

## PHONETIC INTERFERENCE IN BILINGUALS' LEARNING OF A THIRD LANGUAGE

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### ABSTRACT

This paper presents three experiments concerning the acquisition of French and English as L2 or L3 by bilingual and monolingual speakers. The results are interpreted in terms of the influence of L1 and L2 in third language learning in bilinguals. These results suggest that interference phenomena in L3 can be explained in terms of the acoustic nature of the sounds of L1.

### 1. INTRODUCTION

Accent in second or third language oral productions can be explained in terms of interference between the mother tongue and the acquired language/s. It is sometimes possible to make some predictions based on phonological descriptions but this can lead to hypotheses that do not correspond to the actual problems encountered during L2 or L3 acquisition. It then becomes necessary to characterize phonetic interference phenomena at subphonemic level, using experimental techniques. Some research along this line has been carried out by J.E. Flège and his associates but they deal with second language acquisition by monolingual speakers.

The phonetic performance of bilingual speakers has also been studied from an experimental point of view, but little is known about the pattern of interference between first, second and third language. This paper describes three experiments which aim at assessing the influence of L1 and L2 in L3 productions of bilingual speakers.

The subjects studied are either bilingual speakers having Catalan as a first language and Castilian as second language or monolingual speakers having Castilian as a first language. It has to be borne in mind that for the first group of subjects "bilingual" is a

somewhat confusing designation since the subjects studied don't have the same level of proficiency in both languages, Catalan being dominant over Castilian.

### 2. EXPERIMENT 1

In this first experiment the production of French oral vowels by bilingual learners of French as a third language was studied.

#### 2.1. METHOD

Ten bilingual university students of French (6 female and 4 male) read a series of Catalan, Spanish and French isolated vowels inserted in carrier sentences with a word containing the same vowel that was pronounced in isolation (e.g. "Il a dit 'i' comme dans 'si'"). The vowels studied were [i], [e], [ɛ], [ɔ], [a], [ɔ], [o], [u] for Catalan, [i], [e], [a], [o], [u] for Spanish and [i], [e], [ɛ], [a], [ɔ], [o], [u], [y], [œ], [ø], [ɔ] for French. Recordings were made in anechoic conditions using a Revox A77 tape recorder and a Sennheiser MD 44N1 cardioid microphone placed at constant distance from the mouth.

An acoustic analysis of a total of 240 utterances was made using a Brüel & Kjær 2033 narrow band analyzer. The frequency of the first two formants was determined from visual examination of narrow band spectra obtained using a FFT algorithm.

#### 2.2. RESULTS

F1/F2 plottings for the male speakers are shown in figs. 1 and 2. The analysis of their French productions suggests two different problems: the series of central rounded vowels and the mid-open / mid-close pairs.

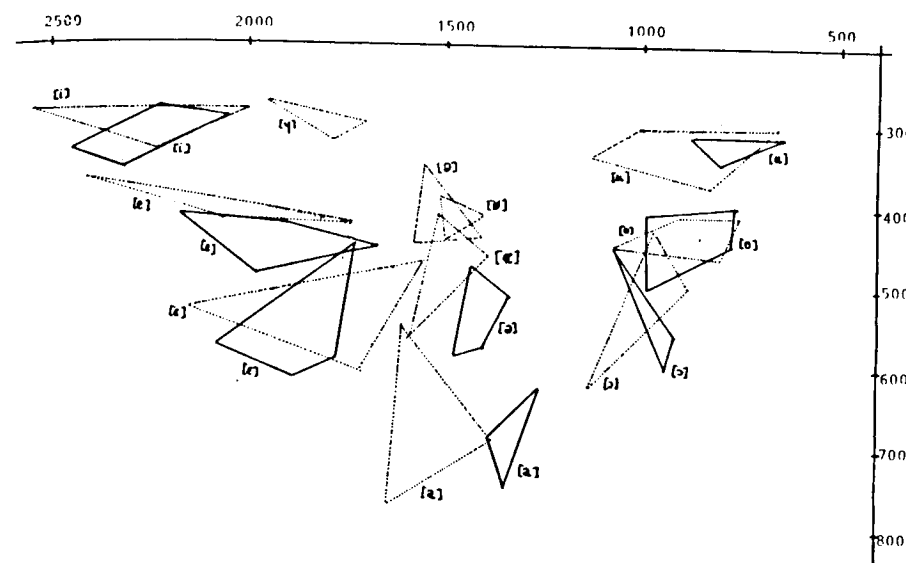


Fig 1: Catalan and French vowel productions bilingual speakers (Catalan: continuous line; French: dotted line).

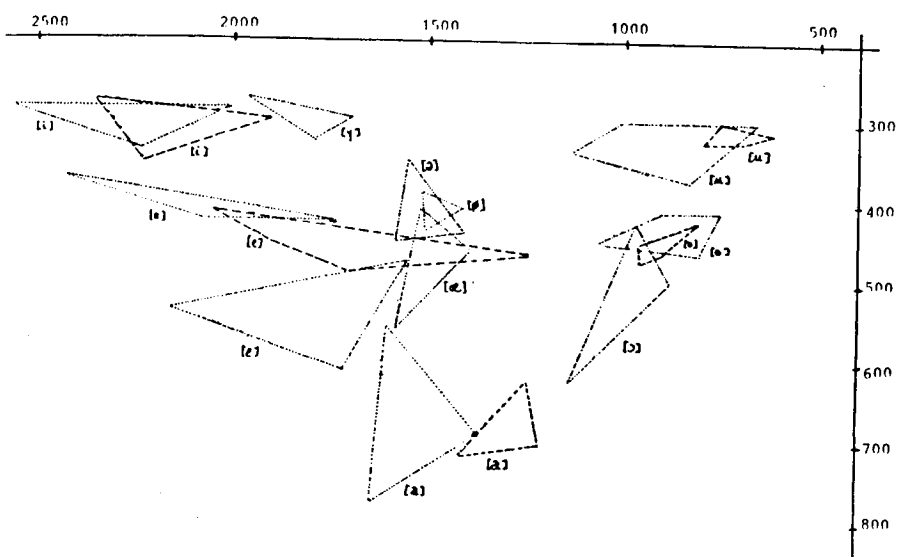


Fig 2: Castilian and French vowel productions by bilingual speakers (Castilian: dashed line; French: dotted line)

Since central rounded vowels do not exist either in Catalan or in Spanish they tend to be clustered in a central area of the F1/F2 vowel space with no differentiation between the members of the class. In a native speaker production there is some overlapping, but always to a lesser extent than in non-native vowels. As for the [e]-[ɛ] and [o]-[ɔ] pairs, their situation in the F1/F2 plane shows the same pattern in French and in Catalan. However, the Castilian productions of

bilingual speakers differ from the results obtained for native Castilian: for the bilingual speakers [e] and [o] appear in the same area as Catalan and French [e] and [ɔ], whereas in Castilian they tend to show the same dispersion as Catalan or French [e]-[ɛ] and [o]-[ɔ] [1][2].

### 3. EXPERIMENT 2

In this second experiment we tried to analyze the production of English vowels comparing the performance of bilingual and monolingual learners of English as second or third language.

#### 3.1. METHODS

Four monolingual and five bilingual university students of English were asked to read a series of quasi-homophone words containing the vowels of Catalan, Castilian and English and embedded in carrier sentences. Recordings were made in the same conditions as in Experiment 1 and were analyzed with the same techniques. A total number of 386 utterances were measured.

#### 3.2. RESULTS

Measurements of vowel durations on oscillograms showed that both bilingual and monolingual speakers do not make significant differences between long and short English vowels; the only pairs where differences between the mean durations were found to be significant were [i]-[i:] and [ɔ]-[ɔ:].

The results for vowel quality are summarized in Figs 3 and 4. It can be observed that there is a high degree of overlapping between

English central vowels, both for bilingual and monolingual speakers; Catalan speakers tend to produce the English schwa with the same acoustic characteristics as Catalan schwa.

Bilingual subjects show a better distribution of the English open/close vowels [ɪ]e] and [ɪ] o], which appear with strongly overlapped areas in the production of monolingual speakers, due to the lack of this pair in the first language.

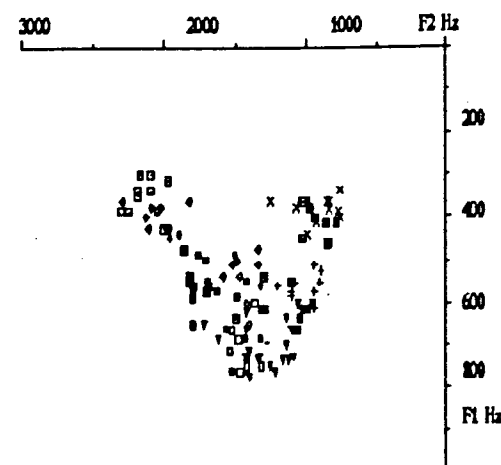


Fig. 3: English vowels by bilingual speakers

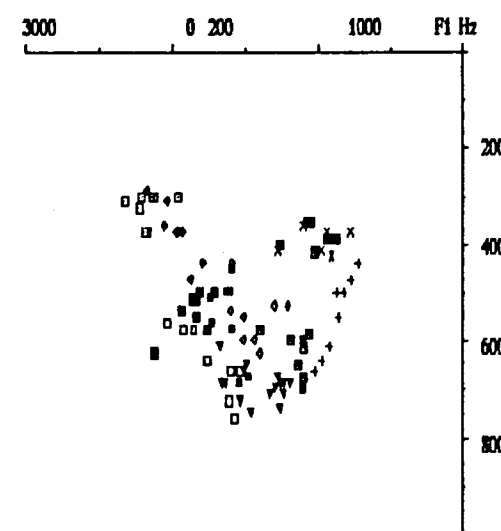


Fig. 4: English vowels by monolingual speakers

#### 4. EXPERIMENT 3

In Experiment 3, the comparison between the performance of monolingual and bilingual speakers was extended to the fricative consonants of French. French exhibits a system of fricatives very similar to Catalan - [f], [s], [z], [ʃ], [ʒ] - while Castilian differs having [f], [θ], [s] and [x].

##### 4.1. METHOD

Four bilingual and four monolingual speakers students of French at university level were asked to read a series of carrier sentences containing words with fricative consonants in Catalan, Castilian and French. Recordings were made under the same conditions as the previous experiments. For each fricative the following acoustic parameters were considered: frequency and intensity of upper and lower limits of acoustic energy, frequency and intensity of the two fricative formants, initial and final slope, energy spread and duration of the consonant. This gives an estimate of the spectral distribution of acoustic energy for each sound.

##### 4.2. RESULTS

Significative differences between the three languages have only been found for the voiceless alveolar [s] [3]. This sound was found to have very similar characteristics in Catalan and Castilian native productions and in Castilian productions by bilinguals. However, both groups showed significant differences with respect to native French. French [s] has higher frequency than the Catalan or Castilian [s], and it was produced by our subjects with frequency parameter values even higher than those found for native French speakers. This is the same behaviour as observed by Murillo [4] and is illustrated in Figs. 4 and 5.

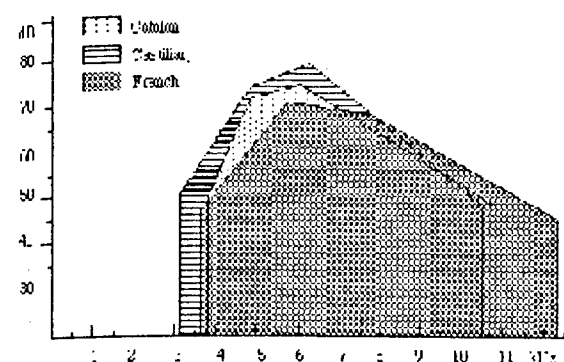


Fig. 4: Distribution of acoustic energy in Catalan, Castilian and French [s] by bilingual speakers.

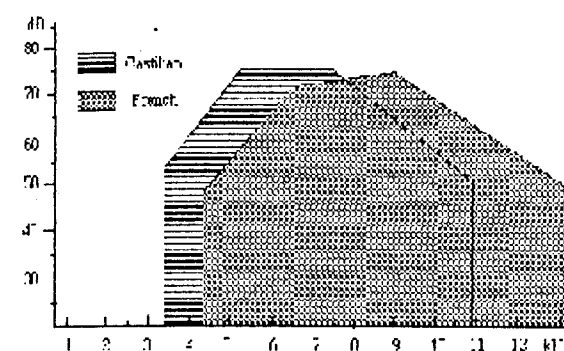


Fig. 5: Distribution of acoustic energy in Castilian and French [s] by monolingual speakers.

#### 5. DISCUSSION

The acoustic study of foreign language vowel productions for French and English shows that bilingual speakers appear to behave in the same way when learning a third language with a complex vowel system. They tend to follow the distributional pattern of their L1 in the acoustic vowel space; the position of this same space for the L2 vowels does not seem to interfere with their L3 productions. The analysis of the L2 productions in bilinguals shows that their distribution of the vowels in the F1/F2 plane is similar in both languages, despite the fact that [e] and [o] in Castilian cover larger areas than in Catalan due to the lack of a phonologically distinctive close/open pair.

Acoustic data for the alveolar voiceless fricative [s]

shows that both bilingual and monolingual speakers tend to overestimate the acoustic characteristics of the target language producing this sound with a concentration of acoustic energy at higher frequencies than those found in native speakers of French.

#### 6. CONCLUSION

It has been experimentally shown that in the case of bilinguals learning a third language, there is no influence of their L2 in the production of L3. Interference seems to be entirely explained by the acoustic features of the sounds of their L1.

The results of acoustic analysis of L2 and L3 productions seem to suggest that, at the phonetic level,

interlanguage phenomena do not appear, since no intermediate values of the parameters measured were found.

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