

# LATERAL CONSONANT PRODUCTION IN BILINGUAL SPEAKERS LEARNING A THIRD LANGUAGE

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## ABSTRACT

The degree of velarization of the lateral consonant [l] is studied in three Catalan-Castilian bilingual subjects reading texts in Catalan, Castilian and French. It is suggested that language dominance for each subject may be related to the use of an alveolar or a velarized variety of this consonant.

## 1. INTRODUCTION

Although the problem of phonetic transfer has been frequently treated in the second language acquisition literature, transfer phenomena arising at the phonetic level when a bilingual speaker acquires a third language have been hardly approached. Previous work by Llisterra and Poch [4] [5] describes the vowel system of French and English as produced by monolingual Castilian and by bilingual Catalan-Castilian speakers, showing a different pattern of distribution in the F1-F2 plane for each group of subjects. However, the analysis of the long-term averaged spectrum of Catalan-Castilian bilinguals carried out by Bruyninckx et alii [1] reveals the need to introduce the notion of language dominance when bilingual subjects are studied. This paper aims at presenting some preliminary data on the pattern of phonetic transfer found in third language learning by bilingual speakers according to dominance in one of the two languages in which they are proficient.

In order to carry out this investigation, we have chosen to analyze the degree of velarization of the lateral consonant [l] in the French spoken by Catalan-Castilian

bilinguals. In an early work comparing lateral consonants in Castilian and in Catalan, Navarro [7] established the velarized character of Catalan [l] in front of the alveolar point of articulation characteristic of this consonant in Castilian. Further experimental studies have confirmed Navarro's remark by showing the existence in Catalan of the lingual retraction common to the so-called "dark" varieties of [l]. This is one of the more prominent features of the Catalan accent when native speakers of this language speak Castilian.

Since French is a language with a "clear" (i.e. alveolar) lateral consonant, the production of this sound should not be difficult for a monolingual Castilian subject having this variety in his native language. However, one may suppose that some transfer from Catalan may occur in the case of bilingual speakers, and that this will result in the use of a velarized variety of [l] when speaking French. On the other hand, it is also possible to hypothesize that this transfer will be stronger for a bilingual with linguistic dominance towards Catalan than in a speaker with Castilian dominance.

## 2. PROCEDURE

### 2.1. Subjects

A large group of students at the Universitat Autònoma de Barcelona were asked to answer a questionnaire aimed at determining their use of Catalan and Castilian and requesting information about their knowledge of French. The questionnaire addresses four skills:

listening, speaking, reading and writing, both in Catalan and Castilian. The subjects had to answer with a percentage of use of each language in a wide range of situations, together with questions about their geographical origin and about the language spoken with each member of the family.

In this paper we will present the data obtained for 3 male bilingual speakers: FC, a bilingual subject who always uses Castilian at home and speaks Catalan around 20% of the time when he is at the University; JJ, also using Castilian as the only language at home, but with a fairly balanced use of Catalan and Castilian (50% each) in other environments; and JT, who uses only Catalan at home and speaks Castilian around 40% of the time when he is at the University and no more than 30% of the time in other situations.

As far as their knowledge of French is concerned, it may be considered quite homogeneous: they have all been studying French at primary and secondary school, with no further contact with the language after this period.

### 2.2. Corpus

Three texts in Catalan, Castilian and French were selected from contemporary fiction. They contained between 770-550 words and a large number of tokens of the lateral consonant [l]. For the purpose of the present study, only sequences of vowel + [l] + [e] have been retained; this offers a suitable environment for inter-language comparisons, since [Vle] sequences are found in the three languages. A total number of 296 lateral consonants have been measured (104 for Catalan, 93 for Castilian and 99 for French).

### 2.3. Recording and acoustic analysis

The speakers read the texts at their normal rate in one single recording session. It took place in a sound isolated room in semi-anechoic conditions at the Phonetics Laboratory at the Universitat Autònoma de Barcelona. A Sennheiser MD 441N directional cardioid microphone and a Revox A77 tape recorder were used.

The signal was digitized at 10 KHz sampling rate, and a 13 pole LPC model was used in the acoustic analysis; a pre-emphasis of 6dB was also applied. This was done using the routines implemented in the MacSpeech Lab II software package by GW Instruments running on an Apple Macintosh SE/30.

The boundaries of the lateral consonant were determined using changes in the waveform as the main criteria; perceptual checking was also applied listening to the segmented consonant when necessary.

Lingual retraction can be related to the frequency of the second formant; a low F2 corresponds to a high degree of tongue retraction and to a raising of the posterior part of the tongue towards the velum. Then, F2 frequency was measured at the center of the lateral consonant in order to assess whether our speakers were using a "clear" or a "dark" variety.

## 3. RESULTS

Results for each language are shown in tables 1, 2 and 3 below.

Table 1: F2 mean values for Catalan [l] for each bilingual subject

Subject	Catalan F2 (Hz)		
	mean	s.d.	n.
FC	1338	96.2	34
JJ	1269	68.6	35
JT	1198	84	35

As far as Catalan is concerned, second formant frequency values for [l] are significantly different for the three speakers (t-test  $p = 0.000$  between FC and JT and  $p = 0.001$  between FC and JJ and JT).

Table 2: F2 mean values for Castilian [l] for each bilingual subject

Subject	Castil.		
	F2 (Hz)		
	mean	s.d.	n.
FC	1473	105	33
JJ	1466	82.1	27
JT	1301	111.5	33

However, for Castilian values, significant differences ( t - test,  $p = 0.000$  ) are only found between JT and the two other subjects.

Table 3: F2 mean values for French [l] for each bilingual subject

Subject	French		
	F2 (Hz)		
	mean	s.d.	n
FC	1607	80.1	31
JJ	1575	84	31
JT	1319	93.8	37

French values for the lateral consonant exhibit highly significant differences between JT and the other two subjects ( t test,  $p = 0.000$  ); nevertheless, differences between FC and JJ for French are more significant than those found when comparing their values for Castilian ( t obs = 0.3, d.f. = 58,  $p = 0.803$  for Castilian and t obs = 1.5, d.f. = 60,  $p = 0.140$  for French ).

On the other hand, intra-speaker comparisons between the three languages show very significant differences in all cases but one: differences between French and Castilian values for speaker JT are not significant ( t obs = 1.1, d.f. = 23,  $p = 0.288$  ).

#### 4. DISCUSSION

In order to assess the linguistic profile of our subjects, the values obtained from the analysis of their productions of the lateral consonant may be compared to reference values for monolingual speakers.

Quilis et alii. [9] obtained an average value of 1534 Hz for F2 in intervocalic context for monolingual Castilian speakers; neither of our subjects approaches this value, and significant

differences between this mean value and all the values obtained are found ( p between 0.000 and 0.002 for the three subjects ). This fact may be explained by the influence of Catalan in the Castilian production of our bilingual subjects, as shown in previous research by Martínez-Daudén [6].

Catalan [l] is given a mean value of 1039 Hz by Panyella [8]. Observed Student's t values are greater when comparing results found for speakers FC and JJ ( t obs = 18.1 and 18.3, d.f. = 33 and 35,  $p = 0.000$  ) than those obtained when comparing this population mean with F2 values for JT ( t obs = 11.1, d.f. 34,  $p = 0.000$  ). It is clear then that values found for JT are more similar to those reported for dominant Catalan speakers than those observed for the two other subjects.

For native French, Chafcouloff [2] quotes values between 1461 Hz and 1849 Hz, depending on the vowel context; average value is of 1656 Hz; the only subject approaching this value is FC, but the difference between the population mean for native French and the sample mean produced by FC is still significant ( t-test  $p = 0.002$  ). This shows that none of our speakers are producing a French native lateral consonant, at least as far as F2 is concerned. This result is in agreement with the analysis of a different group of bilingual speakers previously carried out by the authors [3], although differences appear more clearly in the present study.

However, there is a strong difference between FC and JJ on the one hand and JT on the other. As will be seen later, this has to do with their linguistic dominance.

The values observed so far are coherent with the results of the initial test dividing the speakers in terms of their linguistic dominance: FC exhibits an F2 frequency for the lateral consonant in Castilian which is intermediate between the native Castilian values and the ones found for dominant Catalan speakers when speaking Castilian; on the other hand, they are significantly different from his values for Catalan, which are themselves higher than the F2 values found for Catalan dominant speakers; he may be then considered a bilingual with dominance towards

Castilian. JJ shows a very similar pattern for his Castilian productions, but his values for Catalan are intermediate between those found in Catalan dominant speakers when using Castilian and the values encountered in the Castilian dominant subject. He may then be classified as a more balanced bilingual. Finally, JT shows Castilian values which are different from his Catalan ones, but which are also significantly different from the values found for native Castilian speakers; this corresponds to the pattern usually found in bilingual speakers showing a strong Catalan dominance.

The next question one may ask is how linguistic dominance is related to transfer phenomena in the French texts produced by our subjects. A general trend in the differences between subjects can be observed: a high F2 in French seems to be correlated with a high degree of Castilian dominance. Anyway, the fact that the Castilian values for the speaker FC - a Castilian dominant subject - and also for JJ - a balanced bilingual - do not attain the F2 frequency of a monolingual Castilian has not to be disregarded. A comparison with the performance of monolingual Castilian subjects speaking French would be needed to clarify whether knowledge of Catalan in exerting some influence in the spoken French of these individuals.

A strong case for transfer from Castilian could be made observing the lack of significant differences between the mean for French and the mean for Castilian in speaker JT (  $p = 0.288$  ); however, one has to take into account the fact that this speaker may be trying to approach a target value for F2 higher than the one found in Catalan - his dominant language -, attaining equal unsuccessful results in Castilian and in French; this second hypothesis will favour the idea of a transfer from Catalan.

#### 5. CONCLUSION

It has been shown that the degree of velarization of the lateral consonant in Catalan-Castilian bilingual speakers using French is influenced by their linguistic dominance. The study of phonetic transfer in third language learning reveals then that bilingualism is a notion that embodies

different degrees of language competence for different speakers. However, more research is still needed in order to formulate an adequate model of transfer in third language learning by bilinguals.

#### 6. REFERENCES

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