

## Do Spaniards speak faster than Mexicans? Studying Spanish Rhythm in natural speech

Fabian Santiago, Paolo Mairano

#### ► To cite this version:

Fabian Santiago, Paolo Mairano. Do Spaniards speak faster than Mexicans? Studying Spanish Rhythm in natural speech. Phonetics and Phonology in Europe 2017, Jun 2017, Cologne, Germany. , 2017. hal-01737829

### HAL Id: hal-01737829 https://hal.science/hal-01737829

Submitted on 19 Mar 2018

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers. L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



# **Do Spaniards speak faster than Mexicans?** Studying Spanish Rhythm in Structures natural speech

Fabián Santiago & Paolo Mairano

fabian.santiago-vargas@univ-paris8.fr, P.Mairano@warwick.ac.uk

Background

- Speakers do not produce speech with similar temporal patterns  $\rightarrow$  Different articulation rates (AR)
- Factors affecting AR:
  - Dialectal variations in English [1], French [2], Dutch \_\_\_\_ [3], etc.

# Goals

Compare different temporal patterns of two varieties of Spanish: Castilian Spanish (Madrid) vs Mexican Spanish (Mexico City)

- Speaking style and gender [4]
- Relation between speech rates and vowel space:
  - Faster speak rates  $\rightarrow$  shorter durations  $\rightarrow$  reduction of vowel space [5]
  - Stressed vs unstressed vowels  $\rightarrow$  vowel reduction
- Does AR differ across these two varieties?
- Does AR affect the compression of vowel space similarly?
- Do these varieties display similar rhythmic patterns?

## Corpus

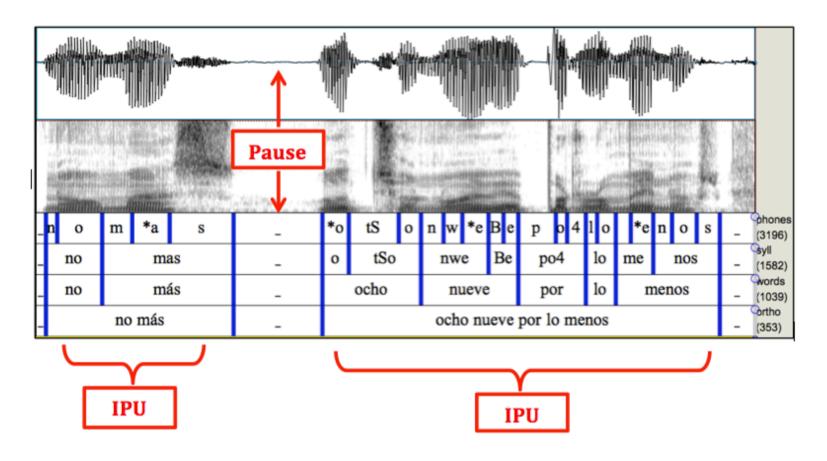
- 22 speakers (university students) 10 from Madrid (CAS) and 12 from Mexico City (MEX)
- ✓ 5.7 hours of speech
- Gender-balanced
- Read (short stories) vs spontaneous  $\checkmark$ speech (interview, narration & description of a painting)

# **Segmentation and Annotations**

# Methods & Metrics

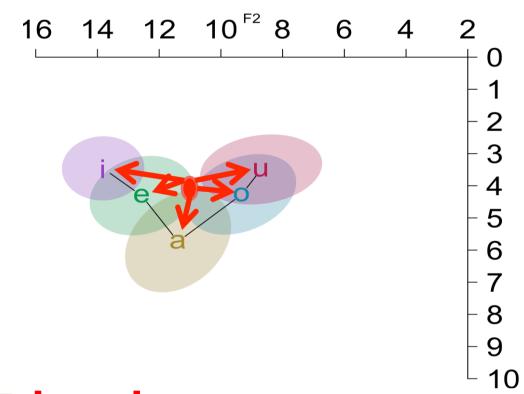
# **Articulation Rate**

- 4,618 Inter-Pausal Units (IPUs)
- Excluded IPUs containing < 3 syll. / hesitations/lengthened words



# Vowel space

- Extraction of F1 & F2 at the mid-point of each vowel
- Degree of dispersion: sum of Euclidean distances from the gravity center to each vowel per speaker



- Phones, syllables and words
- Pauses, disfluences, hesitations, filled pauses, lengthened words

## Rhythm measures

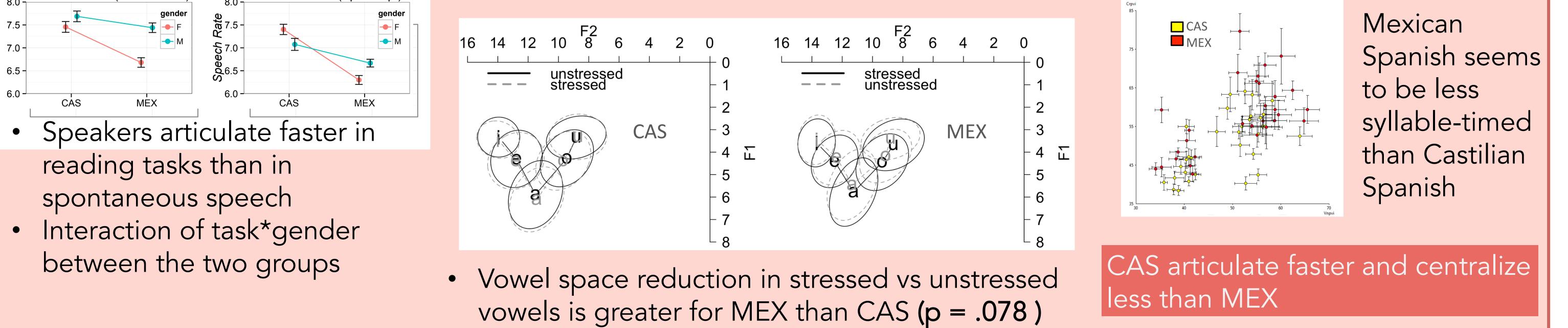
•  $\Delta C$ ,  $\Delta V \& PVI$  (Pairwise Variability Index)

## Results, Analysis and Discussion Rhythm patterns Articulation Rate & Vowel space **Articulation Rate** 16 14 12 10 <del>F2</del> 16 14 12 10 8 6 4 16 14 12 10 <sup>F2</sup> 6 2 0 SD AR 0.06 CAS 7.3 1.41 1.37 MEX 6.6 4 缸 0.02 CAS speakers produce almost one

Variant\*Gender (Read. Tasks) Variant\*Gender (Spont. Sp.

•

- MEX CAS Faster speech rates  $\rightarrow$  compression of vowel space For short vowels, CAS speakers do not compress their vowel space as much as MEX speakers
- Durations ~ lexical status (average)
- Durational differences between stressed vs unstressed vowels
- are greater in MEX (15%) than in CAS (7%) (p< .003)



## References

[1] Jacewicz, E., Fox, R. A., & Wei, L. (2010). Between-speaker and within-speaker variation in speech tempo of American English. Journal of the Acoustical Society of America, 128, 839-350. [2] Schwab, S. & Avanzi, M. (2015). Regional variation and articulation rate in French. Journal of Phonetics, 48, 96-105. [3] Verhoeven, J., de Pauw, G. & Kloots, H. (2004). Speech rate in a pluricentric language: A comparison between Dutch in Belgium and the Neetherlands. Language & Speech, 47 (3), 297-308. [4] Quené, H. (2008). Multilevel modeling of between-speaker variation in spontaneous speech tempo. Journal of the Acoustical Society of America. 123, 1104-1113. [5] Tsao, Y.-Ch., Weismer, G., Iqbal, K. (2006). The effect of intertalker speech rate variation on acoustical vowel space. Journal of the Acoustical Society of America, 119 (2), 1074-1082