THE MID BACK VOWEL MERGER IN GIRONA CATALAN:

Acoustic Evidence

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1. INTRODUCTION

CATALAN


Barcelona
l'Alguer
Palma
València
0km 100km200km
Google
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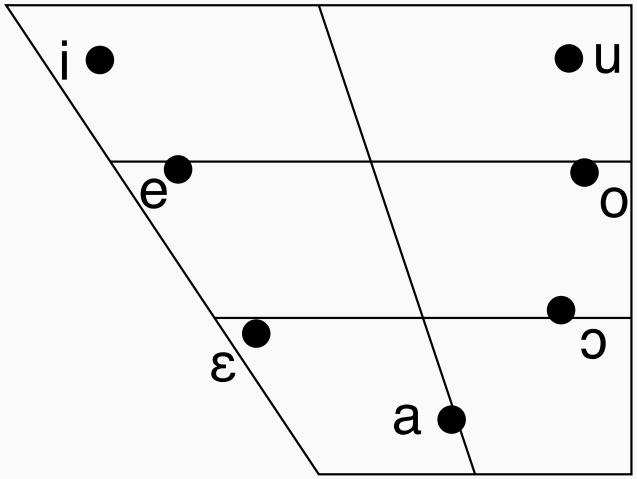
CATALAN VOWELS

- Most Catalan varieties (including the standard) have a 7-stressed vowel system:

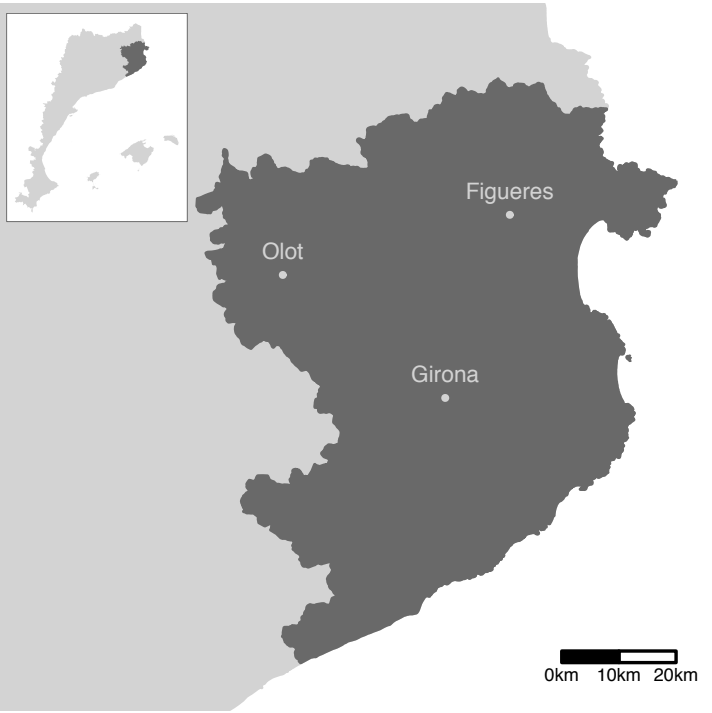


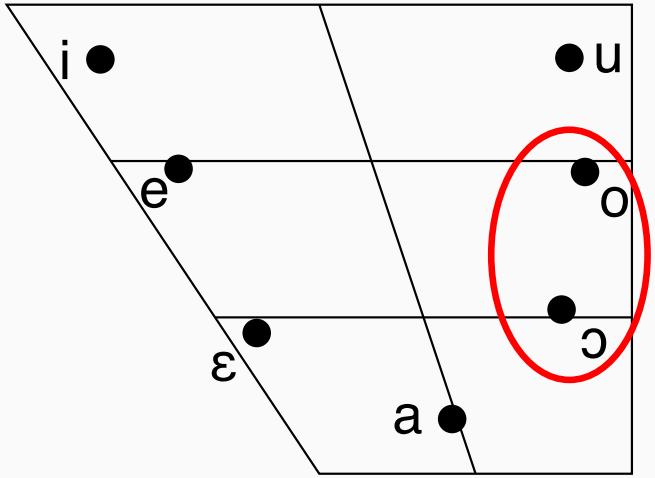
Go check Els sons del català at

http://www.ub.edu/sonscatala/en!

CATALAN VOWELS IN GIRONA

- Most Catalan varieties have a 7-stressed vowel system, but there could be a mid back vowel merger in the subdialect spoken in the area of Girona:





2. BACKGROUND

DIALECTOLOGY ON /o/ AND /ɔ/ IN GIRONA CATALAN

- According to **Coromines (1953)**, ~ 30 words with an etymologically closed *o* in the initial syllable are pronounced with an /ɔ/ in all Catalan varieties, except in Girona and Elna, where /o/ is used.
- Only, with each mention of the theory, the list of words just keeps getting longer (>180 words).

  (Comas 1970: 58-59; Sala 1983: 29; Julià 1986; Puig 1990: 31; Gulsoy 1993: 92; Luna 1995; Monturiol & Domínguez 2002: 28-29; Campmany 2004: 18; Dorca 2008: 24-27, 2010: 152; IEC 2009: 42; Gómez 2011: 51)
- Colomina (1999: 122-124) adds: [ɔ] → [o] / _[n]

ACOUSTIC REMARKS ON /o/ AND /ɔ/ IN GIRONA CATALAN

- Alcover (1908: 328-330), Luna (1995: 283-284), Julià (1986: 132), and Recasens (1996: 131): /ɔ/ *seems* specially *closed* in Girona, and there might not be an /ɔ/-/o/ distinction
- Acoustic studies by Recasens & Espinosa (2009) and Herrick (2003, 2006): no statistical differences between /o/ and /ɔ/ in Girona Catalan speakers (n = 5 + 3)

↓

Girona vowel system: /i/, /e/, /ɛ/, /a/, /O/, /u/

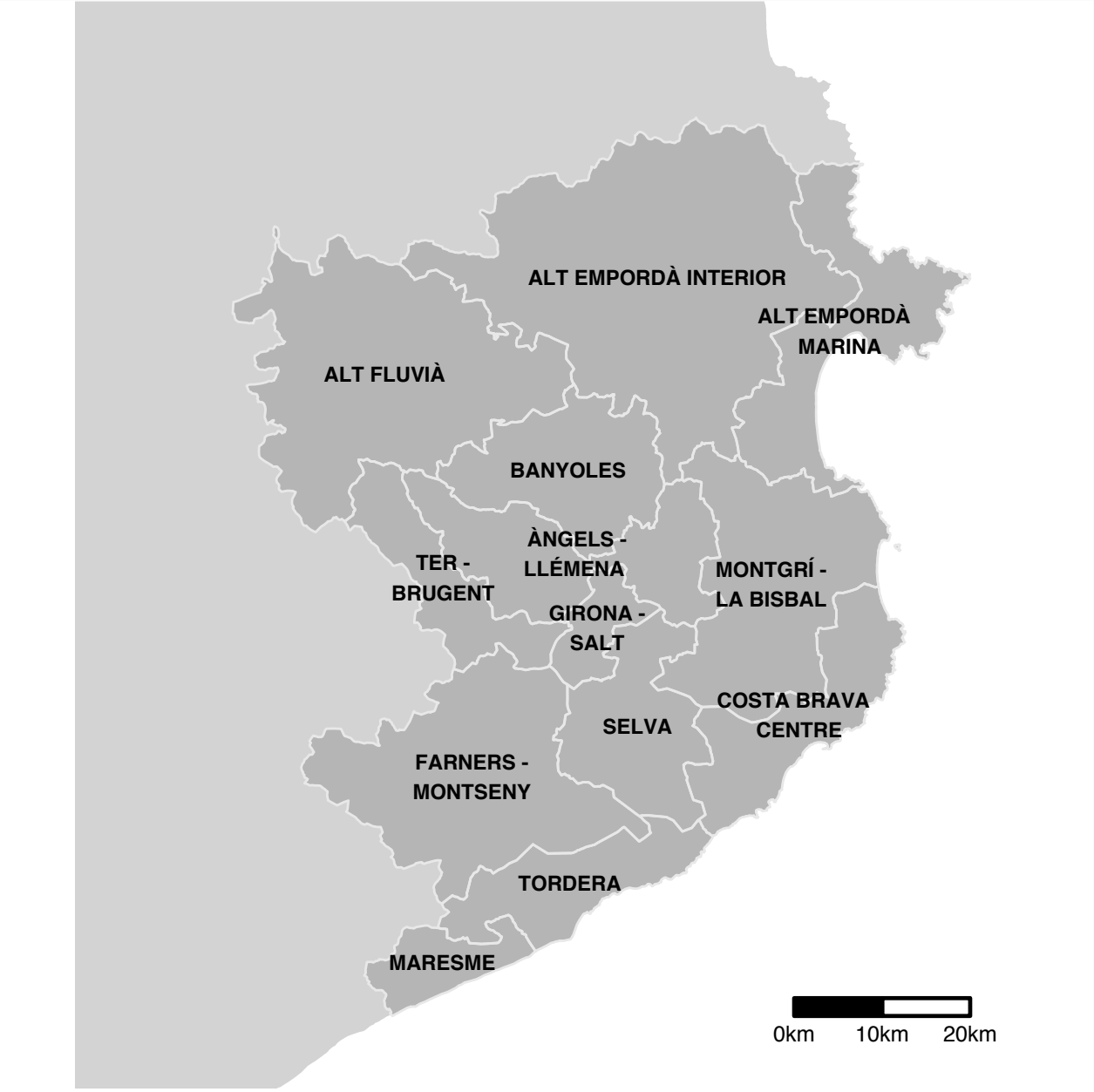
3. HYPOTHESIS AND GOALS

HYPOTHESIS AND GOALS

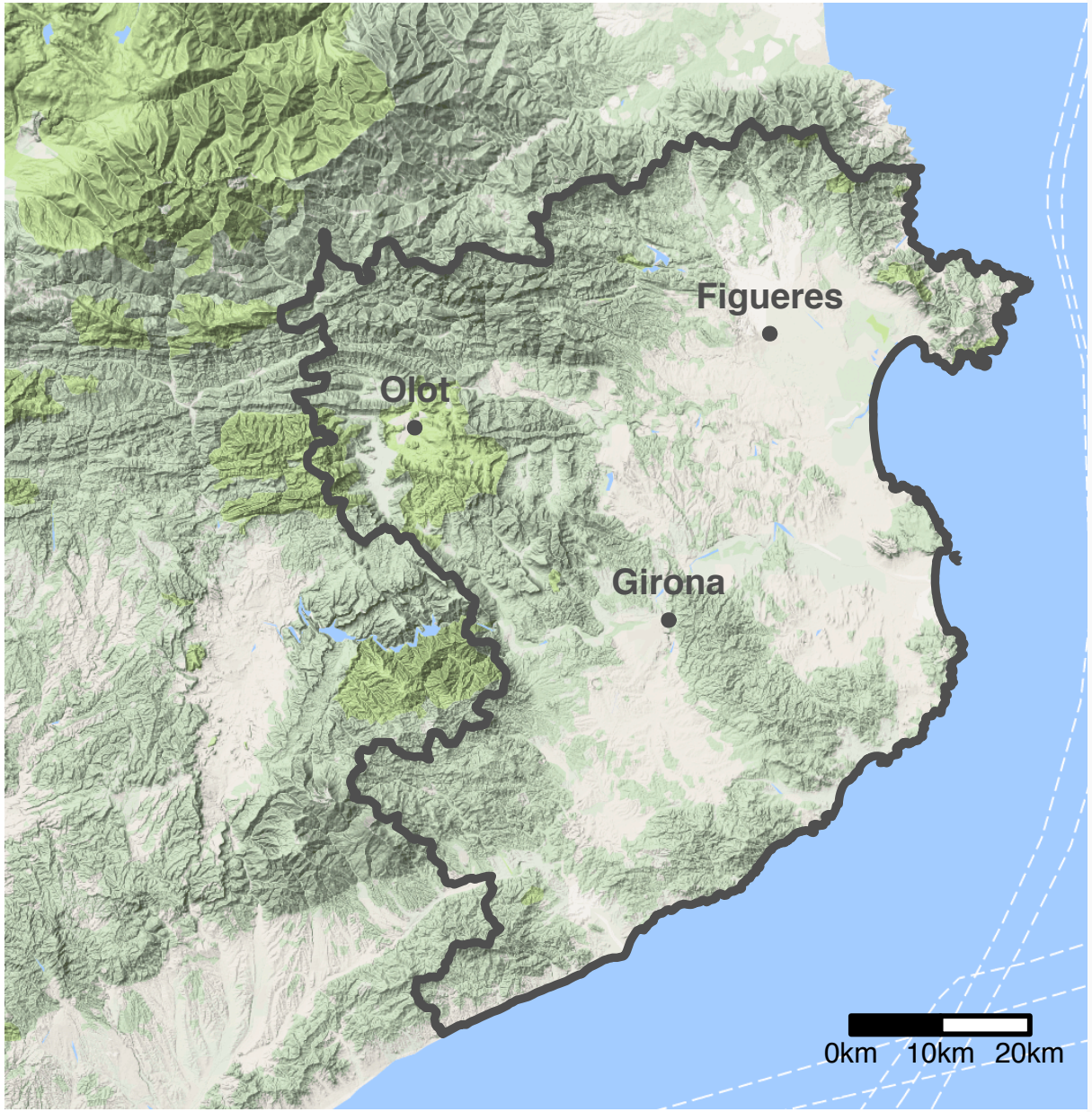
- **Hypotheses:** Mid back vowels are involved in an unconditioned merger in Girona Catalan
- **Goals:**
  - Test the production of /o/ and /ɔ/ —and the whole vowel system
    - in a variety of phonological contexts
    - produced by speakers in different areas of the Girona region
    - produced by speakers of two different age groups
    - produced by male and female speakers
  - Test the perception of /o/ and /ɔ/ —and the whole vowel system

4. METHODS

SURVEY AREAS



SURVEY AREAS



PARTICIPANTS

- **96 speakers** (4, 8, 12 or 16 per survey point, proportionally to population*):
  - 24 m + 24 f, born 1998 (15-17 years old)
  - 24 m + 24 f, born 1948-1957 (57-65 years old)
  - From Catalan-speaking families
  - Native and life-long residents of each survey point
  - Parents born in the same survey area
  - Secondary or higher education

PRODUCTION TESTS

! Many words differentiated by graphical accents in writing, and there are very few minimal pairs:

os/ós, bota/bóta, dona/dóna, mora/móra, (amor/mort)

- **Picture naming task (of sorts):**
  - T1: 7 vowels x 7 contexts (n=49) → syllable, previous and following segment
  - T2: Words mentioned in literature + minimal pairs (n=26)
- **Replication of the reading task in Recasens & Espinosa (2009):**
  - T3: 7 vowels x 4 contexts x 3 repetitions (n=28x3)

* T1+T3: 3,712 tokens, T2: 2,377 tokens

DATA EXTRACTION AND PROCESSING

- Semi-automatic segmentation and alignment with SPPAS (Bigi 2015)
- F1 and F2 values estimated by LPC formant-tracking algorithm in Praat (Boersma & Weenink 2016) and extracted at 7 points throughout each interval with a semi-automatic script (adapted from McCloy & McGrath 2014)
- Data Lobanov-normalized with `vowels` by Kendall & Thomas (2014) in R (R Core Team 2016)

VISUALIZATION, QUANTIFICATION & ANALYSIS

- **Density:** F1xF2 2D KDE contour plots (e.g.: Nycz & Hall-Lew 2013; DiCanio et al. 2015; Amengual 2016; `ggplot2::stat_density2d`, Wickham 2009)

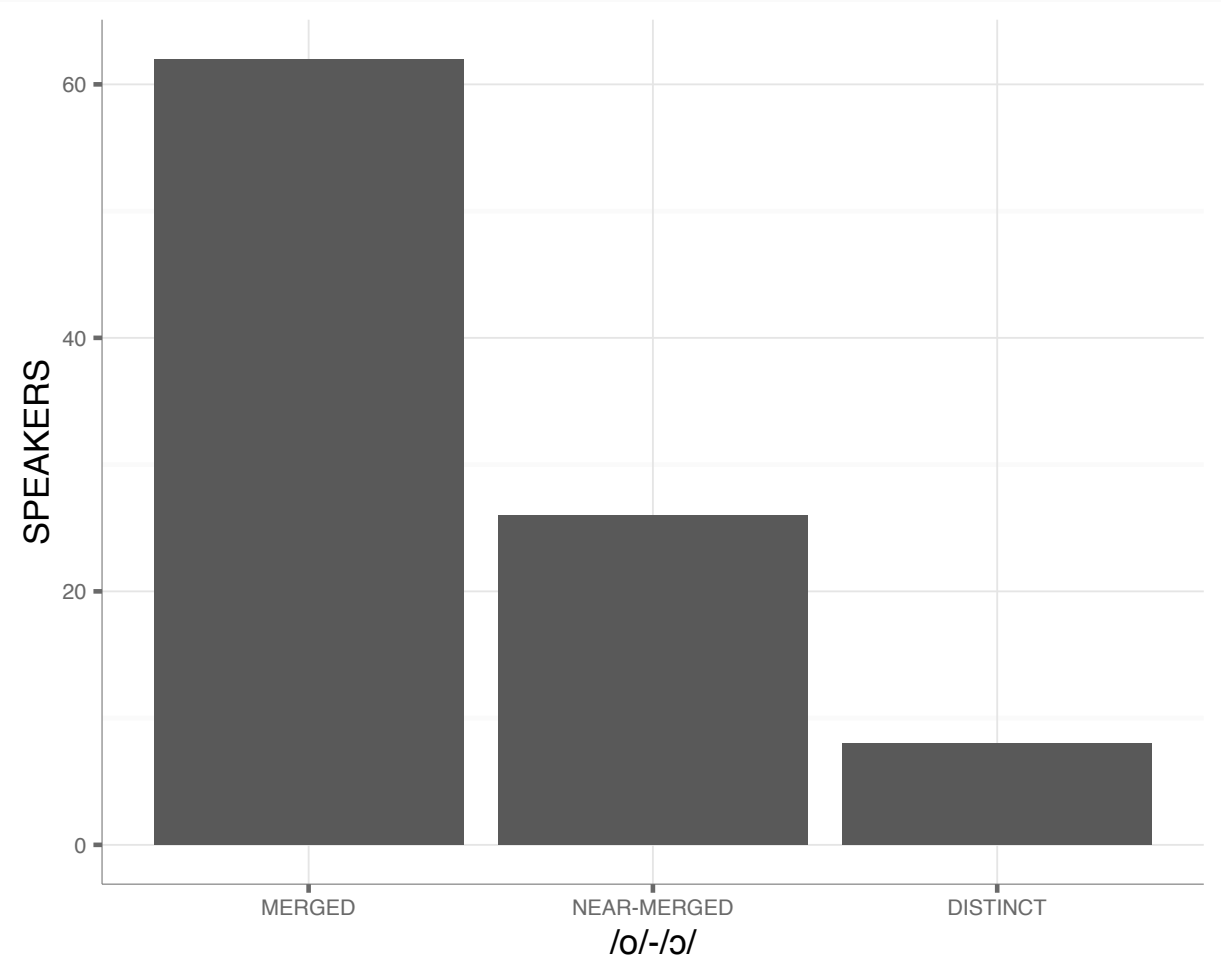
- **Distance:** Euclidean distances /o/-/ɔ/ from F1 & F2 means (e.g.: Baranowski 2013; Dinkin 2011; Evanini 2009; Hay et al. 2009; Recasens & Espinosa 2009; `stats::dist`, R Core Team 2016)
- **Overlap:** Bhattacharyya Coefficient (as proposed by Johnson 2015; `adehabitatHR::kerneloverlap`, Calenge 2006)
- **Trajectory:** SS ANOVA (e.g.: Nycz & Decker 2006; Wassink & Koops 2013; Docherty et al. 2015; Fruehwald 2010; `gss::ssanova`, Gu 2014)

- **Variation:** Mixed-effects models (e.g.: ehem, everyone; `lme4::lmer`, Bates et al. 2015)

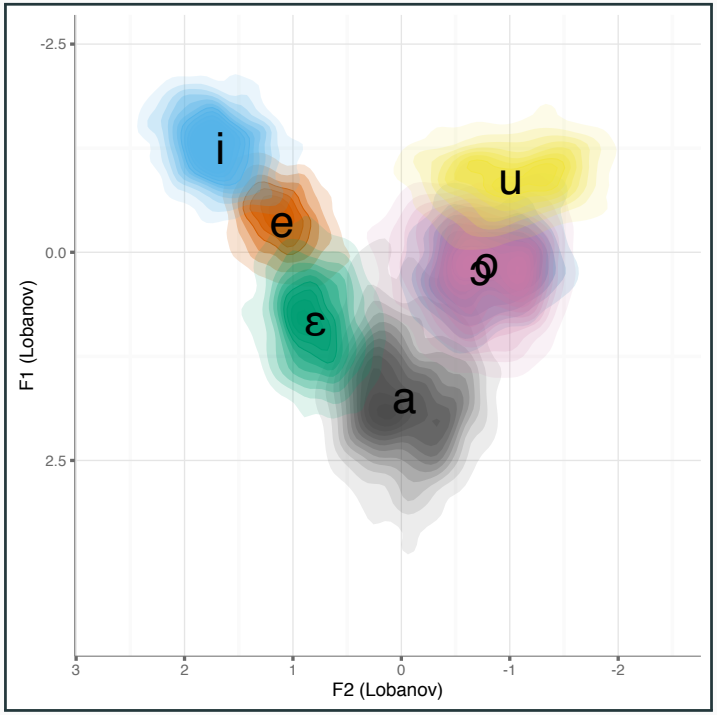
5. RESULTS

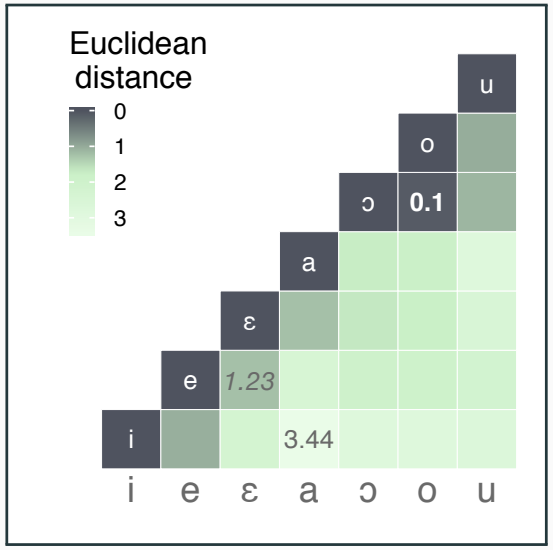
QUANTIFICATION & CLASSIFICATION

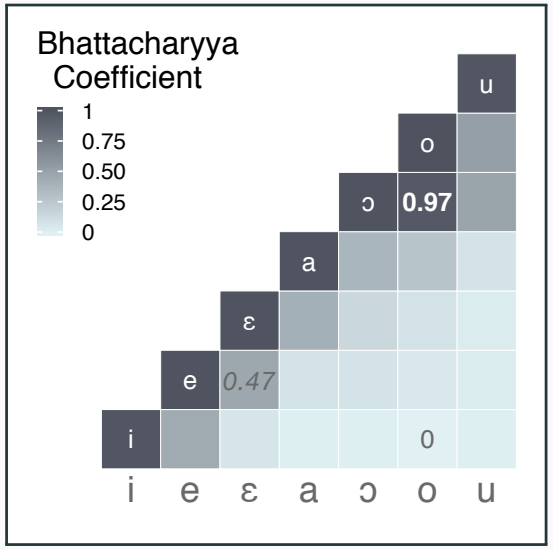
- Individual classification of speakers' mid back vowels:

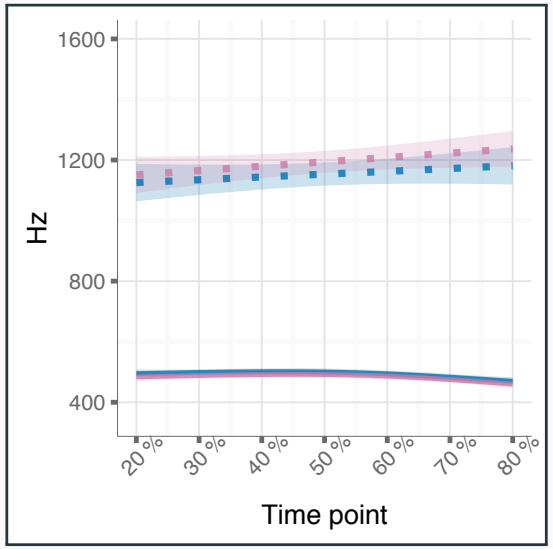


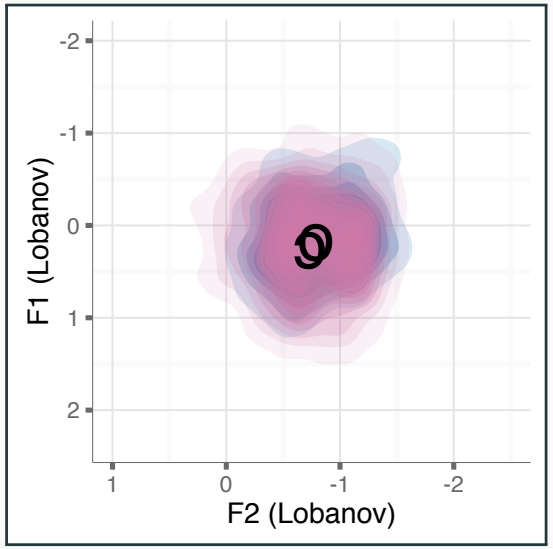
Q & C: MERGED SPEAKERS (62)



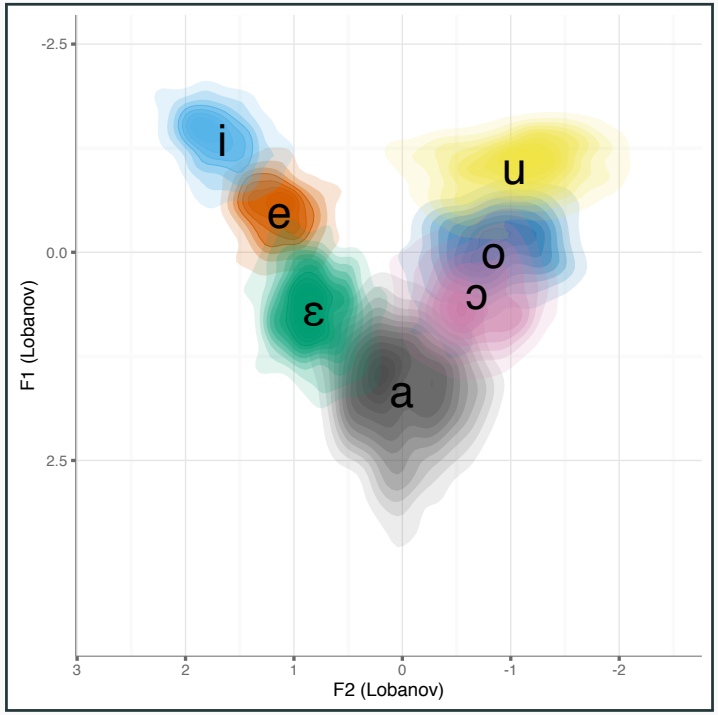


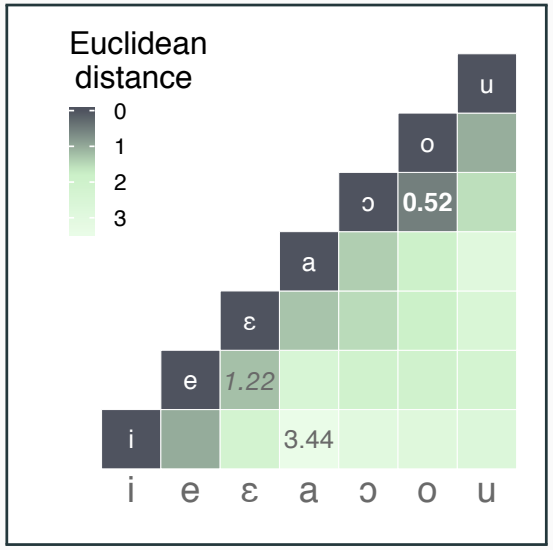


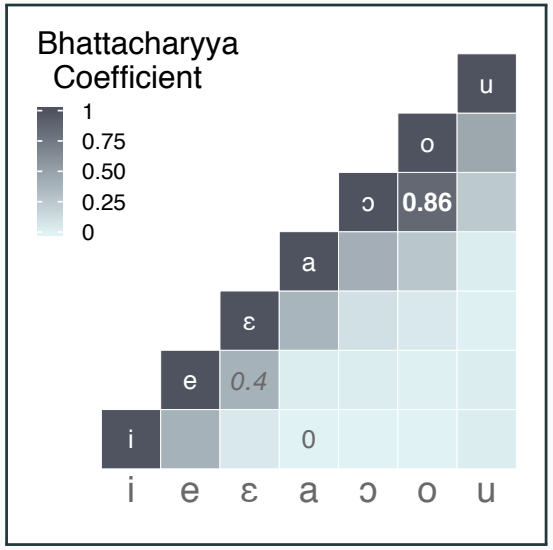


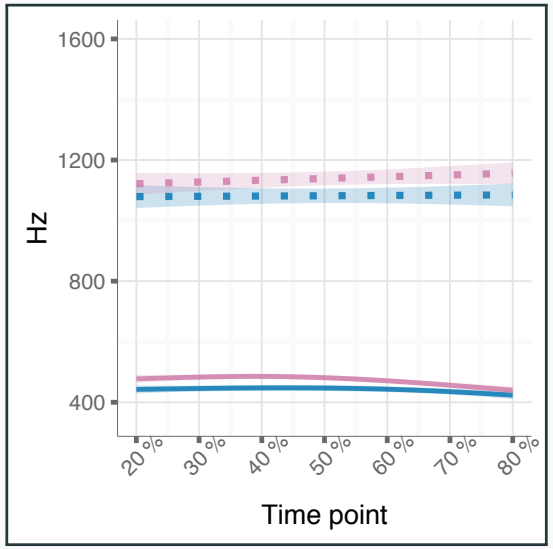


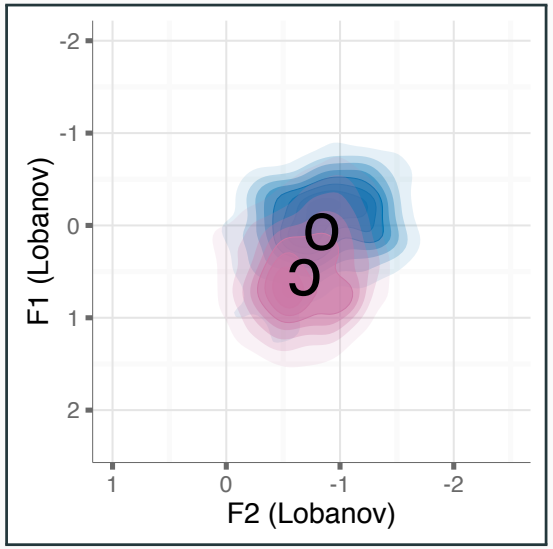
Q & C: NEAR-MERGED SPEAKERS (26)



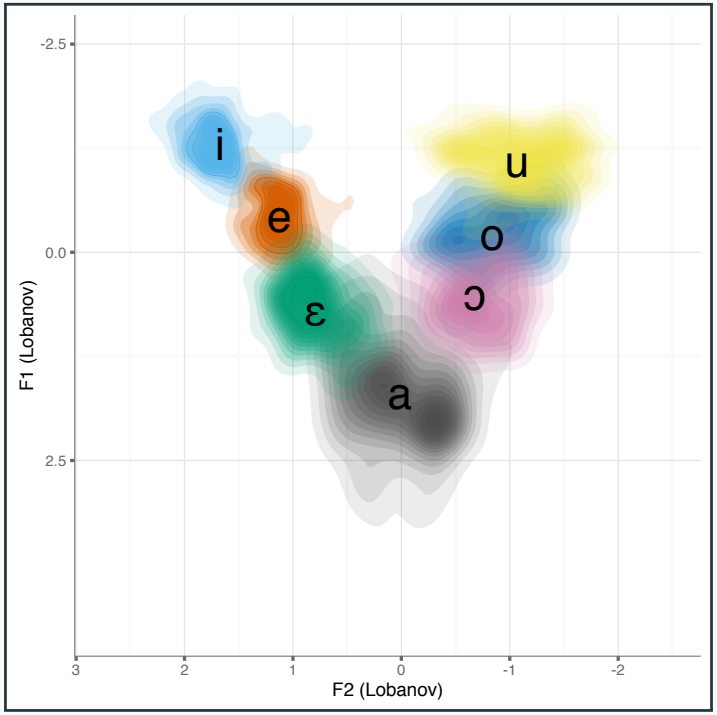


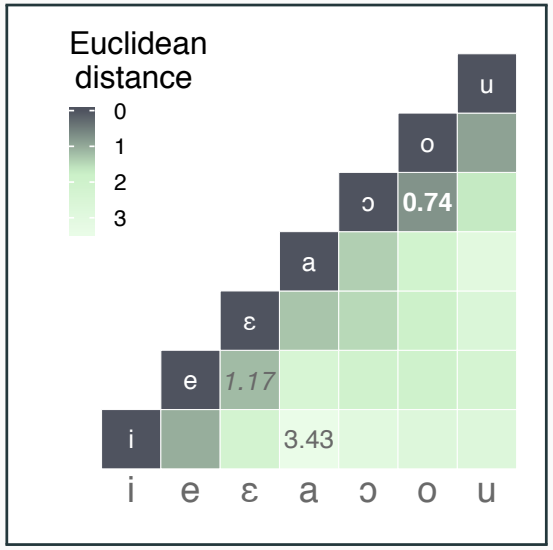


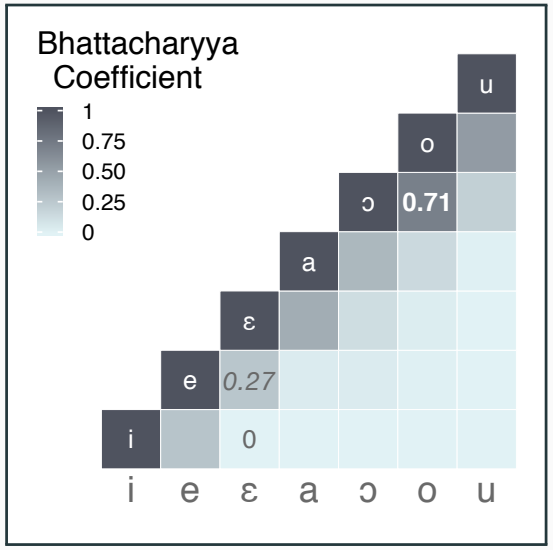


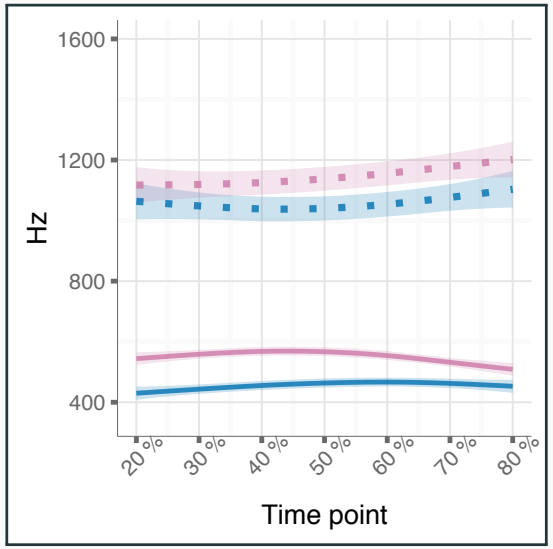


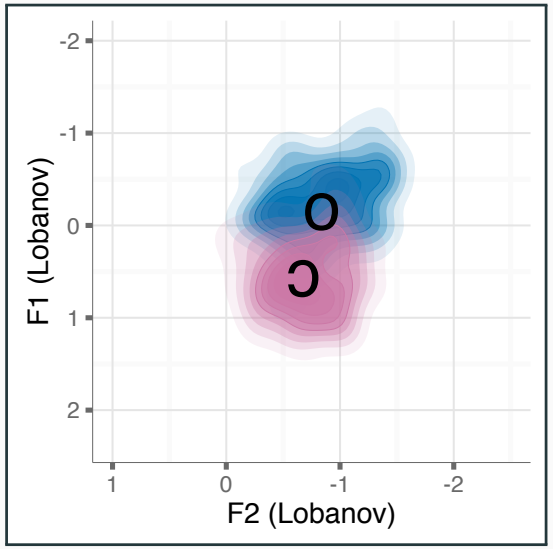
Q & C: DISTINCT SPEAKERS (8)











HOW ACCURATE IS THIS CLASSIFICATION?

F1 LOBANOV ~VOWEL + (1|WORD) + (1|SPEAKER) + (1|PreS) + (1|PostS):

	Estimate	SE	t	Pr(>|t|)	
M1 (M):	0.088	0.091	0.966	0.346	
M2 (NM):	0.41	0.139	2.956	0.0902	**
M3 (D):	0.5891	0.1206	4.884	0.000152	***

DOES SYLLABLE PLAY A ROLE?

- Coromines 1953: /ɔ/ → /o/ in initial syllable
  - Merged /o/-/ɔ/ in FINAL position for
    - near-merged speakers (β=0.1112, SE=0.4902, t=0.227, p=0.842)
    - distinct speakers (β=0.224, SE=0.409, t=0.548, p=0.650)

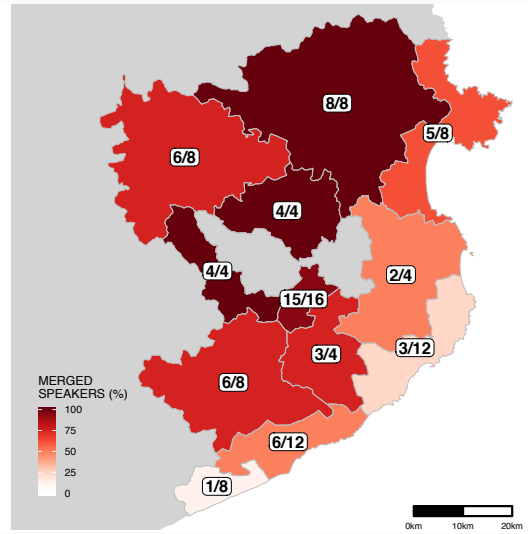
  → just accuracy of the production?

HOW ABOUT *THE LIST*?

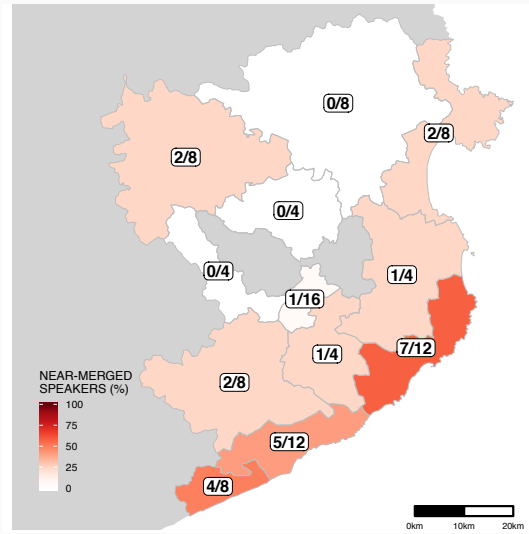
- Words identified by Coromines (1953) and subsequent work, and also minimal pairs, behave just exactly like the mid back vowels produced in T1 and T3 for each of the three (merged, near-merged, distinct) groups of speakers

GEOGRAPHICAL DISTRIBUTION OF THE MERGER I

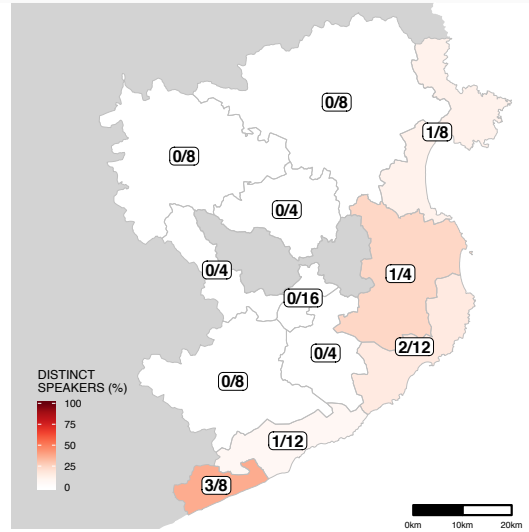
Merged



Near-merged

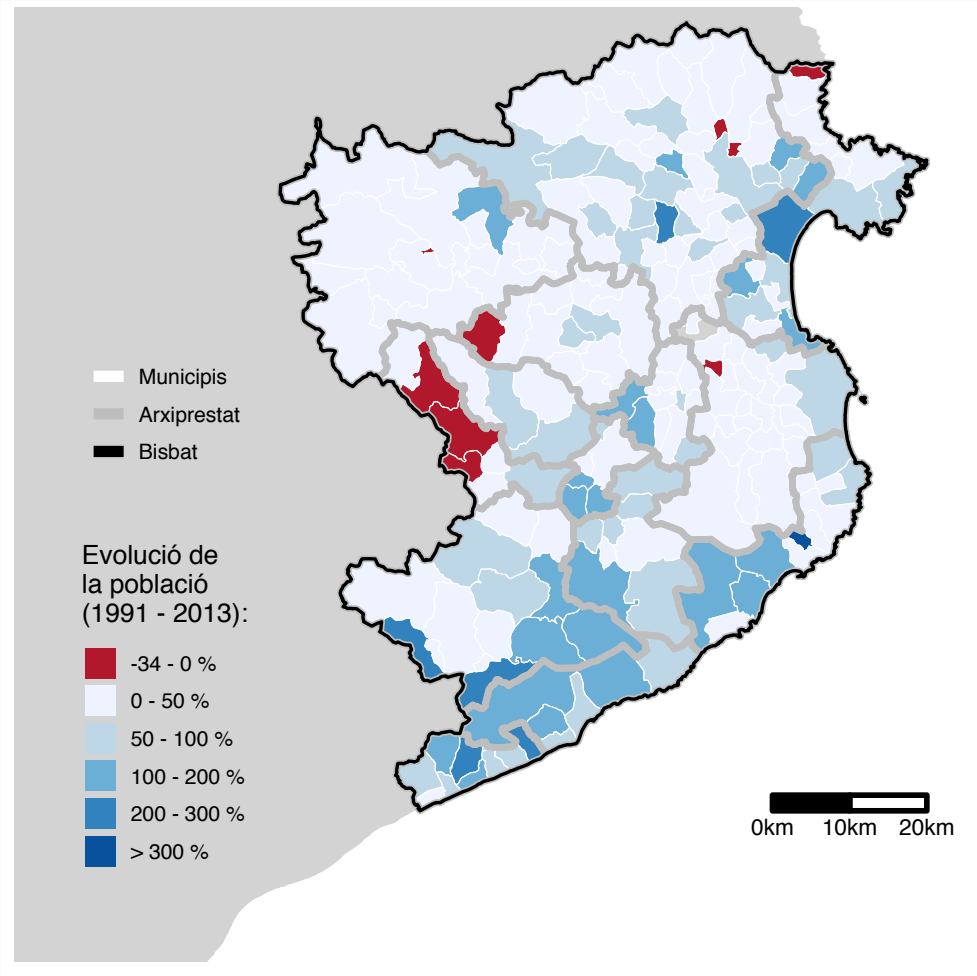


Distinct



GEOGRAPHICAL DISTRIBUTION OF THE MERGER II

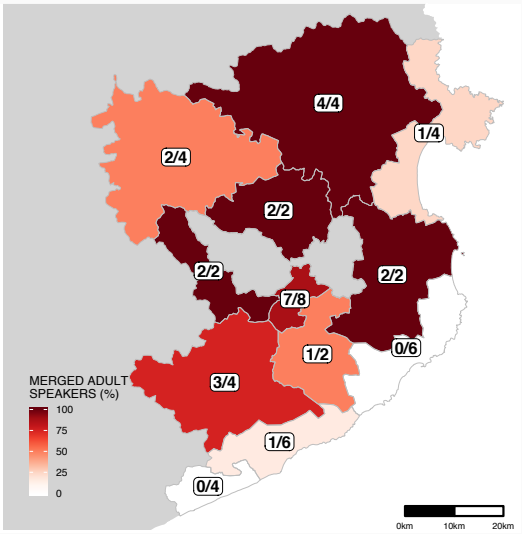
- Major demographic and sociolinguistic differences between interior and coast areas

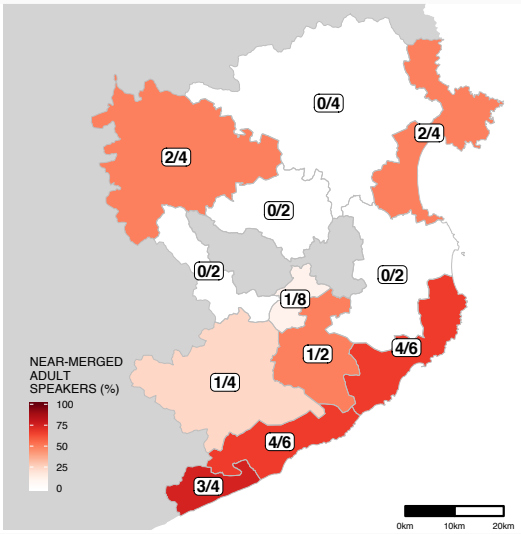


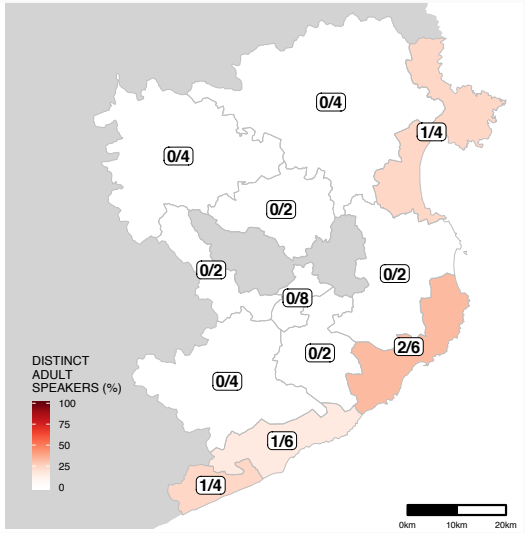
MERGED SPEAKERS BY AREA AND AGE I

Merged | Near-merged | Distinct

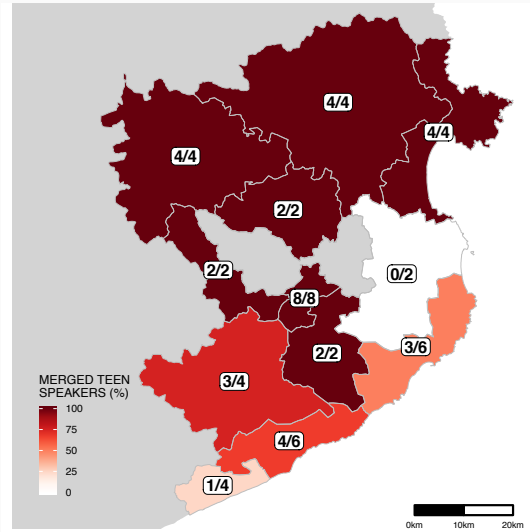
Adults

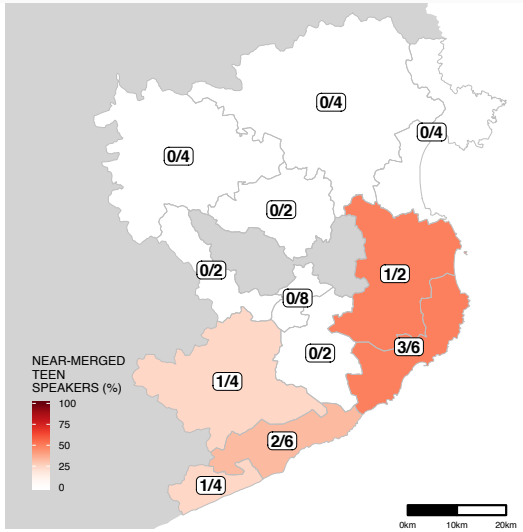


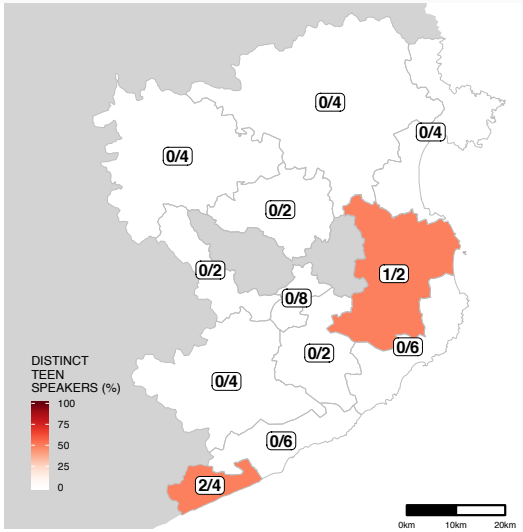




Teens







MERGED SPEAKERS BY AREA AND AGE

- Garde's Principle: "mergers are irreversible by linguistic means" (Labov 1994: 311), but "Given the right social conditions, it is reasonable to think that a distinction can be reintroduced into a speech community in a consistent way" (Labov 1994: 342):
  - Orthography might be playing a big part on the resistance to / denial of the merger → BREAKING NEWS: IEC just decided to remove most diacritic accents affecting minimal/quasi-minimal pairs
- Based on their speech as a whole, the diffusion of the merger among younger speakers in coast areas could be influenced by Spanish (clear instead of dark alveolar /l/, delateralization of alveolopalatal /ʎ/ > /j/, lowering of /ə/) + general comments on language by speakers *and their teachers*

6. CONCLUSIONS

CONCLUSIONS

- The unconditioned merger of /o/ and /ɔ/ in production is complete in the interior part of Girona, and is not complete but expanding in coast areas
- Orthography and the standard variety might be influencing (younger) speakers away from the merger in areas where:
  - the merger is not complete
  - there are important demographic movements and diversity
- Spanish might be influencing younger speakers towards the merger in those same areas → it all depends on each speaker's sensitivity towards language
- Perception results coming soon!

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Huy chexw!

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