

Word stress perception in nuclear and post-nuclear position in Portuguese

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Introduction:

- Speakers of languages with non-predictable stress are more proficient than speakers of languages with predictable stress at distinguishing nonsense words that vary only in stress position (Dupoux et al. 1997, Cooper et al. 2002, Peperkamp et al. 2010);
- The correlates of stress vary cross-linguistically: languages use various combinations of suprasegmental cues (duration, F0 and/or intensity) and sometimes also segmental cues (vowel quality);
- Co-variation between stress and pitch accent also patterns differently across languages, depending on the domain for pitch accent distribution of the language (Hellmuth 2007). Thus research on stress perception both in accented and unaccented contexts is needed.

European Portuguese (EP) word stress:

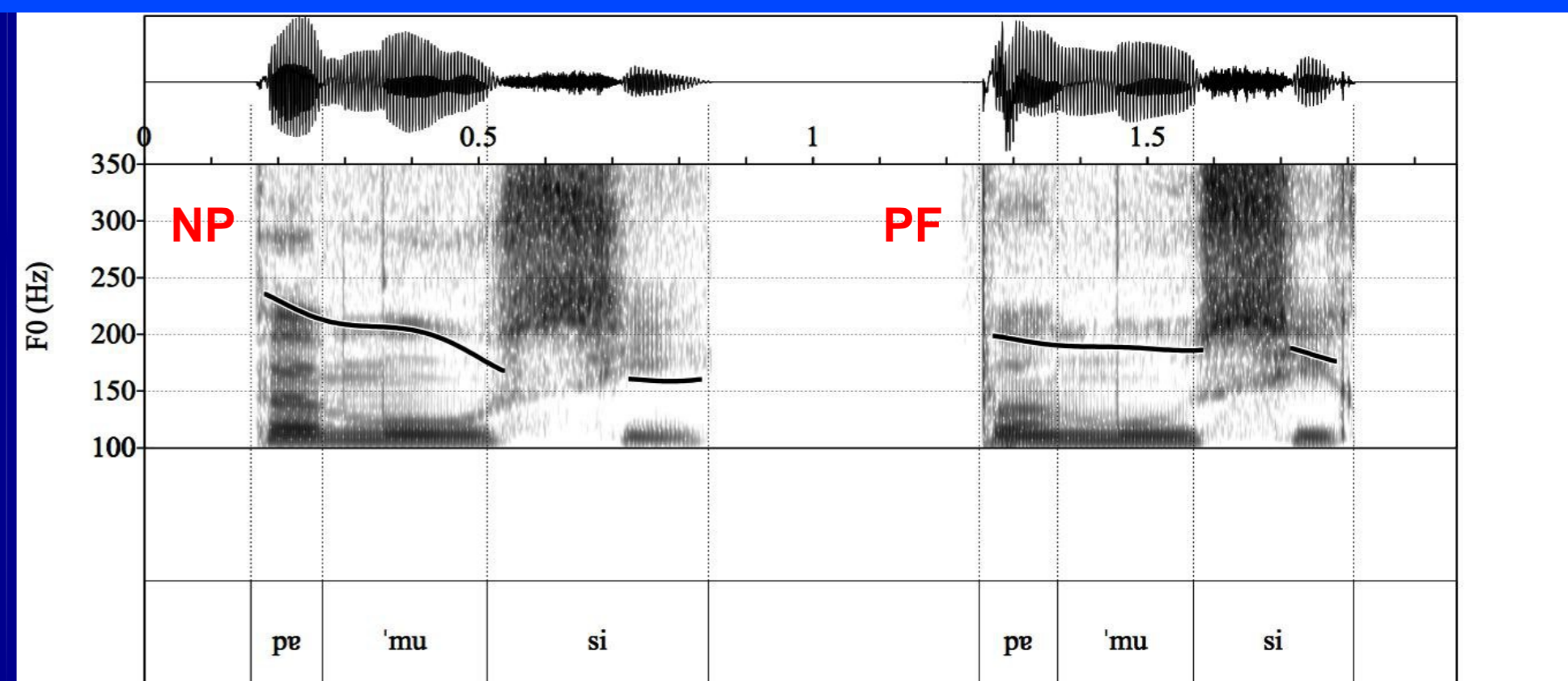
- Variable (within a 3-syllable window at the right edge of the word; Lexically contrastive – e.g. *bambo* 'lax' [ˈbẽbu] / *bambu* 'bamboo' [bẽˈbu])
- Duration cues word stress (Delgado-Martins 1977, Mateus & d'Andrade 2000); Low co-variation between stress and pitch accent (due to sparse pitch accent distribution: 17% - Vigário & Frota 2003);
- Vowel reduction in unstressed position: /i e ε a o u/ > [i i e u].

Rationale and hypotheses:

- EP patterns with Spanish, Catalan and English against French in having variable stress - **Word stress perception in EP is expected to pattern with the perception of stress in Spanish, Catalan or English (no stress 'deafness'** - (Dupoux et al. 1997, Ortega-Llebaria et al. 2008, 2010).
- EP patterns with English and Catalan against Spanish in the diversity of stress cues (duration, intensity and/or pitch + vowel reduction) - **In the absence of vowel reduction, EP is a good test case for prosodic based cross-linguistic perception of word stress** (Ortega-Llebaria et al. 2010)
- EP differs from Spanish, Catalan and English in the co-variation between stress and accent – **Given the sparse pitch accent distribution, unaccented context is expected to only have a weak effect on the ability to detect word stress.**

Method:

- ABX discrimination task with nonsense words, doubles and triplets (Dupoux et al 1997, direct comparison with French, Spanish)
 - e.g. A: [ˈdemitu] B: [dɛˈmitu] – X [ˈdemitu]/[dɛˈmitu]
 - Exp. 1 - stress perception in nuclear position (**NP**)
 - Exp. 2 - stress perception in post-focal context (**PF**)
- No vowel reduction in the stimuli
 - e.g. [ˈmipu]/[miˈpu] and [ˈdemitu]/[dɛˈmitu]/[demiˈtu]
- Control condition: segmental contrast (C, NRV, RV) but the same stress pattern - e.g. [ˈdɛsu]/[ˈdɛtu]
- Duration was the main cue to stress both in NP and PF – **NP**: stress M=251,SD=63, unstress M=186,SD=56 (p=.03), **PF**: stress M=169, SD=42, unstress M=130,SD=36 (p=.000);
- A pitch fall (**H+L***) was a further cue in **NP**.



Analysis:

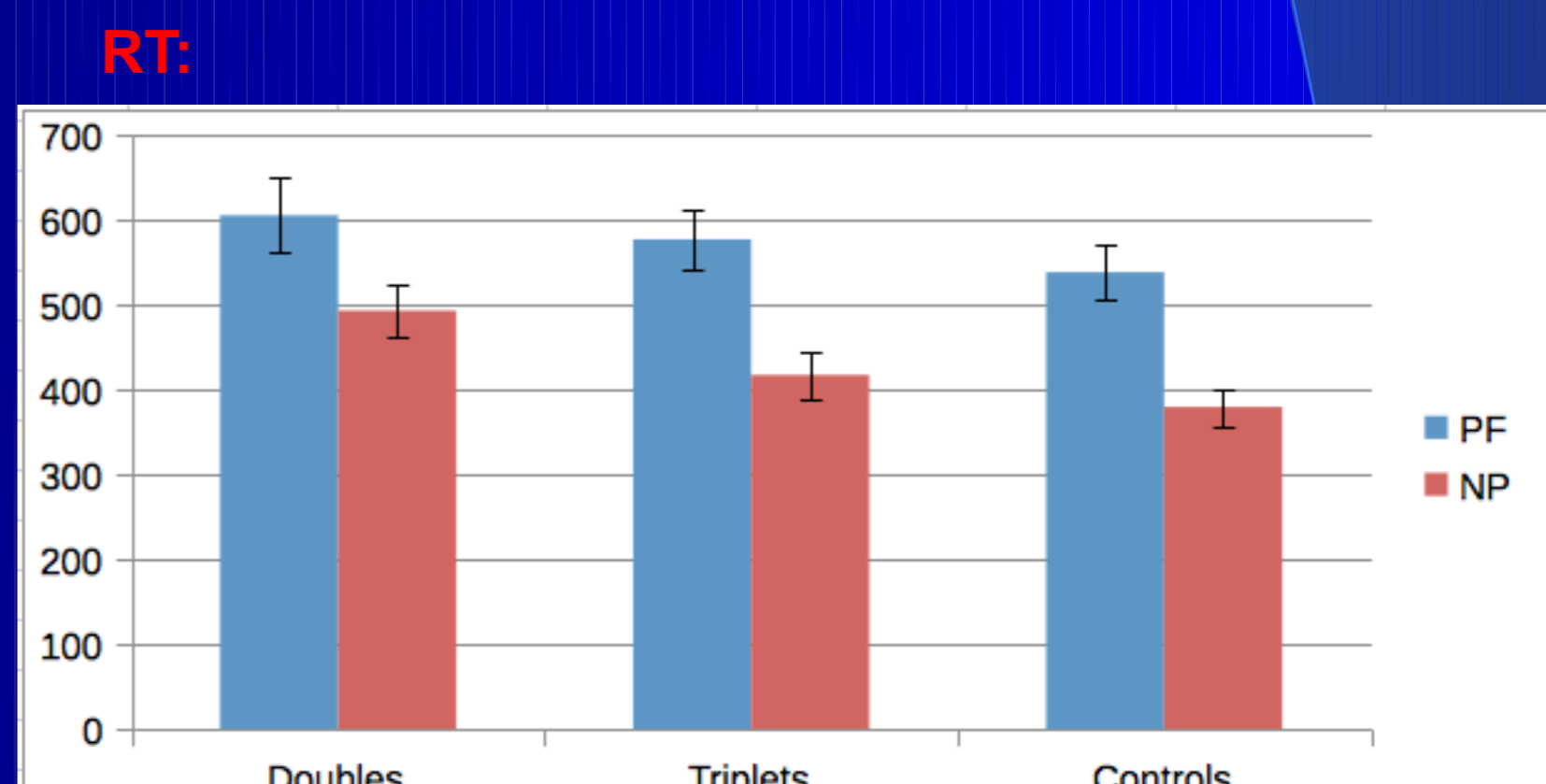
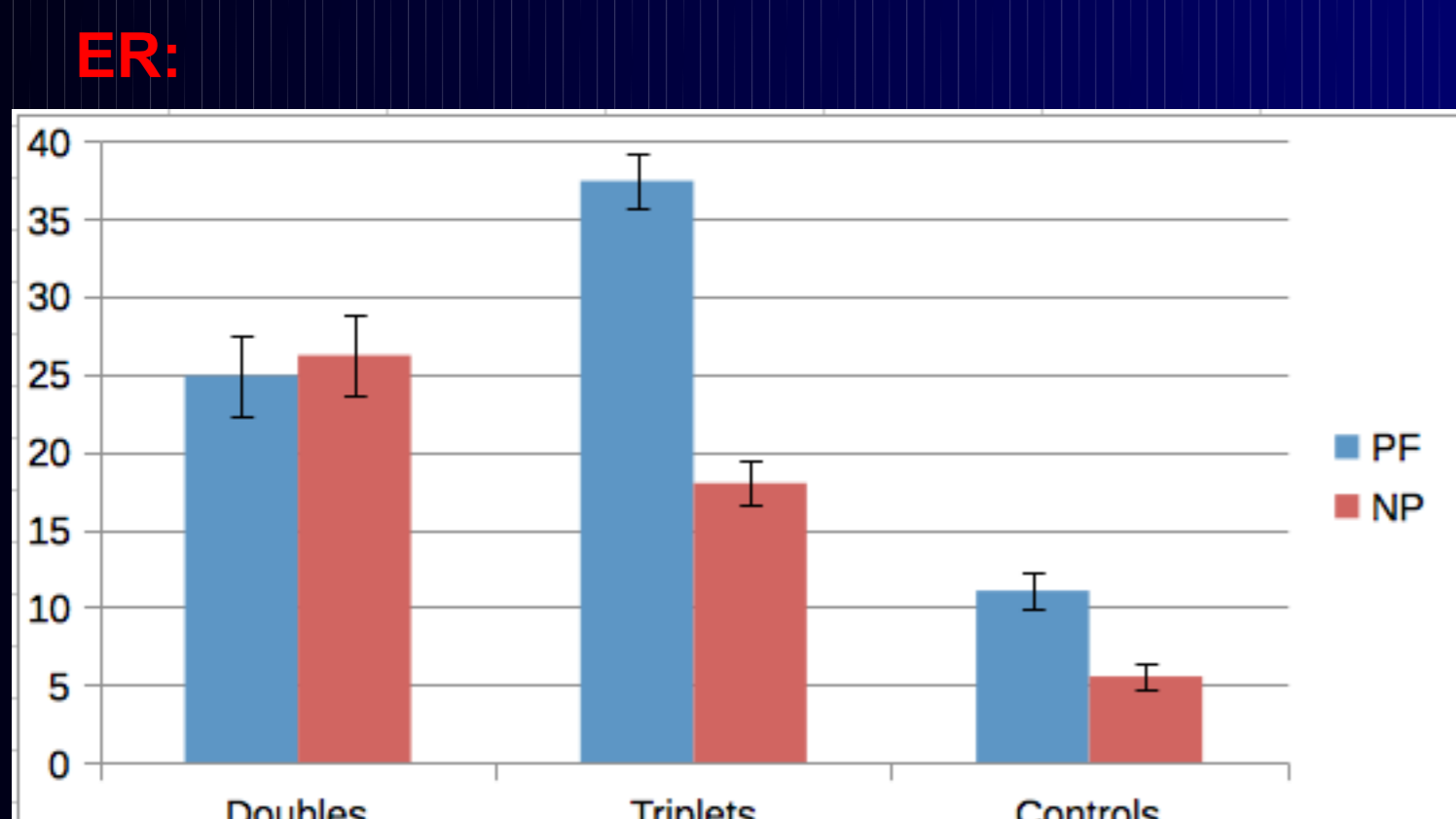
- Responses and reaction times were recorded in SuperLab Pro.
- Thirty-two subjects (16 in Exp. 1 and 16 in Exp. 2)
- ANOVAs were run for the two dependent variables: error rate (ER) and reaction time (RT)

Results and discussion:

NP: ER in SC is significantly higher than in CTR condition; RT is significantly slower in SC than in CTR condition

PF: ER is significantly higher in SC than in CTR condition; no effect on RT

	Stress condition (SC)		Controls (CTR)	
	Error Rate (ER)	Reaction Time (RT)	Error Rate	Reaction Time
NP	21%*	403ms*	5%*	321ms*
PF	36%*	546ms	13%*	545ms



* p < .001

- PF is overall significantly different from NP (ER p<.001, RT p<.05), with weak interaction between SC/CTR and NP/PF only for ER, no interaction for RT. **Absence of pitch accent cue has no strong effects on stress discrimination.**

- **NP:** significant differences between doubles and triplets (ER: p<.05; RT: p<.05), doubles and controls (ER: p<.001; RT: p<.05) and triplets and controls in the ER only (ER: p<.001; RT: p=.36); **PF:** in ER, significant differences between doubles and triplets (p<.01), doubles and controls (p<.001) and triplets and controls (p<.001); in RT, no significant differences in responding to the SC/CTR.

- Comparison with French and Spanish results from Dupoux et al. shows that the EP ER in the stress condition is similar to the ER reported for French (21%), whereas the EP ER in CTR is similar to the stress discrimination ER reported for Spanish (4%).

- EP speakers attend less to suprasegmental cues to stress (pitch and/or duration) than Spanish or Catalan speakers, and, in the absence of vowel reduction, show a similar **stress 'deafness' effect** to that reported for languages with predictable stress in their phonological grammar.

- Future research: implications for claims of prosodic based cross-linguistic perception of word stress (Ortega-Llebaria et al. 2010), and language-specific acquisition of stress patterns (on the light of acquisition data also suggesting similarities between Portuguese and French).