

EFFECTS OF LANGUAGE CHANGE ON VOICE QUALITY.  
AN EXPERIMENTAL STUDY OF  
CATALAN-CASTILIAN BILINGUALS

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SUMMARY

The paper is aimed at determining whether the language spoken by the speaker exerts influences on his or her voice quality. The investigation involves 24 bilinguals (12 males and 12 females) spliced into two subgroups of linguistic dominance (Catalan or Castilian). The Long Term Average Spectrum (LTAS) is used as an acoustic cue to voice quality. The inter-language variability is higher than the intra-language variabilities, irrespective of the sex and language dominance categories. The data moreover exhibit a tendency towards greater intra-language variability in the dominant language than in the non-dominant one.

1. INTRODUCTION

Various experiments have dealt with the idea that the language spoken by a subject could influence his or her voice quality. Studies using Long Term Average Spectra (LTAS) in order to objectivate voice quality have nevertheless resulted in -at least apparently- contradictory results (Nolan, 1983).

In order to by-pass the

contradiction, Harmegnies & Landercy (1985) have developed a specific methodology, aimed at differentiating subject- and language related variabilities. Analysing utterances from bilingual speakers (French/Dutch), they confirmed the existence of language effects on long-term spectral variability but also revealed that these effects are smaller than individual ones.

Harmegnies et al. (1989) have confirmed these findings on the basis of recordings drawn from languages even closer one to another (Castilian and Catalan, that belong to the same Romance group). Their investigations, together with others (Bruyninckx et al., 1990) nevertheless showed that a more refined assesment of bilingualism could be of some use. On the other hand, splitting the samples into sex groups might be more convenient, given the generally important differences between within-subject variabilities in males and females (Harmegnies, 1988, a).

This paper is therefore meant as an extension of previous research, putting emphasis on the kind of bilingualism, and involving

both male and female subjects in a balanced proportion.

## 2. EXPERIMENTAL SETTING

A sample of 24 bilingual subjects (12 males, 12 females), with a fairly good knowledge of Catalan and Castilian was selected. Each of them nevertheless exhibited dominance either in Catalan or in Castilian; their assessment was performed by means of classical sociolinguistic methodology (Viladot, 1981).

Each speaker was asked to utter 5 times both a balanced Castilian and Catalan text. The recordings and analyses were performed thanks to the experimental setting previously used, i.e. 0-5 kHz LTAS (Harmegnies et al., 1989). The spectra were compared by means of the SDDD dissimilarity index (Harmegnies, 1988, b).

## 3. COMPARISON PROCEDURE

Two types of intra-speaker comparisons of the stored LTAS were performed for each subject: inter-language comparisons and intra-language comparisons.

In the case of the inter-language comparisons (Catalan vs. Castilian) each Catalan LTAS of each subject was matched against each Castilian LTAS of the same subject; in intra-language matchings (i.e. both Catalan vs. Catalan, and Castilian vs. Castilian), for each one of the 24 speakers, one comparison was performed for each possible non-redundant pair of his or her 5 LTAS in each language.

The whole procedure resulted in a total of 1080 comparisons (480 intra-language and 600 inter-language).

## 4. RESULTS

As shown in Figures 1 a-b, which summarize the results, the SDDD values derived from inter-language comparisons tend to score higher than those drawn from intra-language matchings. This relationship can be observed for the average values in each sex/dominance group. This tendency moreover appears to be very strong, since the relationship holds true for each one of the 24 speakers in the sample.

A specific statistical analysis (Bruyninckx et al., forthcoming) confirms this observation. It moreover shows that in 2 out of 4 subgroups (Catalan dominant females and Castilian dominant males), the intra-language comparisons exhibit results significantly different one from another.

## 5. DISCUSSION

At first sight, the results seem in partial agreement only with those previously reported by Harmegnies et al. (1989): in the present research, inter-language differences also appear to be significant; however, the systematic superiority of the inter-language dissimilarity values is no longer to be regarded as the only one source of variation in the design: the differences between intra-language dissimilarities suggest that in some cases, the intra-

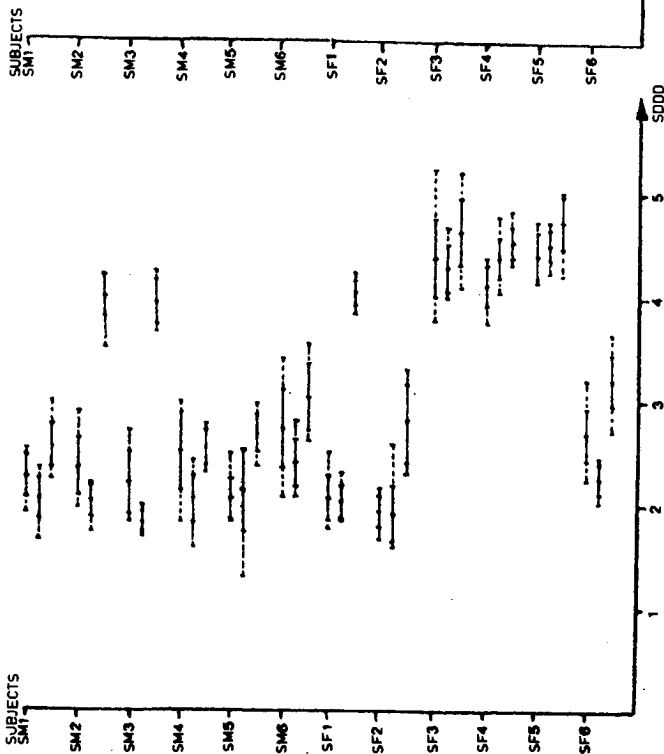


Figure 1a : means, standard deviations, lower and upper values of the SDDD values for each Catalan dominant male (SM) and female (SF) subject in each comparison condition (cat/cat; cast/cat; cat/cast).

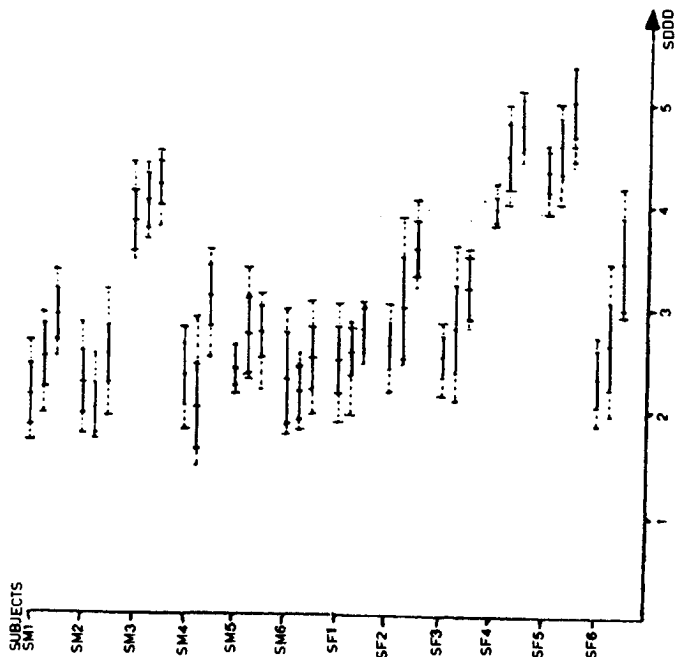


Figure 1b : means, standard deviations, lower and upper values of the SDDD values for each Castilian dominant male (SM) and female (SF) subject in each comparison condition (cat/cat; cast/cat; cat/cast).

language consistency tends to depend upon the language spoken. As shown in figure 1, the significant differences in the Catalan dominant group may be attributed to greater voice consistency in Castilian, as opposed to Catalan. On the other hand, in Castilian dominant speakers, the significant differences are due to greater voice consistency in Catalan.

Thus, there is a tendency towards greater voice quality variability for a given speaker in his or her dominant language, while the degree of voice coherence tends to be higher in the non-dominant language.

Finally, this research not only confirms previous findings (i.e. Catalan LTAS are different from Castilian LTAS), but also suggests a new hypothesis: voice consistency in bilinguals is greater in the non dominant language; inter-language variability is nevertheless greater than intra-language ones.

## 6. REFERENCES

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