Speech rate in a gradient process: Intervocalic /s/ voicing in Lojano Spanish
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Introduction
With the number of studies in laboratory phonology increasing, linguists are becoming more concerned with the phonetic nature of phonological processes. Two such studies have looked at voicing assimilation of /s/ before voiced consonants in Spanish (Campos-Astorkiza 2011, Schmidt and Willis 2011) and determined that it is a gradient process. On the other hand, while previous studies looking at intervocalic /s/ voicing in Highland Ecuadorian Spanish (HES) have argued it is a categorical process (Robinson 1979, Lipki 1989), these claims have not been corroborated with fine-grained acoustic analysis. The present study reports on production data from Lojano Spanish, a sub-dialect of HES. The results show that intervocalic /s/ voicing in this dialect is not categorical, but rather a gradient process that is conditioned by speech rate, position within a word, stress, and gender.

Research Questions
1. What is the status of intervocalic /s/ in Lojano Spanish?
2. Which linguistic and extralinguistic factors influence the voicing of intervocalic /s/ in this variety?

Methodology
Participants
- 16 natives of Loja, Ecuador; 8 males, 8 females
- evenly distributed for age between three groups: 18-30, 40-50, 60+

Interview Task
- 20 tokens of intervocalic /s/ per word position per speaker extracted

Reading Task
- 64 tokens of intervocalic /s/ per speaker, balanced for word position and stress

Acoustic Measurements
- percent voicing = duration of voicing / fricative duration
- speech rate = syllables per second of 3-word sequence

Quantitative Analysis
- 1720 tokens total; separate mixed effects models for each task using pairwise comparisons
- dependent variable: unvoiced (0-20%), partially voiced (20-90%) vs. fully voiced (100%)?
- independent variables: word position (initial, medial, final), stress (between stressed or unstressed vowels), gender; individuals’ speech rate as random effect

Results
- distribution: unvoiced (852), partially voiced (589), voiced (279)
- read data: speech rate, stress, word position and gender
- interview data: speech rate, word position and gender
  - more voicing in faster speech, between unstressed vowels, in word final and initial contexts, and in males’ speech

Conclusions
- Unlike in other dialects of HES, intervocalic /s/ voicing in Lojano Spanish is a gradient process, affected by both linguistic and extralinguistic factors.
- Voicing in this dialect can be seen as a reduction process since it happens more in fast speech and between unstressed syllables, which can be explained through gestural overlap (Brown and Goldstein 1999).
- Two opposing forces: gestural overlap + aerodynamic requirements → gradient voicing of intervocalic /s/
- Despite the seemingly phonetic nature of this process, it also has social correlates (gender) and future research may show that it even carries social meaning.

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