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SOME CURRENT PHONOLOGICAL FEATURES IN THE CATALAN OF BARCELONA*

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ABSTRACT

This article presents some preliminary results of a project on alleged on-going phonological changes of the Catalan spoken in Barcelona that is carried out at the University of Hamburg. Data focusing on the production of the Catalan mid-open vowels and schwa elicited from three generations of speakers (children, young adults, and older adults) in two districts of Barcelona differing in usage of Spanish have been auditorily analyzed. Results show that, in Nou Barris (the district with more Spanish input), mid-open vowels are often replaced by their mid-close counterparts, and schwas are replaced by [a] in the two younger generations, whereas in Gràcia (the district with less Spanish input), the younger generations produce Catalan vowels more often than the older generation. These findings are attributed to the positive influence of school together with a strong presence of Catalan in Gràcia, and to a limited Catalan input in Nou Barris.

INTRODUCTION

At the time when, after Franco's death, a democratization process began in Spain, and the new constitution of 1978 was enforced, the Catalan language had suffered forty years of repression, i.e., of being banned from official functions, as well as from school, and being relegated to the family domain. Furthermore, between the 1950s and 1970s a great number of immigrants coming from other non-Catalan speaking regions of Spain, i.e., Andalusia, Extremadura, Galicia, Aragon, etc., added to the number of those who were not able to use Catalan, especially in the metropolis of the language, Barcelona. The unofficial status at Franco's time promoted diversity, and some studies (e.g., López del Castillo 55-59) at that point and immediately afterwards were complaining about the presence of several social varieties in Barcelona which tended to assimilate to Spanish, i.e., *xava* or *bleda*, but at the same time there were hardly any studies reporting what the Catalan language was like at that time. As Catalan had not

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been transmitted at school but only in the family domain, the language had been receiving many loanwords from Spanish, some of which came with new phonemes, as in the case of /x/ (see Cerdà).

After Franco's dictatorship, the situation essentially changed, as the language recovered most of its social functions in Catalonia, and it was taught at school. This process led to a revival of the language, which was then used again in many other areas outside the family. One essential change taking place with democratization was the vast increment of Catalan speakers. Here are some examples about the evolution of the number of Catalan speakers in Barcelona: according to the *Institut d'Estadística de Catalunya*, in 1981 1,475.193 people could understand the language, whereas in 1991, after the language had recovered its social functions (see below), the number increased to 1,543.218.¹ Moreover, in 1996 only about 41% of the population who had arrived in Barcelona between 1951 and 1965 could speak the language, whereas out of the population who arrived between 1981 and 1985 more than 60% could speak it. This means that the base of Catalan speakers has substantially augmented, nurturing itself from the great number of monolingual Spanish speakers who immigrated to the metropole. These newcomers, or rather their descendants, who until that point had generally used Spanish as their language, began to have access to the Catalan language through school, learned it and began to use it in different realms of society, often outside the family, as many of them kept Spanish as their family language.

This ever since changing situation poses the question about which characteristics the language spoken in Barcelona presents. Besides López del Castillo (55-59) or Tuson, who have tried to define the characteristics of sociolects like *xava* or *bleda*, there are very few studies stating what the language in Barcelona looks like. López del Castillo (93-209), from a general perspective, as well as Payrató, Recasens (77-135), Veny (36), from a phonological and phonetic point of view, have stated some on-going changes, motivated by the influence of Spanish, like the merger of the open and closed mid vowels to /e/ and /o/; opening of [ə] towards /a/; merger of voiced and voiceless fricatives to the voiceless ones; substitution of the velarized lateral, [ɫ], with the non-velarized one, [l]; substitution of /ʎ/ with [j], etc. However, it is not clear whether these changes have already taken place, whether they affect all speakers or whether they are at an on-going stage. It is also not clear if the changes affect a subset of them only, depending on age, language of the parents (Catalan or Spanish), and district (with a high variability of Catalan and Spanish use). The

¹ There are no data available before 1981.

project "Phono-prosodic development of Catalan in its current bilingual context" at the University of Hamburg investigates the status of these phonological processes in several age groups and districts of Barcelona.

In this article, we present some preliminary findings of this project. In the following section, the phenomena under study are described, as well as the internal and external factors that can influence their evolution. The criteria for the selection of the subjects are also reviewed, describing the age groups and districts selected for the sample, and the hypotheses of the study are stated for each age group. In the section thereafter, we present the methodology used in order to gather the data, as well as the characteristics of the auditory analysis carried out for this study.² Next, we present some results of the data on vowels and a discussion. Finally, the last section brings the conclusions of these results together and predicts possible trends in the evolution of Catalan vowels in Barcelona.

SETTING THE STAGE FOR THE PROJECT

Segmental and prosodic phenomena under study

The project aims at observing the status of those phono-prosodic phenomena of Catalan that may be changing due to the influence of Spanish. It thus focuses on those aspects which differ in both languages. Two lexical phenomena are also taken into consideration: a) cognate nouns differing in gender in the two languages, Catalan and Spanish, and b) usage, with or without phonological adaptation, of traditional loanwords from Spanish containing the non-Catalan phonemes /x/ and /ø/. Before comparing both systems, it will be useful to go through the main characteristics of the phonology of Eastern Catalan, the variety under study. Only the data concerning the production of vowels will be dealt with in the present paper.

The Catalan spoken in Barcelona belongs to the Eastern variety of the language. The vowel system contains two high vowels, /i/ and /u/; four mid vowels, with two degrees of opening: mid-close, /e/ and /o/, and mid-open, /ɛ/ and /ɔ/, as well as one low vowel, /a/. These are the vowels in stressed position. In unstressed position, there are only three vowels, two of them used indistinctly unstressed and also stressed, [i] and [u], and [ə], which only appears in unstressed position. Besides corresponding to /u/, the vowel [u] when unstressed is the phonetic

² Acoustic analyses are also carried out within the project. They will be reported in future publications.

result of reducing /ɔ/ and /o/, whereas [ə] is the phonetic reflex of reducing /ɛ/, /e/, and /a/ in unstressed position.

As far as consonants are concerned, Eastern Catalan has voiced and voiceless stops at three places of articulation: labial /b/, /p/; coronal /d/, /t/, and dorsal /g/, /k/. The voiced members of these pairs always show spirantization after vowels and after /s/, /r/, and /l/ —the latter only in the cases of /b/ and /g/. Catalan has many fricatives and affricates, especially at the coronal point of articulation, with voiced and voiceless counterparts: alveolar fricatives /z/ and /s/, pre-palatal fricatives /ʒ/ and /ʃ/; alveolar affricates /dz/ and /ts/, pre-palatal affricates /dʒ/ and /tʃ/.³ It also has the fricative labiodental voiceless /f/, but no dorsal one.

Sonorants are present as well: nasals /m/, /n/, and /ɲ/; rhotics /r/ and /r̄/, and laterals /l/ and /ʎ/. It is to be noticed that the lateral liquid /l/, although produced in the coronal area (actually alveolar), also has some velar resonance: [ɫ]. There is discussion in the field whether glides /j/ and /w/ have any phonemic role in the language.

As for intonation, Catalan has been described as containing the following pitch accents (Prieto et al. 5): H*, !H*, ¡H*, L*, L+H*, L+!H*, L*+H, H+L*, and !H+L*. Following the description of Catalan intonation in Prieto (402-49), it can be said that, in general, declarative sentences have a final falling tune. As for interrogatives, yes/no questions can have either a rising final contour (H-H%); e.g., *Veu'reu la Maria?* 'Are you going to see Maria?', or a falling one (L-L%) in the case of sentences beginning with the particle *que* 'that'; e.g., *Que veu'reu la Maria?* 'Are you going to see Maria?' And it has been said that in the area of Barcelona both options bear a neutral attitude from the speaker, although with some possible minor pragmatic differences. Wh-questions can also show both final contours: falling tune or rising tune, the latter showing more involvement on the part of the speaker.

A cursory comparison between the phonologies of Catalan and Spanish

If the system presented above is compared with the Spanish phonological system, it is clear that the Catalan system presents many more segments than the Spanish one. In particular, the stressed vowels /ɛ/ and /ɔ/, and the unstressed [ə] are not present in Spanish. Within

³ Not all descriptions agree with attributing phonemic status to [ts]. For instance, according to Badia (298-306), [ts] should not be considered a phoneme, but just the combination of a stop /t/ and a fricative /s/.

consonants, Spanish does not exhibit a voicing distinction among fricatives or affricates: it only has the voiceless fricative /s/ and the voiceless affricate /tʃ/, i.e., the following phonemes are missing in Spanish: /z/, /ʒ/, /ʃ/, /dz/, and /dʒ/. The segment /ts/ is also only present in Catalan and not in Spanish. The Spanish lateral is alveolar, with no velar resonance, i.e., it is [l], not [ɭ]. And although the Spanish inventory is usually described as containing the palatal /ɰ/, this is generally produced as the glide /j/, by a process called *yesismo* in the phonological descriptions of Spanish (see Hualde, "The Sounds" 179f). On the other hand, Spanish has the velar segment fricative /x/ and the dental one /θ/, not present in Catalan.⁴

It has been reported that the Catalan of Barcelona is losing the vowels /e/ and /ɔ/, which are respectively being replaced by [e] and [o]. As for [ə], it is being replaced by [a]. In the case of fricatives and affricates, the voiceless ones are substituting for their voiced counterparts: /z/ is being produced as [s]; /ʒ/ as [ʃ] (often affricated instead of being a fricative), and /dz/ and /dʒ/ as [ts] and [tʃ], respectively. Apparently, the additional velarity of [ʃ] is disappearing, and the palatal liquid /ɰ/ is being replaced by [j].

Turning to intonation, some differences between the two languages can be inferred from existing studies. Firstly, the pitch accent H+L*, often used in Catalan, is said to either be absent or seldom used in Spanish (Hualde, "El modelo" 162-63). Secondly, neutral yes/no questions in Iberian Spanish have a rising contour (Sosa 126). Thirdly, the final lowering of a declarative sentence tends to begin earlier in Catalan than in Spanish (Prieto 403f). Finally, in studies based on read speech, some differences of phrasing in the two languages have also been reported: Catalan seems to show more preboundary lengthening and less pitch resetting than Spanish (Frota et al. 135) and (SV)(O) phrasing was found in 24% of sentences with long object, whereas in Spanish such a phrasing was practically inexistent (D'Imperio et al. 67-71, 79f). The research project takes into consideration all these differences in order to reveal whether the influence of Spanish on the Catalan of Barcelona is also present at this prosodic level. However, in this paper we will only report on vowels.

⁴ Although /x/ appears in some of the loanwords that entered Catalan in the 20th century.

The role of internal and external factors

Internal factors: markedness and complexity

All the substitution processes of the segmental phenomena show a clear tendency from the marked to the unmarked, i.e., a vowel system with open and closed mid vowels is more marked than a vowel system with only one degree of opening in the mid vowels. Voiced obstruents are clearly more marked than voiceless obstruents. Some of the substitutions also show a tendency from more towards less complexity, as in the case of the substitution of [a] for [ə]. The process of vowel reduction in unstressed position can be argued to imply complexity, as it leads to allomorphy. For example, the morpheme for 'bag' has two allomorphs: *b/o/ss-* and *b/u/ss-*, the latter appearing in the diminutive *b/u/sseta* 'small bag'; and the same is true for the morpheme for 'leg,' which has the allomorphs *p/o/t-* and *p/u/t-*; the latter appears in *p/u/teta* 'little leg.' And in the case of *p/ε/l* 'hair,' it not only has one more allomorph *p/ə/l*, which appears in *p/ə/let* 'little hair,' but the phone that appears in unstressed position, i.e., schwa, does not have any further purpose in the language than turning the vowels /a/, /ε/ or /e/ into an unstressed vowel. Using [a] instead of schwa avoids allomorphy in those cases with underlying /a/, but more importantly, it avoids the complication of the vocalic system with a vowel that only appears in very limited contexts, namely unstressed ones. That is to say, in the case of schwa it is not clear whether it is a more or less marked vowel, as both positions have been defended in the field, but it is clear that the substitution of [a] for it accomplishes some simplification.⁵

At this point, we should devote some thought to vowel reduction, as it is a phenomenon that has attracted the attention of phonological theory. Among the various analyses, we will concentrate on Crosswhite's, who proposes two tendencies in vowel reduction systems: either to reducing prominence (mid vowels are converted into high vowels and the low vowel is converted into schwa), or to enhancing contrasts (non-peripheral vowels are reduced towards the periphery of the vowel space, leading to, e.g., [i, u, a]). The Catalan of Barcelona shows a mixed tendency, as the reduction of [a] to [ə] corresponds to a reduction of prominence, but the reduction of /e/ and /ε/ to [ə] does not respond to enhancement, which thus suggests that it may respond to prominence reduction as well. The reduction of /o/

⁵ Van Oostendorp (196) considers schwa as unspecified for place features, and thus "unmarked" when occurring in weak prosodic positions. However, from a typological perspective, schwa is a relatively infrequent vowel in the world's languages, and thus marked. According to Maddieson (252), it appears in 73 languages out of the 317 included in his survey, corresponding to 23% of the languages.

and /ɔ/ to [u] is in fact ambiguous, as it can respond to both tendencies, reduction of prominence as well as enhancement of contrast. The apparently on-going substitution of [a] for [ə] changes the unstressed vowel system substantially, as both /e/ and /ɛ/ are reduced to [a], and the resulting inventory in unstressed position, [i, u, a], does clearly correspond to enhancement of contrast, as these have been shown to be the most unmarked and best perceived cardinal vowels. Accordingly, the substitution may respond to Spanish influence, but it must be noted that it brings some advantages to the system; namely, unmarkedness, reduction of complexity, and possibly enhancement of contrast.

External factors

Internal factors like reduction of markedness and complexity as well as perceptibility undoubtedly play a role in these substitutions, but there are other important factors, which also influence the on-going changes. If markedness played the most important role, we should rather find [ɛ] and [ɔ] substituting for /e/ and /o/ respectively, because the former vowels appear more often in the languages of the world than the latter, and we agree with Archangeli and Pulleyblank (183-86) that for mid and low vowels [-ATR] is less marked than [+ATR]. However, according to the reports available and to the results of this study, it is the closed mid vowels that substitute for the open ones. As one reviewer has pointed out, Catalan may also show a tendency in favor of closed rather than open mid vowels, as several exceptions to vowel reduction lead to a partial reduction, whereby mid-close vowels substitute for the mid-open vowels, accounting for a relatively large number of closed mid vowels in Catalan.⁶ Notice, though, that this partial reduction corresponds to a reduction of prominence in Cross-white's proposal. However, here we are concerned with the appearance of the vowels /ɛ, e, ɔ, o/ under stress, which is not affected by partial reduction, and we hypothesize that the apparently on-going substitution of the mid-close vowels for the mid-open ones is due to the fact that Spanish has mid-close vowels only.

Thus, we expect to find some influence of external factors onto the on-going changes. One of these has to do with the fact that many speakers have learned Catalan at school, and their Catalan may be influenced by their L1 and their parents' L1 (Spanish in both cases). That is, the presence of Spanish in their lives may play an important role, which we have decided to incorporate into the study by

⁶ See detailed treatments of vowel reduction and its lexical and phonological exceptions in Bonet and Llorer (39-53), Mascaró, and Palmada (51-85).

collecting data in three districts of Barcelona, differing in the degree of presence of Catalan: Gràcia, Nou Barris, and Eixample. Given the possible importance of this external factor, we also differentiate the L1 of our subjects' parents.

Age may also be an important external factor, especially because it relates to the degree of schooling in Catalan: hardly any formal education in Catalan in the case of young children, all education in Catalan in the case of young people in their twenties, and education mostly in Spanish in the case of adults in their mid-thirties. We also think that it is important to control for the kind of input that children receive, so we also decided to include one of the children's parents in the study.

Gender might also be an influential factor, but we have not considered it, as this would have obliged us to duplicate the number of subjects to analyze.

Groups

Having age and language context as the main independent variables, we have collected data from three age groups and three districts of Barcelona. The criteria for the selection related to both variables are presented in this section.

Age groups

Our sample population comprises three age groups, namely G₁, G₂, and G₃. The participants in G₁ were children aged between 3 and 5, whose linguistic competence was not yet influenced by schooling. G₂ was composed of young adults aged between 19 and 23, who had finished secondary school and had received all of their education in Catalan. Finally, the participants in G₃ were adults who were between 32 and 40 years old, and they are the parents of the children in G₁. The productions of the participants in G₃ are examined on two grounds. First, they did not have education in Catalan from the very beginning, thus partially reflecting the earlier situation under Franco's dictatorship. Second, they offer the parental input to G₁'s subjects, and thus give us the possibility to control input and assert what is more relevant for the children's variety: the family input or the environment input.

Districts

Three districts of Barcelona were chosen depending on their different degree of Catalan usage, according to the *Cens Lingüístic de Cata-*

lunya (Institut d'Estadística de Catalunya). The data available from the 2001 census regarding the different districts is based on the level of competence in Catalan for the four basic skills: understanding, speaking, reading, and writing (Table 1).

TABLE 1
PERCENTAGE OF CATALAN LINGUISTIC COMPETENCE IN THE TEN DISTRICTS OF BARCELONA IN 2001, ORDERED FROM THE HIGHEST TO THE LOWEST INDEXES (ADAPTED FROM THE INSTITUT D'ESTADÍSTICA DE CATALUNYA)

	Understand	Can speak	Can read	Can write	Do not understand
Sarrià-St. Gervasi	97.39	84.61	84.49	57.66	2.60
Gràcia	97.21	83.02	83.07	55.76	2.78
Les Corts	97.19	81.92	82.36	53.49	2.80
Eixample	96.48	81.79	81.59	53.65	3.51
St. Andreu	95.28	73.17	73.74	45.02	4.71
St. Martí	95.14	71.36	71.99	43.62	4.85
Horta-Guinardó	95.06	72.65	73.51	45.31	4.97
Sants-Montjuic	94.67	73.61	73.56	44.72	5.32
Nou Barris	92.64	61.79	63.84	36.47	7.35
Ciutat Vella	88.08	59.76	58.51	34.62	11.91
BARCELONA	95.12	74.59	74.96	47.14	4.87

Sarrià-Sant Gervasi is the district with the highest competence in Catalan. However, this district was discarded due to the sociolect usually spoken in the area, *bleda* or "*apijat*" (Pla Fulquet 146-49), tending to assimilate to Spanish for sociohistorical reasons, mainly related to the prestige language being Spanish. This factor might have distorted the data for a presumed district with low usage of Spanish. Gràcia was the second district with regard to mastery of Catalan, and it was thus selected as the district where the sample of Catalan speakers with the lowest usage of Spanish should be found.

At the other end of the spectrum, Ciutat Vella was the district with the lowest Catalan competence among its inhabitants. This district was discarded because its population includes great numbers of new immigrants who are not only Spanish speakers from South America but also speakers of many other languages, like Arabic, Urdu or Chinese. In Raval, the area of the district with the highest number of newcomers, the population coming from abroad amounts to 45.4% (Ajuntament de Barcelona 92). This phenomenon brings, thus, a completely different type of multilingualism and a sample from this

population would not only show the influence from Spanish on Catalan but presumably from many other languages. The second district with the lowest level of knowledge of Catalan is Nou Barris, which was therefore selected for our sample as the district with the highest degree of Spanish presence.

Table 1 shows that Eixample is in between the two ends of the spectrum. The data from this district were collected after a preliminary auditory analysis of the data from Gràcia and Nou Barris. Such an analysis showed significant differences between speakers from G₁ and G₂ across these two districts. Eixample was included with the expectation that it would show an intermediate status between the other two districts. The data from the linguistic census about the three chosen districts of Barcelona coincide with their well-known character: Gràcia traditionally is a Catalan area in the center of the city. Nou Barris was created in the outskirts of Barcelona with the aim to host the newcomers of the immigration wave from the rest of Spain around the 1960s. And finally, Eixample is a historic area of the city but it is quite mixed as far as its population origins are concerned. However, preliminary results regarding Eixample, which will not yet be reported at this point, tend to show that this district aligns quite closely with Gràcia.

Hypotheses per age groups

Taking into account previous research and the internal and external factors that might be influencing the potential on-going changes, we can formulate the following hypotheses:

Hypothesis 1. We expect changes in G₁ that lead to simplification, as it is generally claimed that markedness and complexity play a crucial role in childhood. However, the results of G₁ should, to a large extent, depend on the quality of the input they receive, so that those children with Spanish-speaking parents might have carried out the changes further than those with Catalan-speaking parents. On the other hand, supposing that the great presence of Spanish outside the family may also be an important external factor, we expect a gradual progress of the changes, being more advanced in Nou Barris and less advanced in Gràcia.

Hypothesis 2. Although G₂ has attended school in Catalan, G₂'s phonology should show a strong influence of Spanish, given that teachers do not pay much attention to phonetics. This influence should be reflected in a relatively advanced stage of the expected phonological changes. This changes should be more advanced among those young people with Spanish-speaking parents, and in Nou Barris, but not that much in Gràcia.

Hypothesis 3. The phonological system of the older generation

should be less influenced by Spanish. Taking into consideration the language of the parents and the district, we expect more advanced changes in those speakers with Spanish background, but no significant difference among the three districts, as most of Catalan speakers in this generation grew up in Catalan-speaking districts, differently from G₂, whose Catalan has often been acquired at school.

DATA CORPUS

Subjects

The corpus gathered for the current project includes data from three generations of Catalan speakers in three different districts in Barcelona, as described above. Here follows a more detailed description of the groups of subjects interviewed. The schools the children (G₁) attended are specifically described for each group. The young adults in G₂ were met at sport clubs, public libraries, and youth associations in the three districts, whereas the group of adults in G₃ comprises either the father or the mother of the children in G₁ (Table 2).

TABLE 2
PARTICIPANTS IN THE STUDY

	G ₁	G ₂	G ₃
Gràcia	n=14 (8F, 6M) Mean age: 3.9 CEIP Patronat Domènech, CEIP Josep Maria Jujol, and Vedruna-Gràcia (Priv.)	n = 10 (5F, 5M) Mean age: 21	n = 11 (9F, 2M) Mean age: 36.3
Eixample	n=10 (4F, 6M) Mean age: 4.2 CEIP Ramon Llull, CEIP Fort Pienc, and IPSI (Priv.)	n = 10 (9F, 1M) Mean age: 20.6	n = 10 (7F, 3M) Mean age: 39.4
Nou Barris	n=12 (7F, 5M) Mean age: 4.5 CEIP Gaudí and Sant Lluís (Priv.)	n = 10 (6F, 4M) Mean age: 20.8	n= 11 (7F, 4M) Mean age: 36.5

Note: Priv. = private school. All the other schools (CEIP) are public. F = female, M = male.

The total number of speakers recorded for the moment is 98, but not all of them were included in the analyses carried out on the data for different reasons (e.g., bad output quality of the recording or impossibility to elicit enough data from some children). The total number of recorded speech analyzed here amounts to 60 hours and 43 minutes.

Elicitation procedure

Subjects were recorded in individual sessions run by two experimenters (two of the authors of the study) in the case of children and some of the adults, or just by one experimenter for most sessions with adults. The sessions lasted between 30 minutes (for the adults) and more than an hour (for some children). The average time was between 40 and 45 minutes. The sessions were carried out either at schools, when interviewing children and those subjects in G₃ who preferred having the recording done there, or at the subjects' private apartments, or in study rooms in libraries at their district. The only condition that the room for the interview had to fulfil was that it had to be minimally quiet in order to control for the acoustic quality of the data.

Table 3 shows the different tasks carried out by the participants and the order in which they were done.

TABLE 3
CONTENTS OF SESSIONS IN CHRONOLOGICAL ORDER

G1	G2 and G3
Very short conversation	Conversation
Naming pictures on some books	Same as G1
Answering some specific questions	Same as G1
Naming pictures on notecards	Same as G1
Answering questions: elicitation of cognates with different gender	Same as G1
Role play: interaction with a teddy bear	Role play: interaction with the experimenter
---	Reading a text aloud
---	Answering a sociolinguistic questionnaire

The initial conversation tended to be very short with children because they would not feel at ease with strangers from the very first moment. However, adults were asked about life in their district, which

led to conversations that generally lasted between 5 and 10 minutes. The aim of this conversation, in the case of adults, was two-fold. On the one hand, it was used as the source of declarative spontaneous sentences for the study on intonation. On the other, the topic distracted the attention of the speaker from the real linguistic objective of the study, avoiding possible prejudices and attempts at performing according to grammatical prescriptivism. In the case of children, the conversation would lead to a major familiarity with the experimenters.

The elicitation of quasi-spontaneous speech was carried out by asking the subjects to describe images on some books, to answer specific questions about objects or events, and to describe illustrations on notecards. The target items in these tasks were chosen because they contained the target phones for our studies in different phonological contexts, which allow us to have a minimum of 10 tokens for each target phone from each subject. Adults fulfilled another task, which consisted in answering specific questions aimed at obtaining the production of words which differ in gender from their Spanish cognates; e.g., Catalan *la dent* (fem.) vs. Spanish *el diente* (masc.) 'tooth.' Some children managed to provide us with some target words in this task as well.

The following role play (with a teddy bear, for children, and with the experimenter, for adults) allowed us to elicit interrogatives from the subjects, in order to analyze the intonation of this kind of sentences. Children were presented with a teddy bear, which was supposed to refuse to talk to adults. The experimenters told the child that they wanted to know some specific information and requested their help. One of the experimenters faked the teddy bear's voice, while the other tried to talk to the teddy bear but obtained no direct answer from the bear. Thus, children were surprised when the teddy bear started to talk to them when they addressed it themselves. This task was devised adapting the description of elicitation procedures for syntactic target items in Thornton (83) to our goals, within the phonological realm. In the case of adults, they were given a list of features a friend of theirs would like to know about a computer and they were to interact with a shop assistant (role played by the interviewer) at a computer shop.

Role play was the last task for children, whereas adults were still asked to read a text containing the specific target phones in specific positions. This task served the purpose of eliciting a more formal speech style. Finally, adults answered a sociolinguistic questionnaire about their linguistic background and habits. G₃ subjects also answered another sociolinguistic questionnaire with information about their children (i.e., the subjects of G₁).

Auditory analysis

Due to our specific goal and the nature of the study, the target items for the results presented here (i.e., those referring to vowel analysis) were segmented in individual sound files. Every item in the corpus containing a target vowel was transcribed by two Catalan speakers, namely, one of the authors and a student at the University of Hamburg.⁷ Transcribers listened to the target items and provided their own transcription. These paired transcriptions were compared and showed an agreement value above 76%.

The transcriptions were divided in target-like productions vs. non-target-like productions, which turned them into categorical data. For example, a target [ə] was counted as either a schwa or something else – in most cases, an [a]. Due to the categorical coding of the data (e.g., schwa or non-schwa), chi-square analyses were used in order to check whether the differences between and across specific groups were significant or not.

RESULTS

In this section we present the results of the auditory analysis of all the vowels under study (/ɛ/, /ɔ/, and [ə]), in all three generations (G₁, G₂, and G₃) only in the two districts of the sample that differ the most as for the presence of Catalan: Gràcia, as representative for the highest values, and Nou Barris for the lowest ones.

Tables 4, 5, and 6 show the percentages of target-like production for /ɛ/ in each age group across districts for each speaker, including the mother's and father's language.

Since the percentages of target-like production are quite similar across all vowels, and for the sake of space, we only show the individual results for /ɛ/. The degree of statistically significant difference between groups of the same age across different districts is indicated on the last row.

⁷ We would like to thank Laura Batalla, Laia Puig, and Anna Schreibweis for their help in data treatment, transcription, and analysis.

TABLE 4
INDIVIDUAL AND GROUP PERCENTAGES OF TARGET-LIKE PRODUCTIONS
FOR /ɛ/ IN G1 ACROSS TWO DISTRICTS

G1 Gràcia					G1 Nou Barris				
Subject	Age	L. Mother	L. Father	% /ε/	Subject	Age	L. Mother	L. Father	% /ε/
APR	3	Ct	Ct	58.33	LVG	4	Ct	Ct	25.00
EMT	3	Ct	Ct	96.15	CRS	5	Ct	Sp	10.52
JPC	3	Ct	Ct	100	MJG	5	Ct	Sp	7.40
JBC	5	Ct	Ct	100	MTG	5	Ct	Sp	22.22
MBB	4	Ct	Ct	87.50	ACM	4	Sp	Ct	0
GGP	4	Ct	Ct	88.23	ICC	5	Sp	Sp	0
MTC	4	Ct	Sp	85.71	ACG	5	Sp	Sp	0
CPL	5	Sp	Ct	100	CRG	5	Sp	Sp	4.76
UPW	4	Sp	Ct	100	JCL	3	Sp	Sp	12.50
MSD	4	Sp	Ct	61.90	DGS	4	Sp	Sp	5.26
Mean percentage of target-like production				88.50	Mean percentage of target-like production				8.19
$\chi^2 (1, N = 20) = 230.75; p \leq .001^c$									

Note. Ct = Catalan, Sp = Spanish, L. = language.

TABLE 5
INDIVIDUAL AND GROUP PERCENTAGES OF TARGET-LIKE PRODUCTIONS
FOR /ɛ/ IN G2 ACROSS TWO DISTRICTS

G2 Gràcia					G2 Nou Barris				
Subject	Age	L. Mother	L. Father	% /ε/	Subject	Age	L. Mother	L. Father	% /ε/
AGQ	22	Ct	Ct	100	ARJ	23	Ct	Ct	82.35
LDB	20	Ct	Ct	88.88	AMC	19	Ct	Ct	100
JFC	20	Ct	Ct	100	APC	19	Ct	Ct	47.05
JAD	18	Ct	Ct	100	ALM	22	Ct	Ct	87.50
DCA	23	Ct	Ct	94.73	NGE	23	Sp	Ct	70.58
MRV	19	Ct	Ct	100	LSA	20	Sp	Sp	6.66
MUV	20	Ct	Ct	100	IRE	19	Sp	Sp	44.44
MBB	23	Ct	Ct	75.00	RHL	22	Sp	Sp	5.26
ELP	22	Ct	Sp	100	ACM	18	Sp	Sp	13.33
DGT	23	Sp	Sp	95.00	GFD	23	Sp	Sp	28.57
Mean percentage of target-like production				94.35	Mean percentage of target-like production				33.74
$\chi^2 (1, N = 20) = 147; p \leq .001^*$									

Note. Ct = Catalan, Sp = Spanish, L. = language.

TABLE 6
INDIVIDUAL AND GROUP PERCENTAGES OF TARGET-LIKE PRODUCTIONS
FOR /ɛ/ IN G₃ ACROSS TWO DISTRICTS

G ₃ Gràcia					G ₃ Nou Barris				
Subject	Age	L. Mother	L. Father	% /ɛ/	Subject	Age	L. Mother	L. Father	% /ɛ/
MTF	33	Ct	Ct	76.92	ISB	37	Ct	Ct	77.77
ECP	39	Ct	Ct	100	TGM	37	Ct	Ct	80.00
LBR	33	Ct	Ct	100	MGT	39	Ct	Ct	88.23
MCG	39	Ct	Ct	82.35	NGC	34	Ct	Ct	100
IBL	38	Sp	Ct	100	PGB	33	Ct	Sp	93.33
SRD	35	Sp	Sp	0	JCN	40	Sp	Sp	27.77
PLC	41	Sp	Sp	42.85	CGB	33	Sp	Sp	45.00
SWR	31	Sp	Sp	92.85	IGT	39	Sp	Sp	80.00
EPR	39	Sp	Sp	100	CCR	34	Sp	Sp	35.71
CDQ	36	Sp	Sp	61.90	FCP	45	Sp	Sp	57.14
Mean percentage of target-like production				74.68	Mean percentage of target-like production				70.10

$$\chi^2 (1, N = 20) = 0.88; n.s.$$

Note. Ct = Catalan, Sp = Spanish, L. = language.

Table 7 provides the mean percentages of target-like production for the three vowels. The shadowed cells indicate those age groups which show statistically significant differences between both districts, which can be found in G₁ and G₂, but not G₃.

TABLE 7
MEAN PERCENTAGES OF TARGET-LIKE PRODUCTION FOR VOWELS /ɔ/, /ɛ/,
AND [ə] IN EACH AGE GROUP IN GRÀCIA AND NOU BARRIS

		G ₁	G ₂	G ₃
% /ɔ/	Gràcia	85.26	91.58	71.34
	Nou Barris	16.36	49.14	74.87
% /ɛ/	Gràcia	88.50	94.35	74.68
	Nou Barris	8.19	33.74	70.10
% [ə]	Gràcia	57.98	83.27	69.86
	Nou Barris	22.87	41.86	60.98

The three generations exhibit quite different sets of results. The group of children has very distant values in each district: in Gràcia open mid vowels reach about 85% and schwa almost 60% of target-like production. In Nou Barris, instead, the former only reach around 10% and the latter about 20% of target-like production. The results of the young adults (G₂) are also quite apart in each district, but not so much as in the case of G₁, mainly due to a higher target-like production by G₂ in Nou Barris. More specifically, G₂ in Gràcia shows results of around 90% for the mid-open vowels and of a bit more than 80% for schwa. In Nou Barris, G₂ has results between 30 and 50% for the three vowels. As for the adults of G₃, the results are very similar in both districts and in fact there is no significant difference between them, as shown in Table 6. Target-like production for the mid-open vowels by G₃ reaches between 70 and 75% in both districts and for schwa it reaches almost 70% in Gràcia and only 60% in Nou Barris.

In general, three trends can be clearly observed when looking at the percentages of target-like production for all three vowels. First, both G₁ and G₂ show a statistically significant difference in production depending on where the speakers live: children and young adults from Gràcia produce all three target vowels more often than their corresponding age groups in Nou Barris, and even slightly more often than G₃. This difference is especially large in the case of G₁ for the mid-open vowels. Second, the production of G₃ in both Gràcia and Nou Barris displays no significant difference across districts. And third, both districts display quite a different evolution across generations: whereas in Nou Barris the older the age group is, the more target-like the production of the Catalan vowels appears to be in Gràcia, G₂ is the group with the highest results, closely followed by G₁, and, contrary to what happens in the other district, G₃ shows the lowest percentages (except only for the case of [ə], for which the production by G₁ is lower than that by G₃ in Gràcia).

DISCUSSION

The three general trends observed in the previous section can be analyzed as follows. From the statistically significant difference between both districts in G₁ and G₂, we can infer that a change in Catalan vowels is taking place in Nou Barris, where the presence of Spanish is stronger. This confirms Hypothesis 1, which stated that children may be a group especially sensitive to the effect of markedness and complexity. We also predicted that if the external factor of the dominant language outside the family was relevant, the

changes would be more advanced in Nou Barris than in Gràcia. And this is exactly what happens, as in Gràcia G₁ shows very high results for target-like production, suggesting that in spite of markedness and complexity, children keep producing the Catalan vowels to very high percentages, and do not seem to show influence of Spanish. What is also striking in the case of G₁ is the little connection that can be established with the results of their parents, i.e., their family input, in both districts: the percentage of target-like production by G₁ in Gràcia is even higher than that of its corresponding G₃, and G₁'s percentage of target-like production in Nou Barris is much lower than that of G₃ in the same district.

The statistically significant difference within G₂ is smaller than in the group of children, Nou Barris showing higher percentages of target-like productions than G₁ in the same district. Thus, the evolution of the change in vowel production that is so clear in the group of children of Nou Barris is slightly reduced in the group of young adults. G₂ in Gràcia has also slightly higher results than their corresponding G₁. This generalized increase could be explained by the effect of schooling and mass media on G₂. Hypothesis 2 had predicted that G₂'s production would indeed show the benefit of having had Catalan schooling, although we pointed to an improvement on lexical aspects in comparison to G₃, but to a lack of attention for the phonological aspects which should have led to the vowel change especially in the group of Nou Barris. It is clear that the change is more advanced in this district, due to the higher presence of Spanish in the district, but the results of G₂ in general are higher than expected.

The second general trend shows that both groups of G₃ are quite homogeneous as far as their results of vowel production are concerned. This is consistent with Hypothesis 3, in the sense that we had expected no significant difference between the two districts, because in this generation the basis of speakers with Spanish family background has not increased as much as in G₂. Besides, the speakers of this age group happen to live now in these districts, but generally they have lived also in other parts of the city and therefore have received varied linguistic influence from several environments of Barcelona. We also expected that the vowel change would be less advanced in G₃ than in G₂, as the effect of the sociolinguistic situation of Catalan during their childhood would have more incidence in the lexicon, showing more borrowings from Spanish, than in the phonology of G₃, which would have kept the Catalan features through their (mainly) Catalan families. This more advanced evolution of the vowel change in G₂ in comparison with G₃ is observable in Nou Barris, but not in Gràcia.

The third trend indicates that the evolution of the Catalan vowel

change is clear in the district with more presence of Spanish, Nou Barris. The factors at play in this district are: markedness and complexity for children, and enhancement of contrast in the case of the unstressed vowels [i, u, a] both for children and young adults. Moreover, schooling together with the language of the environment is also an important factor for young adults, and family background for the oldest generation. As for Gràcia, it shows that the presence of Catalan at school is highly reinforced by that found in the general environment of the district. This is especially the case for G₁ and G₂. As for G₃'s speakers, they have a linguistic history that lies outside the district in the case of Nou Barris, and hardly dependent from school, which may be the reason for the homogeneity found in G₃ in both districts.

Finally, it may be relevant to add a note on the role that the internal and external factors previously introduced have in these results. Although it can be argued that precisely the features of the Catalan vowels that do not exist in Spanish are vulnerable because they are marked and complex, and they are thus more prone to disappear, it is obvious that they are not disappearing in both districts, and that external factors are thus crucial in the present evolution of the vocalic system in Nou Barris. Language contact with Spanish is triggering a change leading to the reduction or even loss of certain Catalan features under the pressure of Spanish, the dominant language in the district of Nou Barris. This shows that external factors are taking the lead over internal factors in the present-day of the Catalan of Barcelona.

CONCLUSIONS

This study has compared production of the Catalan vowels that do not exist in Spanish, namely /ɛ/, /ɔ/, and [ə], by three generations (children, young adults, and adults) living in two districts of Barcelona differing in their presence of Catalan (Gràcia, where the usage of Spanish is very limited, and Nou Barris, with a strong presence of Spanish). Based on auditory analysis, the study has compared vowel production by about ten subjects in each group with standard production of the vowels, thus capturing the percentages of target-like production. The results show that phonological change is mainly taking place within the groups of the Catalan speaking population that has been and still is most exposed to language contact with Spanish from birth, that is, G₁ and G₂ in Nou Barris. In addition, G₃ exhibits very similar results in both districts. However, in Gràcia G₃ reaches percentages of target-like production lower than those of G₁, which in its turn has percentages of target-like production slightly lower than those of G₂,

whereas in Nou Barris G₃ reaches the highest percentages in target-like production. It is concluded that the fact that G₂ has had all its schooling in Catalan has led to the maintenance of Catalan phonological features, provided that the language of the environment, including mass media, is Catalan. This is only found in Gràcia. In Nou Barris, the intense presence of Spanish has led to the loss of some phonological features of Catalan.

Given that in both districts G₂ produces more target-like vowels than G₁, this suggests that when speakers in G₁ reach the age of those in G₂, they will also produce a higher percentage of target-like vowels than they do today. This will especially be the case in Gràcia. In Nou Barris, it is plausible to think that the distance between G₃ and the other groups will keep on growing, if the lack of attention paid to phonology at school is not reversed.⁸

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⁸ Our results have only shown percentages of target-like production, i.e., how many times Catalan /ɛ/, /ɔ/, and [a] have been produced as such or have been substituted by [e], [o], and [a], respectively. Acoustic analyses should reveal whether the vowels produced by G₁, G₂, and G₃ are similar to the target ones or whether they may be merging with /e/, /o/, and /a/ in spite of the fact that they can often be identified by native speakers as target-like.

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