	49%	51%	78%	22%	73%	25%	58%	39%	63%	37%
<b>Non-branch</b>	44%	56%	77%	23%	71%	30%	55%	46%	64%	36%
<b>Branching</b>	65%	35%	83%	18%	80%	13%	68%	20%	59%	42%

Figure 2. Percentage of realization of (S)(VO) and (SVO) phrasing patterns, according to subject branchingness.

## Preliminary Results

Porto



Short, Non-branching S

(SVO)



Figure 3. Intonational contour of the sentence *A loura mirava morenos*, “The blond girl looked at dark-haired boys”, (SVO) phrasing pattern, non-branching subject, produced by a speaker from Porto.

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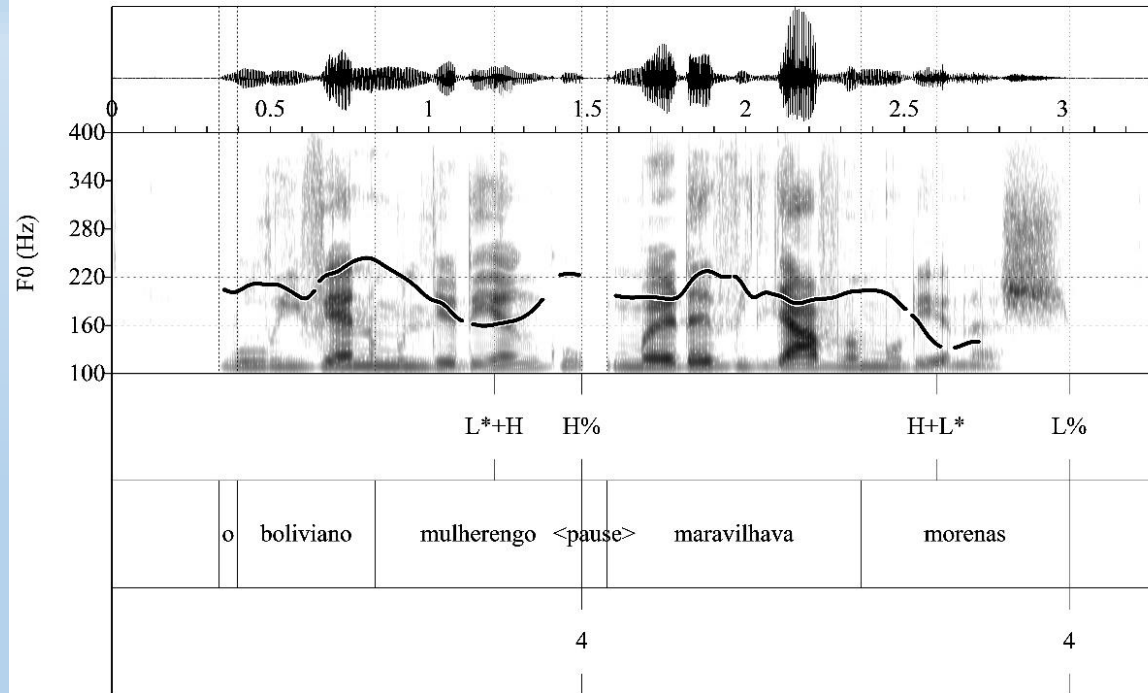
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# Preliminary Results

Porto



Long,  
branching S

(S) (VO)



Figure 4. Intonational contour of the sentence *O boliviano mulherengo maravilhava morenas*, “The Bolivian ladies’ man marvelled dark-haired girls”, (S) (VO) phrasing pattern, branching subject, produced by a speaker from Porto.

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## Preliminary Results

- In non final IPs, **L\*+H H%** is the most frequent contour in Porto, Braga, Castelo Branco. Évora and Coimbra show a different pattern (Fig. 5).

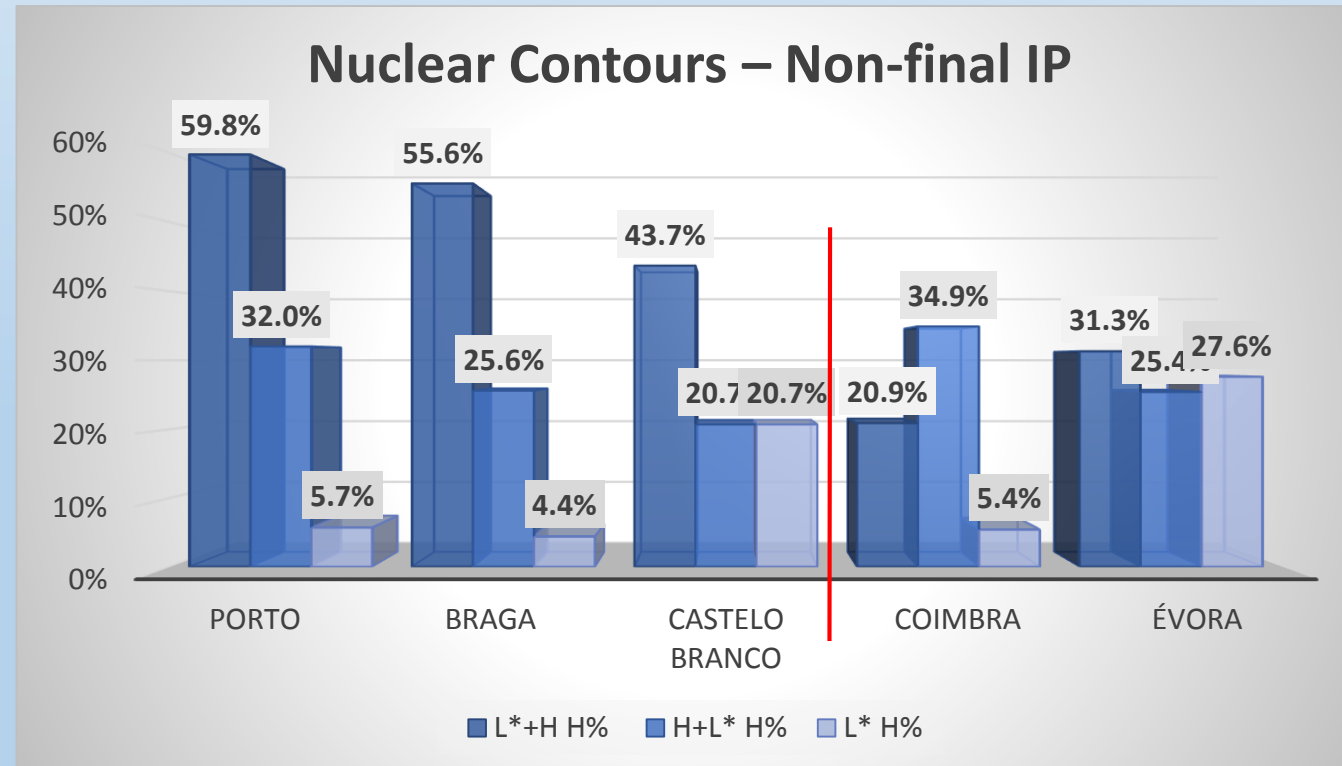


Figure 5. Nuclear contours, in **non-final IPs**, in Porto, Braga, Castelo Branco, Coimbra and Évora.

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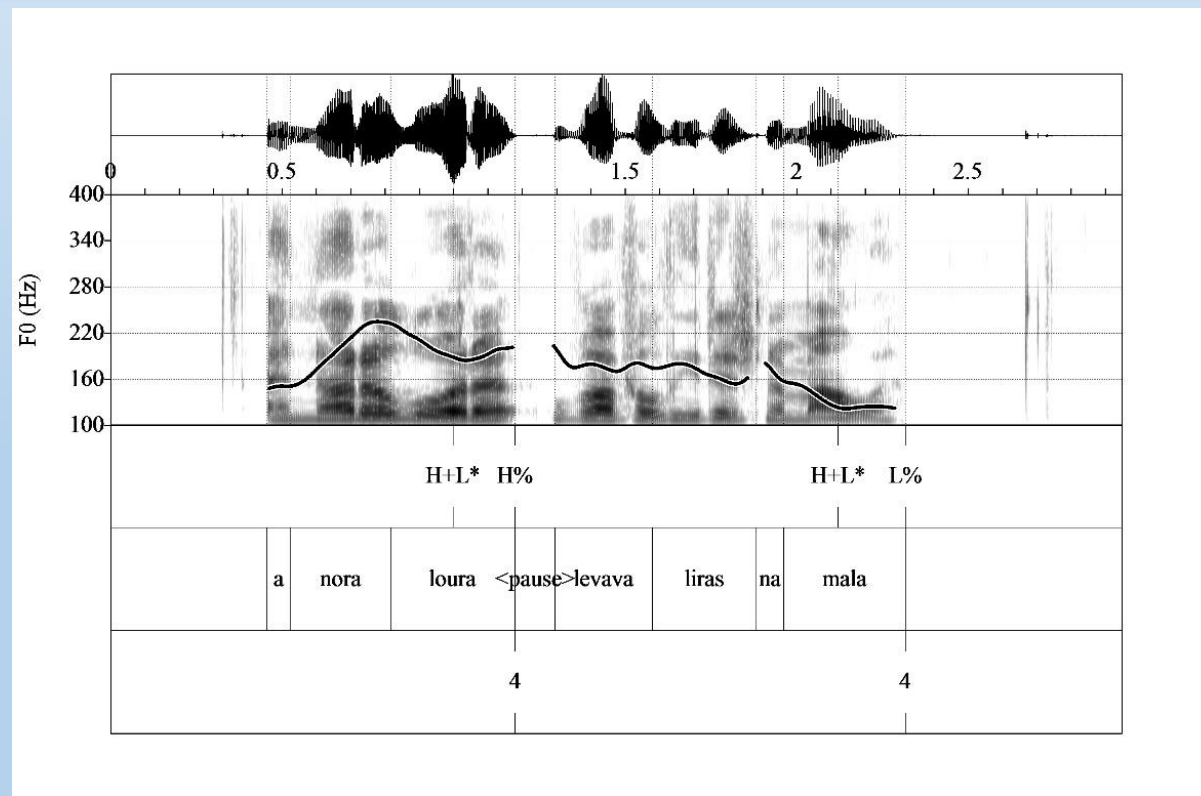
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## Preliminary Results

- In Coimbra, **H+L\* H%** is the most frequent contour in non-final IPs (Fig 6).

Coimbra



Short, branching  
S

H+L\* H% H+L\* L%



Figure 6. Intonational contour **H+L\* H% H+L\* L%**, (S)(VO) phrasing pattern, produced by a speaker from Coimbra.

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## Preliminary Results

- **H+L\* L%** (neutral declarative) is the most frequent contour in **final IPs** and in (SVO) phrasing pattern (Fig. 7).

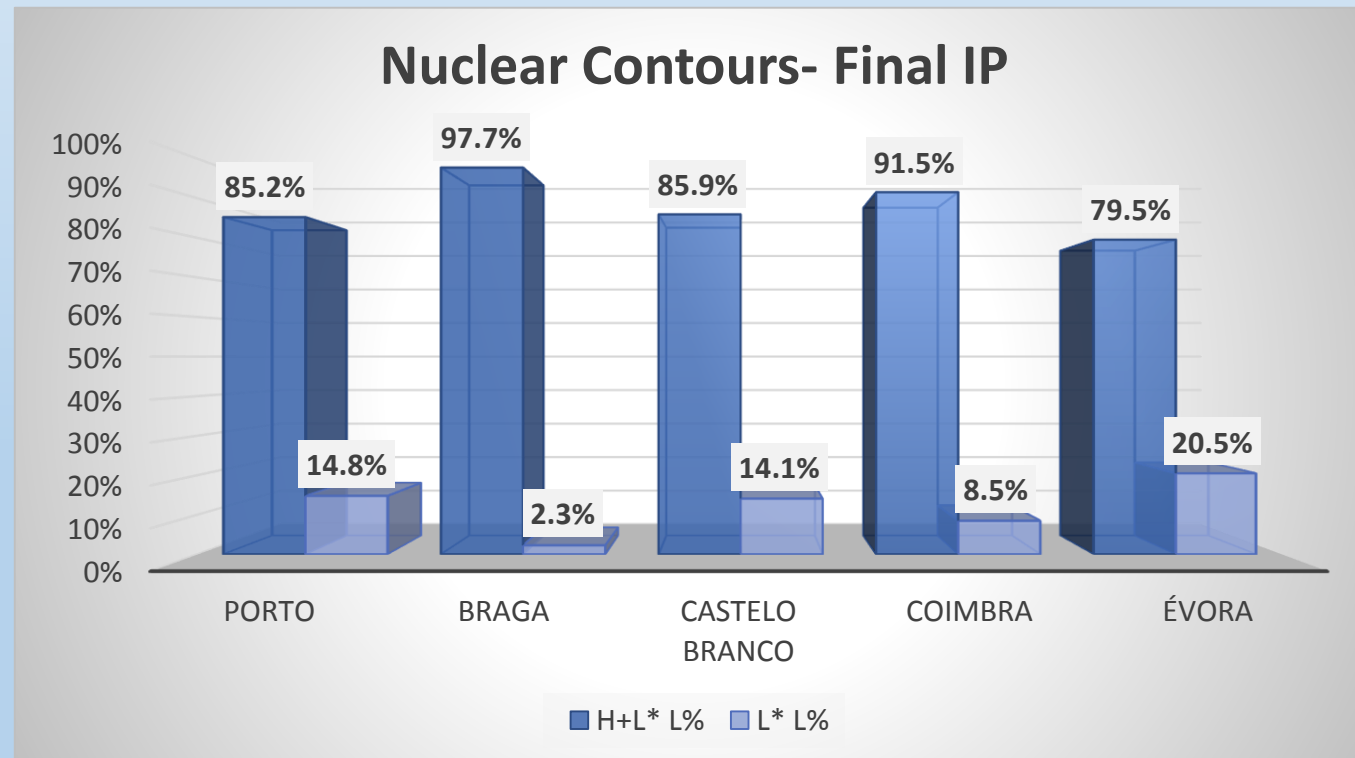


Figure 7. Nuclear contours, in **final IPs**, in Porto, Braga, Castelo Branco, Coimbra and Évora.

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## Preliminary Results

- **Pause** is a cue to mark the prosodic boundary, with variation across regions

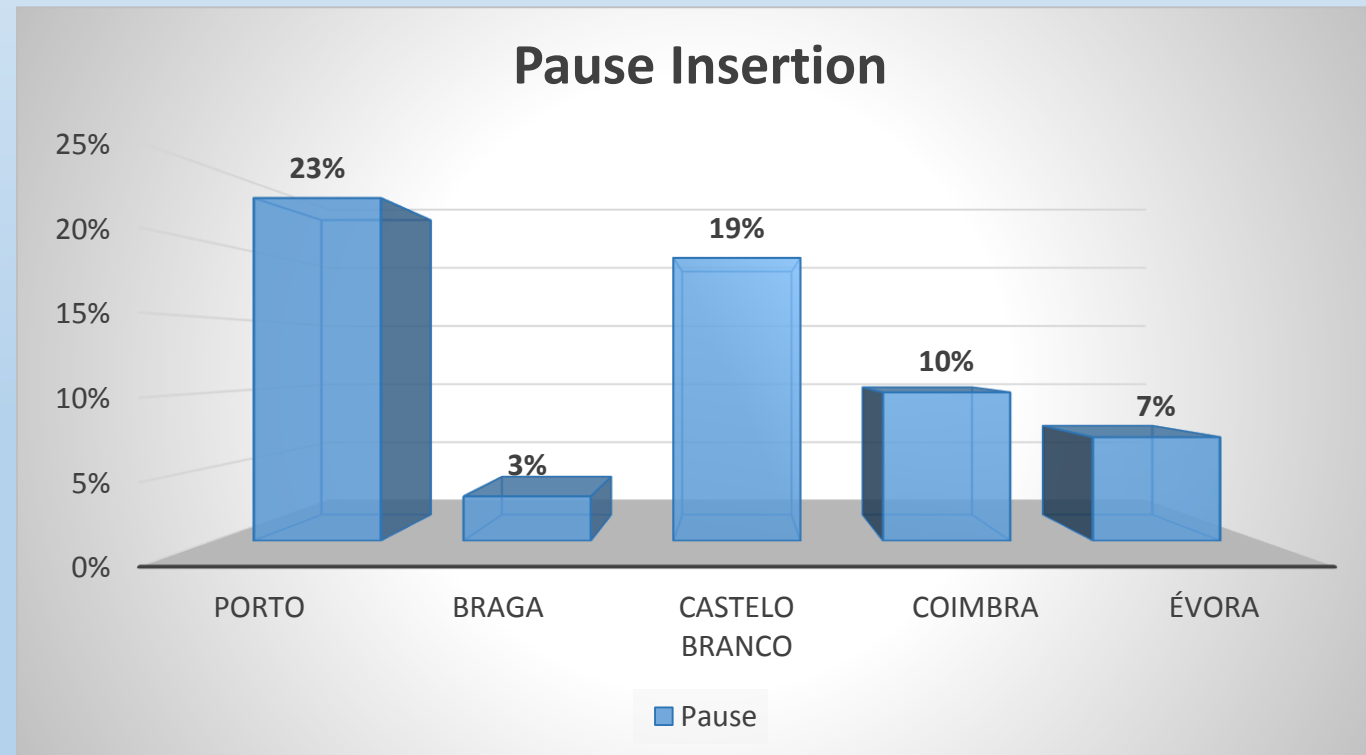


Figure 8. Pause insertion in Porto, Braga, Castelo Branco, Coimbra and Évora.

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## Discussion

Preliminary results confirm results found in previous studies:

- ✓ There is variation in the intonational phrasing patterns: **(S)(VO)** was found in other Northern and Central-Southern varieties, whereas **(SVO)** characterizes SEP and Algarve (Cruz 2013; Frota 2000, 2014)
- ✓ There is no variation in the type of boundary cues; but the implementation of boundary cues varies:
  - ✓ **Pause** is a cue to mark prosodic boundaries, with variation between regions
  - ✓ **Non-final IPs** show, mainly, a rising contour, marked by a **H%** boundary tone, but the nuclear accent varies (a division Northern vs. Others?)
- ✓ **Final IP** and **(SVO)** show **H+L\* L%** contour, the most frequent for neutral declaratives (Cruz 2013; Frota 2000, 2014; Frota & Vigário 2007; Vigário & Frota 2003)

This study puts forward a preliminar analysis of the prosodic phrasing tendencies in Portuguese varieties, contributing to the knowledge of prosodic variation in Portuguese and in Romance languages

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## Future Work

- Develop and deepen the phonological analysis of the differences in phrasing between varieties, considering other phonetic cues to mark IP boundaries, such as pre-boundary lengthening and F0 pitch range variation
- Consider speech rate and segmental phenomena (sandhi)
- Analyse the variation in constituent length (including double-branching constituents)
- Explore syntactic and phonological constraints, as well as socio-phonetic aspects, which may impact on prosodic phrasing variation
- Include other regions and more speakers

**Final  
goal:**



**Deepen our knowledge on the extent of prosodic phrasing variation in EP and the typology of prosodic phrasing patterns within and across Romance languages**

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**Thank You! 😊**

