Devoicing of phonologically voiced obstruents: Is European Portuguese different from other Romance languages?

ieeta

universidade de aveiro

Daniel Pape (IEETA+UA Aveiro, Portugal), **Luís M.T. Jesus** (IEETA+ESSUA Aveiro, Portugal)

Abstract: This paper presents results for voicing maintenance during European Portuguese (EP) stop and fricative production. Results indicate that EP shows a very high percentage of devoicing for all phonologically voiced stops and fricatives. This is in contrast to classical literature reporting high voicing maintenance during stop closure for Romance languages, but confirms our preliminary results from previous work. Further, for the first time results are presented for the analyses of (time-dependent) EP voicing profiles. These profiles show for EP no differences for place of articulation or vowel context. The results for EP are compared to identically constructed corpora for German (as a Germanic language reference) and Italian (as a Romance language reference). Results for the cross-linguistic comparison show that the devoicing behaviour for EP is more similar to a Germanic language than to a Romance language.

INTRODUCTION

Devoicing of voiced obstruents: There is a long known discrepancy between the phonological voicing status and the actual phonetic realization!

Germanic languages:
- high occurrences of devoicing for stops and fricatives (Shih et al. 1999, Pape & Mooshammer 2006)
- devoicing increases with more posterior POA (Ohala 1983, Pape & Mooshammer 2006)
- devoicing increases with lower vowel heights (Ohala & Riordan 1880)

Romance languages:
- „Classical view": Romance languages maintain voicing throughout complete consonant duration
- Shih et al. (1999): No devoicing for voiced stops in Spanish
- However, Jesus & Shadle (2002, 2003) showed high devoicing for EP fricatives

MOTIVATION

1. Does EP exhibit a different devoicing behaviour than other Romance languages?
2. What are the cross-linguistic differences of devoicing with respect to:
   - consonant position
   - place of articulation and vowel context?
   - Are there differences in devoicing between voiced stops and fricatives?

Voicing profiles German (Shih et al. 1999)

Voicing profiles Spanish (Shih et al. 1999)
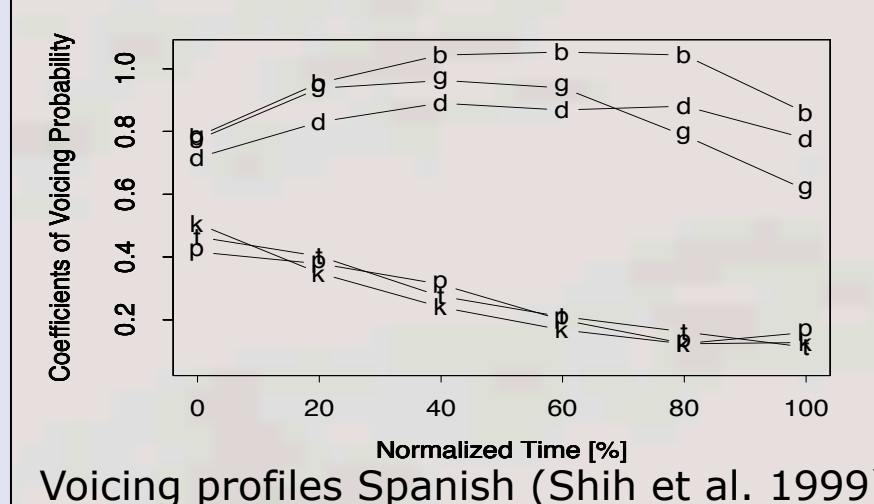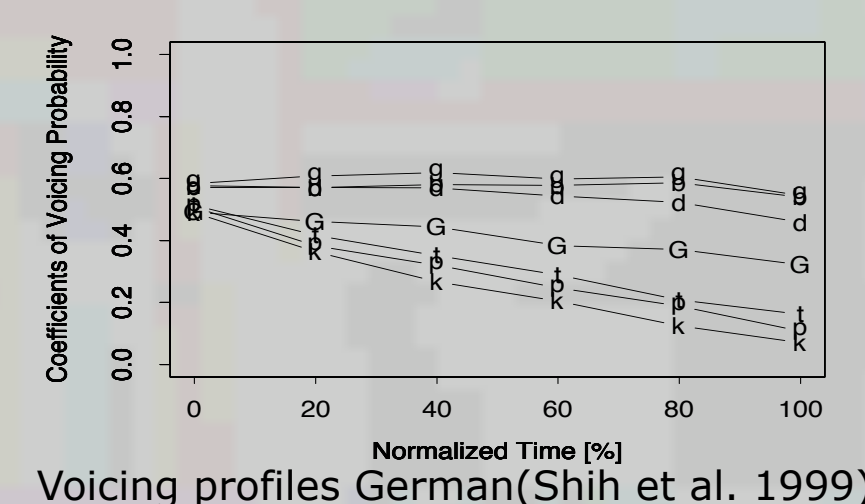
METHOD

German and Italian recordings:
- German control corpus:
  - same consonants as in EP corpus
  - recording of German lax vowels /a e i o/
  - initial and medial position, 9 repetitions
  - 4 speakers
- Italian control corpus:
  - /z ʒ/ excluded, 9 repetitions, 2 speakers

Extensive European Portuguese corpus recording:
- all EP stops and fricatives /p b t k b d g f v s z ʃ ʒ/
- context vowels /a e i o/ in CVCV clusters
- frame sentence „Diga CVCV outra vez."
- initial and medial consonant position
- 9 repetitions
- 4 speakers

Devoicing measures:
1. traditional method: no detectable voicing bar for one glottal period
2. voicing profiles (Shih et al. 1999): voicing status sampled at 10 equidistant landmarks throughout the consonant duration

RESULTS

1) Voicing decisions
- EP: very high devoicing occurrences for stops, high occurrences for fricatives
- German: very high occurrences of devoicing for both stops and fricatives
- Italian: nearly no devoicing

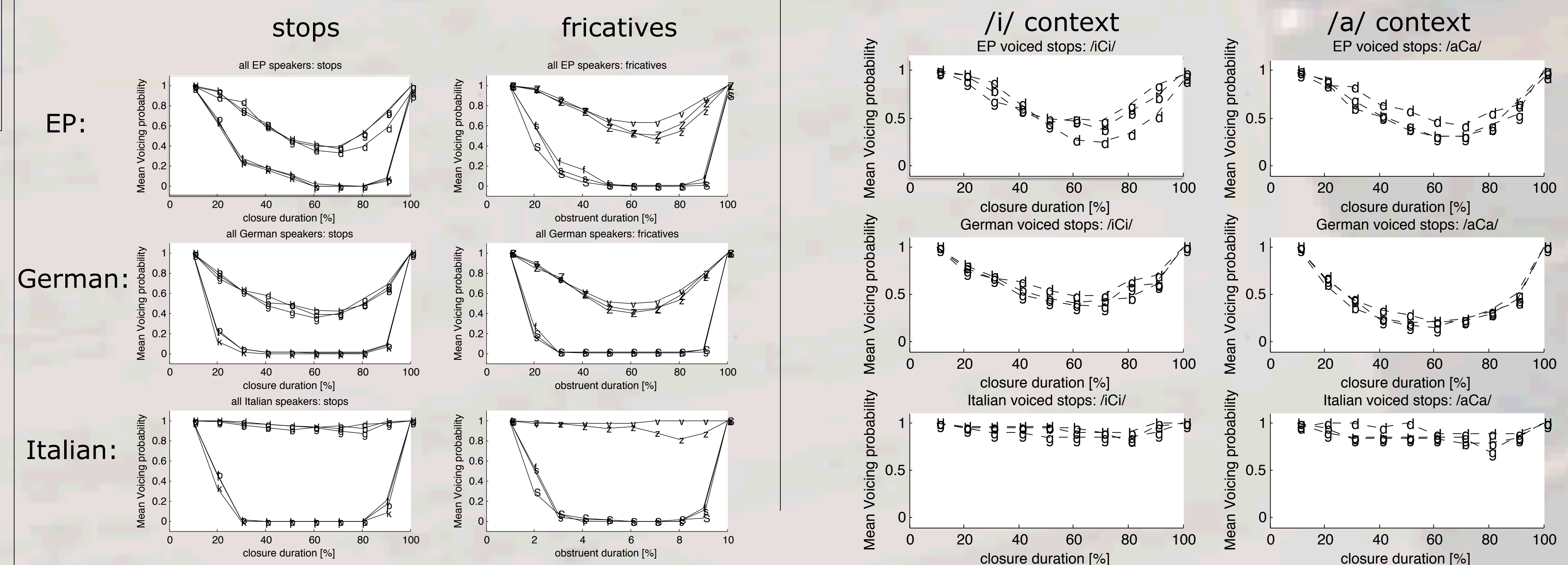| consonant	European Portuguese [%]		German [%]		Italian [%]	
	initial	medial	initial	medial	initial	medial
/b/	74	70	93	76	14	12
/d/	84	82	100	81	21	9
/g/	83	72	96	80	32	18
/v/	48	46	86	66	9	3
/z/	61	59	81	68	71	30
/ʒ/	49	53	83	68	n.a.	n.a.

Table 1: Percentages of devoicing decisions (mean over all speakers and all 4 vowel contexts and 9 repetitions).

2) Devoicing patterns
- **EP:** very strong devoicing for stops, strong devoicing for fricatives (both inital and medial position)
- **German:** very high occurrences of devoicing for both stops and fricatives (both initial and medial position)
- **Italian:** nearly no devoicing

3) Influencing factors
- **position:**
  - for all languages: only minor tendencies for more devoicing in initial than in medial consonant position
- **place of articulation and vowel context:**
  - EP: only small differences
  - German: strong differences

stops fricatives

EP:

German:

Italian:

/i/ context

/a/ context

DISCUSSION

- Voicing in European Portuguese differs from other Romance languages (Spanish, Italian)
- EP devoicing is very similar to German, and therefore to Germanic languages
- Influencing factors:
  - German: place of articulation and vowel context strongly influence voicing during closure
  - Italian: no influence detected -> probably due to high voicing maintenance during closure
  - EP: no influence observed -> active processes override aerodynamic effects?
    - Reasons will be verified in follow-up perceptual experiments,
    - cue weighting will show importance of voicing maintenance and devoicing for the perceptual system