Speech rate in a gradient process: Intervocalic /s/ voicing in Lojano Spanish

Christina Garcia

garcia.318@osu.edu

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, Lipski 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?

Figure 1: Map of Ecuador with province of Loja highlighted; city of Loja

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

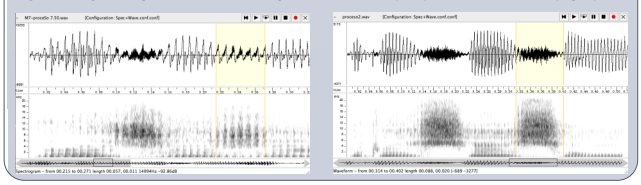
Acoustic Measurements

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

Quantitative Analysis

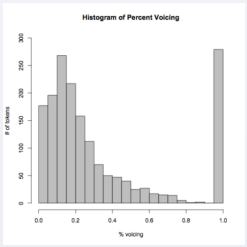
- 1720 tokens total; separate mixed effects models for each task using pairwise comparisons
- **dependent variable**: unvoiced (0-20%) vs. partially voiced (20-90%) vs. fully voiced (100%)
- **independent variables:** word position (initial, medial, final), stress (between stressed or unstressed vowels),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

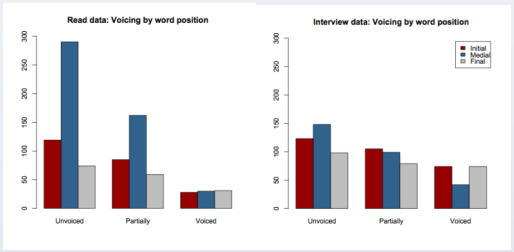
Figure 2: spectrograms of the word *proceso*, 100% (left) and 27% voiced (right)

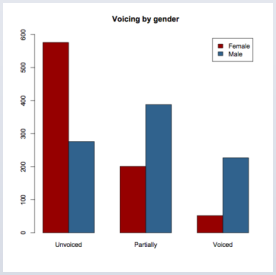


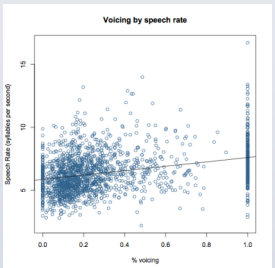
Results

- **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 (Browman and Goldstein 1989).

- **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.

Acknowledgements

For guidance from the first brainstorming to the final analysis of this project, I would like to thank Terrell Morgan. I greatly appreciate the help of Rebeka Campos-Astorkiza in the acoustic analysis and interpreting the data. I would also like to thank Wendy Feliz for her help with transcription. Finally, this project would not be possible without the wonderful participants and I am grateful to the Garcia and Samaniego families for aiding in participant recruitment.