

A FIRST GLIMPSE OF MID BACK VOWELS IN GIRONA CATALAN

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ABSTRACT

Mid back vowels [o] and [ɔ] appear to be merging in the Catalan spoken in the region of Girona. In this brief paper, we present preliminary data on the production of these vowels in one of the 12 designated survey points for the study of the phenomenon, the area of Ter-Brugent. The first results in this area show that our speakers present an almost complete merger of the mid back vowel pair, and no remarkable differences are observed with regard to gender nor age.

Keywords: Sociophonetics, dialectology, vowel mergers, language variation, Catalan.

1. INTRODUCTION

The vowel system of the majority of Catalan varieties, including the Standard, comprises seven stressed items: [i], [e], [ɛ], [a], [ɔ], [o] and [u]. The acoustic studies in [12] and [6], as well as the remarks made in works such as [1], [7], [9] or [11], however, indicate that the mid-closed and mid-open back vowels ([o] and [ɔ]) in the Catalan spoken in the Girona diocese (from now on, *Girona*), in North-Eastern Catalonia, are in fact near-mergers. Thus, the hypothesis under analysis states that these two phonemes have increasingly closer dispersion areas, and that speakers of this variety produce two such similar vowels that they are unable to perceive the distinction.

Our on-going project seeks to investigate this phenomenon in depth both by collecting further quantitative and qualitative data on the merger production—data from 5 male speakers reading a sentence list [12] and 3 female speakers reading nonce-words [6] had been collected so far, in both cases as part of larger studies involving other varieties—, and by obtaining data on its perception by speakers from the region, which has not been done before. In order to do this, a series of production and perception tests are being conducted with 96 participants (24 men and 24 women aged 57 to 65 years old, and 24 boys and 24 girls aged 15 to 17 years old) from 12 geographic areas within Girona.

In this paper, we present the very first results of

our study: those obtained from the 4 speakers in the Ter-Brugent area (TB) in two of the production tests. Because the amount of data available in our project is still scarce, we will not offer statistical analyses on the production of the vowels. On the contrary, the aim of this paper is to use almost raw data to observe the appearance or not of the [ɔ]-[o] merger in TB, and to identify possible variation patterns with regard to gender and age.

2. METHODOLOGY

2.1. Participants

The four participants in Table 1 were interviewed for this preliminary study. They all come from Catalan-speaking families, and are at least second generation citizens and life-long residents of the area of Ter-Brugent, in Western Girona.

Table 1: Ter-Brugent participants

Participant	Gender	Age
TB-FE1-D1	<i>Female</i>	15
TB-FE1-H1	<i>Male</i>	16
TB-FE2-D1	<i>Female</i>	58
TB-FE2-H1	<i>Male</i>	65

2.2. Interviews

2.2.1. Recordings

Participants were interviewed at home. Speech was recorded in a quiet surrounding on a Marantz PMD 620 MK II solid state recorder at a 44.1kHz sampling rate, using a Pioneer DM-DV15 dynamic microphone.

2.2.2. Tests

Data used here—which is part of longer interviews—comes from a visual test (T1) designed to elicit 49 words including the 7 vowels in the Catalan system in 7 different contexts, and from a replication of the reading task used in [12] (T3), whereby another 84 items were obtained from each

speaker (7 stressed vowels x 4 consonantic contexts x 3 repetitions).

2.3. Data processing and analysis

Words elicited in tests T1 and T3 were orthographically transcribed using Praat [4]. These transcriptions went then through manually-adjusted automatised alignment using an adaptation of SPPAS [2] for Catalan. The resulting files were prepared for formant extraction with the TierMapping plugin also available in [2]. F1, F2, and F3 values at the midpoint of each vowel interval were extracted using a semi-automatic Praat script. This procedure made it possible to adjust the estimated formant tracks for each particular vowel and to avoid errors derived from the fact that F1 and F2 are very close to each other in back vowels, which often causes the algorithm to miss one of them. The resulting values were normalised using the NEAREY1 method through [8] for [10]. The point of formant extraction and the normalising method used for our analysis are the same as those used by [12], to allow for a better comparison of the results in subsequent stages.

3. RESULTS

3.1. Unnormalised formant values

Table 2 contains the unnormalised F1, F2, and F3 mean values of the vowels obtained from the female and male TB speakers through tests T1 and T3. The difference between [ɔ] and [o] is of 22 Hz for F1 and 53 Hz for F2 values in the case of the two female speakers, and of 10 Hz for F1 and 39 Hz for F2 in the case of the two male speakers. The minuscule differences between the two vowels indicate that [ɔ] and [o] are indeed in the process of merging, at least for our speakers in TB.

3.2. Mean normalised formant values for all speakers

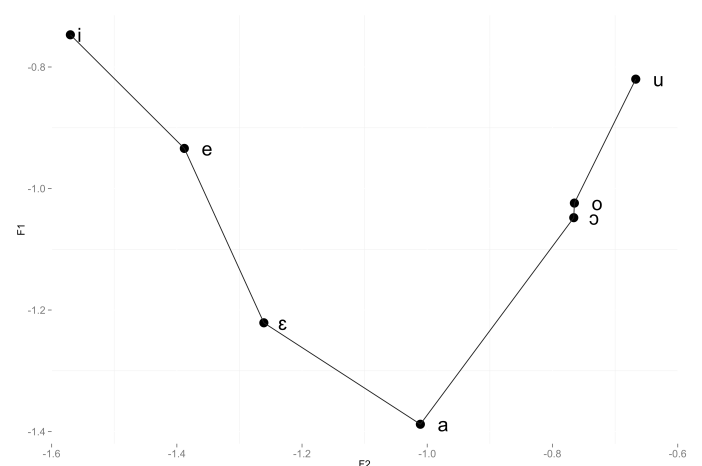
Figure 1 plots the mean F1 and F2 values of the vowels produced by all four TB speakers in tests T1 and T3, using the NEAREY1 normalisation method. The figure shows that the distance between the two mid back vowels for our speakers in the Ter-Brugent area is indeed extremely small, as already expected from the unnormalised results shown in the previous section. Additionally, the plot provides further information on the fact that these nearly-merged mid back vowels might be located on the higher side of the vowel space—that is, closer to the theoretical [o] than to [ɔ]—, but clearly between the two mid front vowels, which are undoubtedly distinct in the pro-

Table 2: Unnormalised F1, F2, and F3 mean values of the vowels obtained from female and male TB speakers in tests T1 and T3

		F1 (Hz)	F2 (Hz)	F3 (Hz)
<i>Female</i>	i	371	2386	2936
	e	436	2149	2865
	ɛ	572	1967	2899
	a	622	1611	2800
	ɔ	485	1270	2754
	o	463	1217	2750
	u	392	1089	2643
<i>Male</i>	i	332	2215	2842
	e	443	1926	2640
	ɛ	579	1740	2582
	a	688	1364	2508
	ɔ	504	992	2484
	o	494	1031	2542
	u	379	880	2559

duction of these TB speakers. The same is true for the speakers in the [12] study, but further data is obviously needed to establish the characteristics of the merging vowels.

Figure 1: Mean F1x2 NEAREY1-normalised values of the vowels produced by the four TB speakers in tests T1 and T3

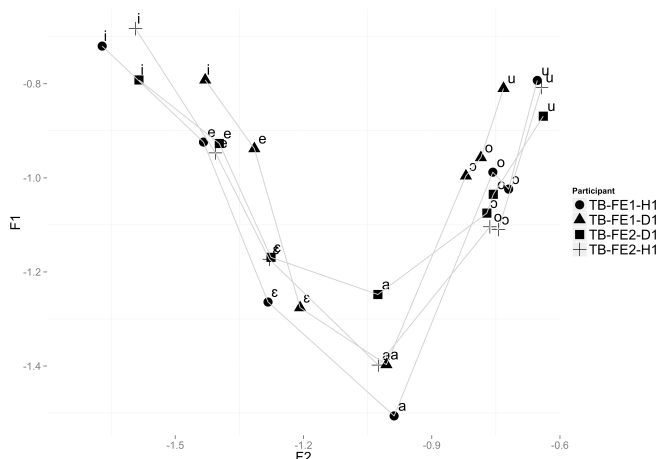


3.3. Mean normalised formant values by individual speakers

The mean F1 and F2 NEAREY1-normalised values for each of the four individual Ter-Brugent speakers are plotted in Figure 2. This plot allows us to observe, first of all, that the [ɔ]-[o] pair is clearly merged for all four of our speakers. Secondly, it re-

flects that the particular mid vowel(s) produced by each participant varies slightly towards the higher side or the mid area of the vowel space, but that none of these seems to be close to the natural [ɔ] area. Finally, the plot shows that the merger takes place independently of the size of the vowel space of each speaker.

Figure 2: Mean F1xF2 NEAREY1-normalised values for the vowels of each of the four individual TB speakers in tests T1 and T3



3.4. Normalised formant values for each vowel by individual speakers

Figures 3, 4, 5 and 6 are scatter plots of all the tokens of each vowel obtained from each of the four speakers in the Ter-Brugent. These figures strongly suggest that what looked like a near-merger in the previous sections is in fact a complete merger: the dispersion areas for the [ɔ]-[o] pair overlap for all of our TB speakers. Moreover, the merger apparently takes place regardless of other partial intersections that may or may not occur across the rest of the vowel space of each participant. In this sense, it must be noted that even though the two male participants (TB-FE1-H1 and TB-FE2-H1) have much more distinct vowels than their female counterparts as a whole—something that will have to be taken into account in future analyses—, there is no doubt that the mid back vowel pair is completely neutralised in the speech of both male and female speakers, and that none of the other vowels are. The specially big dispersion area of the [a] vowel of speaker TB-FE2-D1, and its overall central production, will have to be analysed.

4. DISCUSSION AND CONCLUSION

The results shown in the previous section point at a complete merger of [ɔ] and [o] in the region of Ter-Brugent. Of course, the data presented here constitutes merely a pilot study, and the lack of statistical analysis makes it impossible to assert the prevalence of such a phenomenon even in the small Ter-Brugent area. Together with the data obtained by [12] and [6], though, these preliminary results do seem like a good indicator of the situation in at least some areas of the Girona diocese, and some details must be noted from them.

First of all, it is significant that no obvious divergences with regard to gender or age seem to affect the existence of the merger. This could indicate that the neutralisation process is older than some previous distributional theories regarding the mid back vowels in Girona Catalan (see [5]) suggest. The only factor that might denote an indeed recent development of the merger is the fact that, in the scatter plots in 3.4, while the two mid back vowels of the two older speakers (Figures 5 and 6) have a very similar dispersion area, in the occurrences from the two younger speakers (Figures 3 and 4) one of the two vowels has a smaller dispersion space that is contained within the space of the other.

Additionally, the data presented throughout this paper does not provide any definite answers on the nature of the vowel resulting from the merging of [ɔ] and [o], but it does offer some hints on what might be happening. Thus, plots as well as unnormalised formant values point at the possibility that the mid back vowel produced by Girona speakers might be closer to [o] and even to [u] than to the phonemes in the lower half of the vowel space. Additionally, the scatter plots presented in 3.4 do seem to indicate that the merged mid back vowel has a larger dispersion area than the rest of the vowels in the system.

Finally, it is noteworthy that the [ɔ]-[o] pair does not seem to represent a near-merger, as suggested by [12], but a single, completely neutralised vowel—even the raw unnormalised formant value differences in the pair are too close to think otherwise (cf. the ‘just-noticeable difference’ (JND) used in [3]). This, of course, needs to be tested statistically, but it is likely to pose an extra challenge for the testing of perception, since it illustrates the very definite possibility that a variety of degrees in the merging process is found throughout the Girona region.

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Figure 3: NEAREY1-normalised F1x F_2 values for all tokens of each vowel obtained from speaker TB-FE1-D1 in tests T1 and T3

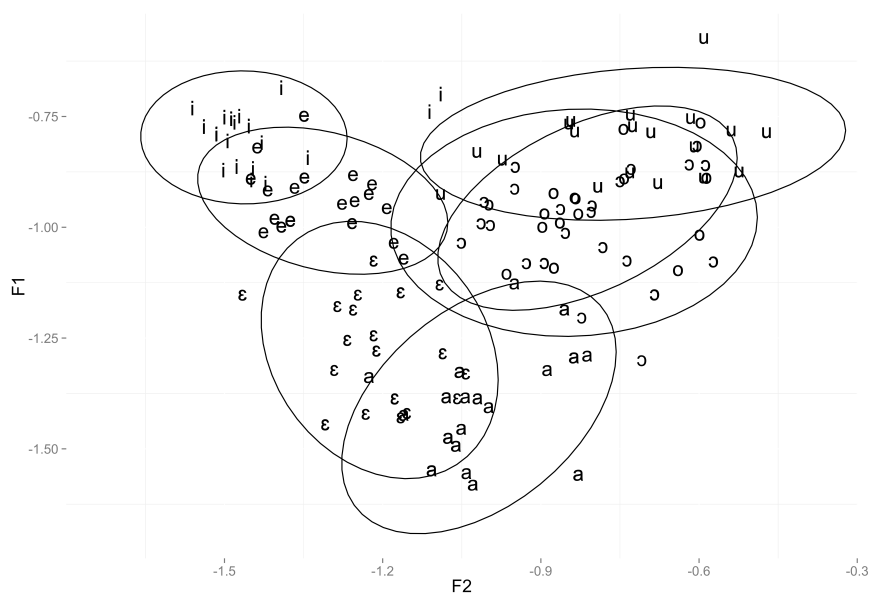


Figure 4: NEAREY1-normalised F1x F_2 values for all tokens of each vowel obtained from speaker TB-FE1-H1 in tests T1 and T3

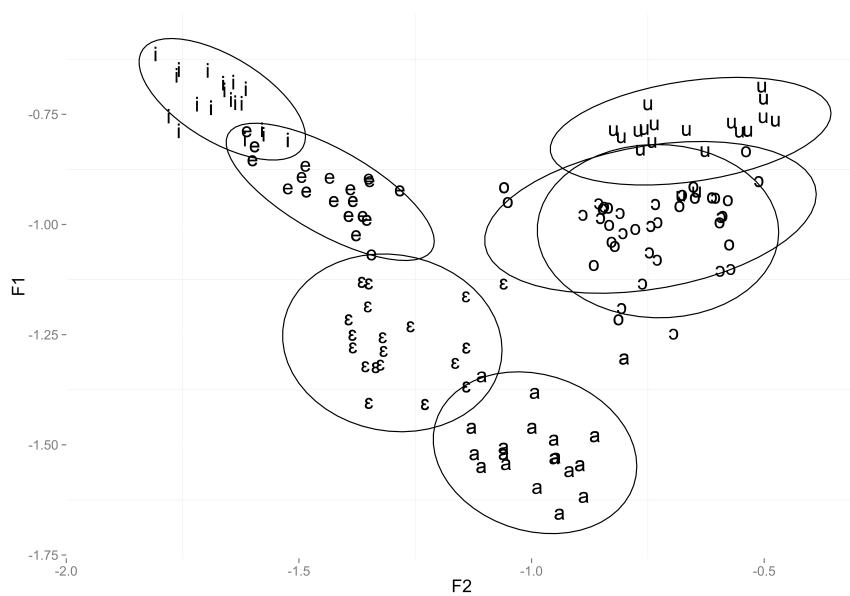


Figure 5: NEAREY1-normalised F1xF2 values for all tokens of each vowel obtained from speaker TB-FE2-D1 in tests T1 and T3

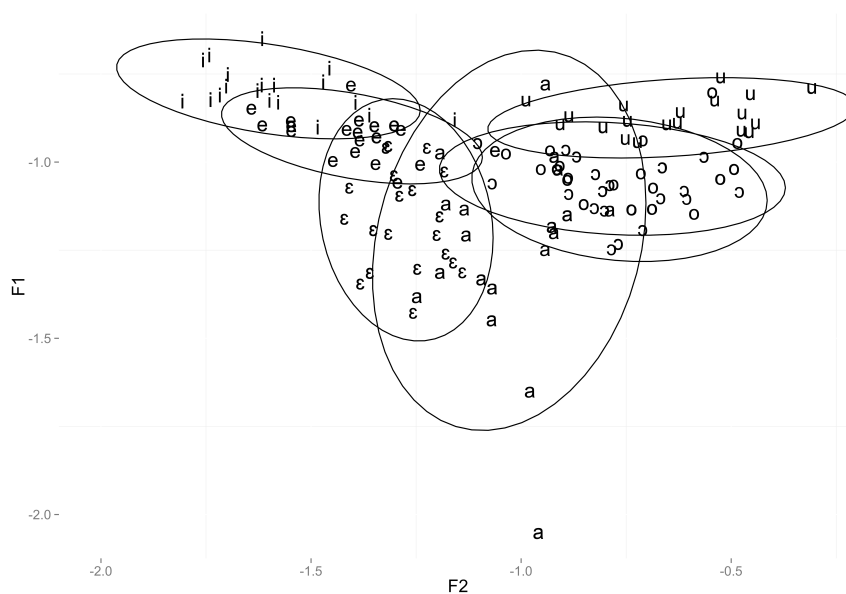
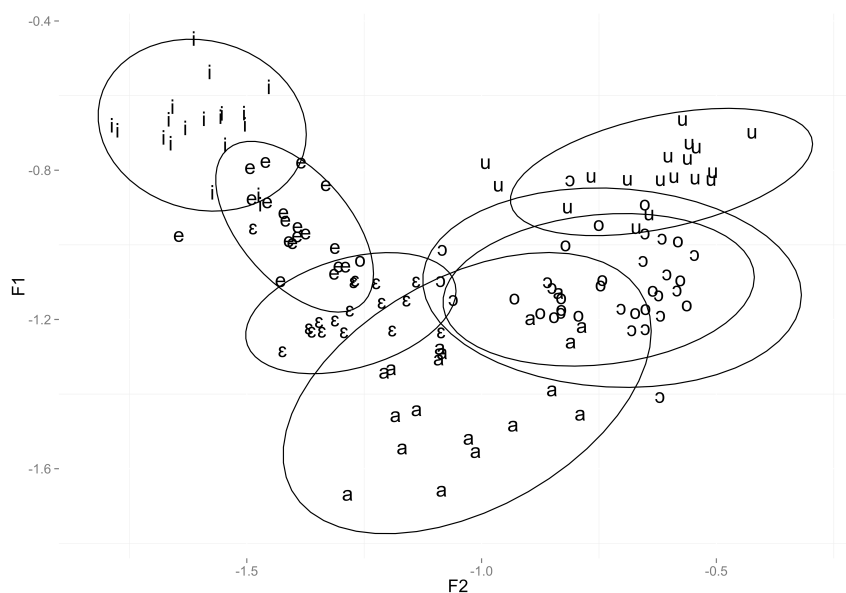


Figure 6: NEAREY1-normalised F1xF2 values for all tokens of each vowel obtained from speaker TB-FE2-H1 in tests T1 and T3



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