Mid-back vowels in Girona Catalan: target vs. dynamic approaches

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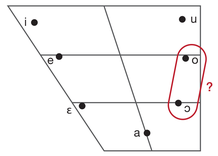
1. Introduction



▸ Most Catalan varieties, including the Standard, have a seven-stressed-vowel system. In the Girona diocese (North-Eastern Catalonia), however, **mid back vowels [o] and [ɔ]** seem to be either **merged** or merging.

▸ Data from 96 speakers in 12 designated survey areas within Girona has been collected.

▸ Traditionally, vowels have been analysed at a **single time point**. But changes over **time** can provide important information on the characteristics of vowels, specially for mergers.

▸ This is a **pilot study** of the vowels obtained in one of the survey areas, to compare the results of **target** and **dynamic** approaches to vowel analysis.

2. Methods

2.1 Participants

Participant	Gender	Age
TB-FE1-D1	*Female*	15
TB-FE1-H1	*Male*	16
TB-FE2-D1	*Female*	58
TB-FE2-H1	*Male*	65

▸ N=4 → **Pilot study!**
▸ Catalan-speaking families
▸ 2nd generation citizens of the Ter-Brugent (*TB*) deanery (Western Girona)

2.2 Interviews

▸ *Recordings:*
  ▹ Marantz PMD 620 MK II, 4.1kHz SR
  ▹ Pioneer DM-DV15 dynamic microphone
▸ *Tests:*
  ▹ Visual test (T1): 7 vowels x 7 contexts
  ▹ Reading task (T3): 7 vowels x 4 contexts x 3 repetitions

2.3 Data processing and analysis

▸ Orthographic transcription: Praat
▸ Adjusted automatised alignment: SPPAS
▸ Formant values extracted with a semi-automatic Praat script
▸ Normalisation, analysis and plotting: R

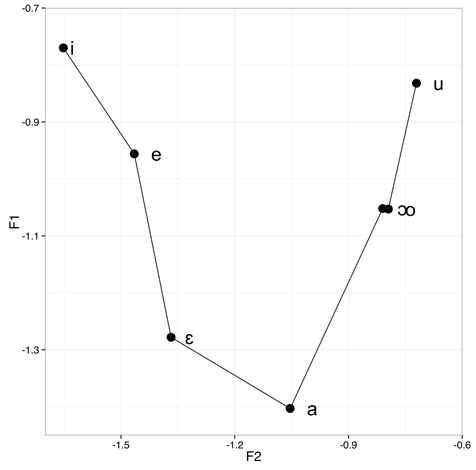
3. Results

3.1 Target approach: analysis at midpoint

Table 1: Unnormalised F1, F2, and F3 mean values at midpoint

	Female			*Male*			
	F1 (Hz)	F2 (Hz)	F3 (Hz)	F1 (Hz)	F2 (Hz)	F3 (Hz)	
i *(n=40)*	379	2422	3005	334	2200	2840	i *(n=39)*
e *(n=39)*	441	2175	2866	446	1926	2664	e *(n=38)*
ɛ *(n=39)*	598	2044	2940	589	1792	2644	ɛ *(n=36)*
a *(n=38)*	629	1595	2728	678	1362	2494	a *(n=38)*
ɔ *(n=41)*	**479**	**1231**	**2733**	**498**	**1043**	**2454**	**ɔ** *(n=40)*
o *(n=36)*	**480**	**1202**	**2702**	**496**	**1029**	**2478**	**o** *(n=36)*
u *(n=39)*	391	1072	2650	380	948	2530	u *(n=37)*

Figure 1: Mean F1xF2 NEAREY1-normalised values at midpoint



3.2 Dynamic approach: Smoothing Spline Analysis of Variance (SS-ANOVA)

▸ **SS-ANOVAs are used to compare curves**, statistically. They tell us whether two formant trajectories are significantly different or not.
▸ Mean formant values were measured at the **20, 30, 40, 50, 60, 70, and 80%** of the vowel interval, and the curve linking them together (each strong line) was fitted through the model.
▸ The dashed lines around each mean curve represent **95% confidence intervals: if they overlap, the vowels are not significantly different**.
▸ **Bark** values allow us to compare results among speakers, and SS-ANOVAs performed on them become easily readable plots: lines at the bottom represent **F1 values (F3-F1)**; lines at the top, **F2 values (F3-F2)**. Plus, Bark values are closely related to **perception**.

Figure 2: SS-ANOVAs performed on Bark values for all (a) mid back and (b) mid front vowels

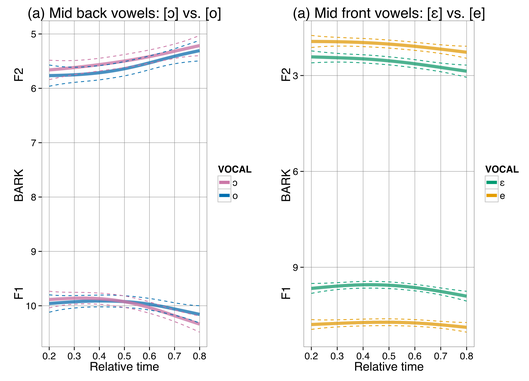


Figure 3: SS-ANOVAs performed on Bark values for all (a) T1 and (b) T3 mid back vowels

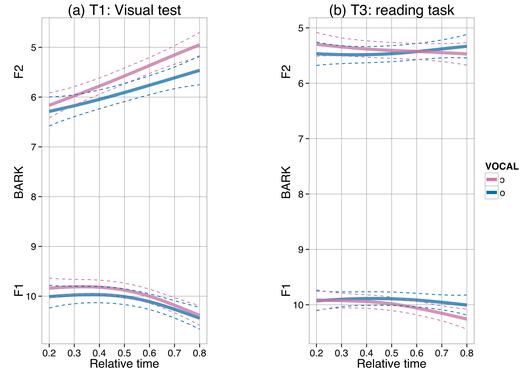
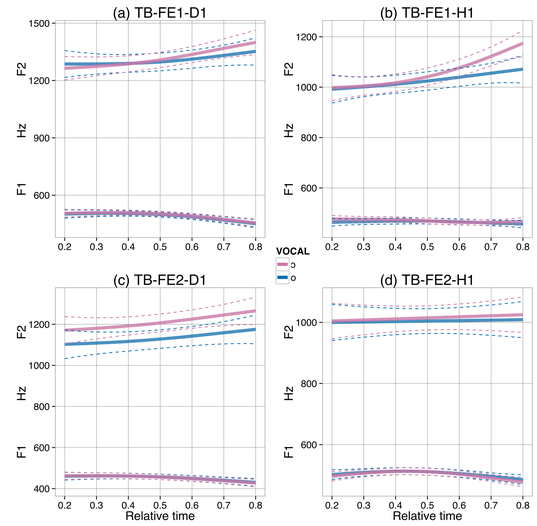


Figure 4: SS-ANOVAs performed on unnormalised Hz values for all mid back vowels by each speaker



▸ Mid back vowels are merged throughout their intervals, while mid front vowels are clearly distinct.
▸ There is less overlap in F2 than in F1 values. For each individual speaker, [o] and [ɔ] have almost the same exact F1 trajectory.
▸ Overlapping seems to diminish slightly towards the end of the trajectory: an analysis of coarticulatory effects will be useful with further data.
▸ More variability in T1 than in T3 results: further data will allow comparing speech styles.

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▹ Poster and other works available at http://www.ub.edu/GEVAD.