

## Effects of the multilingual phonologic competence on the phonetic properties of filled pauses

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### Abstract

*This paper is about the way in which multilingual speakers produce filled pauses. The main question addressed is whether the speaker's phonological system(s) may influence the phonetic characteristics of the fillers. 4 trilingual speakers with contrasted masteries of French, Spanish and Catalan were recorded while performing a simultaneous interpreting task. The acoustical qualities of the filled pauses they produced were compared to those of utterances of phonemes from the 3 languages involved. The results are discussed in relation with the concept of language activation.*

### 1 Introduction

This paper focuses on the cognitive control multilingual subjects exert on speech sounds usually referred to as *filled pauses*, *fillers*, or *hesitation markers*. Those phenomena are very common: they appear at moments when speech production is temporarily hampered, though the speaker aims at meaning that his or her message has not come to an end [1]. We are wondering whether those sounds, notwithstanding their non-linguistic nature, depend upon the subject's phonological competence, and if this possible dependency may be influenced by specific factors.

Those questions appear to be justified, since previous research has shown that the fillers are not realized in the same way by different linguistic communities [2]. Nevertheless, up to now, few is known about the psycholinguistic processes accounting for the specific behavior of *individuals* under varying conditions. With this aim in mind, we study subjects who seem to master several

phonological systems (i.e., multilingual speakers) and observe the effects of changing languages on the acoustic characteristics of their utterances. In this exploratory account, we study hesitation markers appearing in two languages of the Romance group: Spanish and French. This contrast is interesting because the [ə] quality (which is usually considered to be phonetically close to that of the fillers – at least in French –) is not linked in the same way to the phonological structures of the two languages. Purposely, we moreover selected subjects with variable linguistic biographies, i.e., differing in terms of their mastery of both languages, but also of their command of another, third, language (Catalan), the phonology of which involves the central vowel in yet a different manner.

### 2 Languages

French and Spanish are directly involved in this research, since the corpora are made of utterances of these languages, and the productions were collected in situations where both languages were expected to be activated (i.e. the *simultaneous interpreting* task). On the contrary, Catalan is only indirectly concerned, because even if our subjects have at least a minimal mastery of it, its use was not solicited.

French has a very rich vowel system, with numerous oral- and 4 (tending to 3) nasal vowels, and also a central /ə/ phoneme, that has the phonological status of *schwa*, i.e., a phoneme that may result either in a [ə]- or in a null realization. On the contrary, Spanish has a very simple five-vowel phonemic system containing oral vowels only, without any central unit, nor phonological rules of reduction. Catalan has oral vowels only (/i/, /e/, /ɛ/,

/a/, /ɔ/, /o/, /u/), and no /ə/ phoneme. In Eastern Catalan (the dialect which is concerned here), these vowels are realized, [i], [e], [ɛ], [a], [ɔ], [o] and [u], respectively, only in stressed syllables. In unstressed syllables, phonological reduction rules apply, with the consequence that /ɔ/, /o/ and /u/ are realized [u], although /a/, /e/ and /ɛ/ are realized [ə]. In the Barcelona area, the reduction processes result in front vowels tending towards [a] rather than towards [ə], which is therefore unobservable in that dialect.

### 3 Speakers

We chose subjects with a very good command of two languages, and a weaker proficiency in a third one. We very carefully analyzed the characteristics of the subjects' languages mastery, using questionnaires about their linguistic biography (the way they had learned each language, their languages uses in family relationships, at work and during leisure time, etc.). Each subject moreover took part in an interview with two psychologists, aiming at a guided subjective assessment of each language's mastery [3].

Our 4 speakers are from Catalonia (Spain), where they have been living for several decades. Catalonia is an autonomous community, where Castilian Spanish and Catalan both are official languages. For historical reasons, all citizens speak Spanish, either exclusively or along with Catalan. The proportions of natives of each language are rather balanced and in everyday life, the two languages are, broadly speaking, equally used.

S1 (a 63-year-old male university teacher of French) was born in a monolingual region of Spain and had Spanish as his unique language during early childhood; he has nevertheless had frequent contacts with French since the age of 9 and spent a large amount of time in France when he was young. He currently gives lectures, holds professional conversations and writes scientific texts in French. In family relationships he often speaks French. He considers himself to be a perfect French-Spanish bilingual, but thinks that his written proficiency is slightly better in French than in Spanish. S2 (a 65-year-old female conference interpreter) was born in Barcelona, and was raised in French (mainly) and Spanish by her French-speaking mother and Spanish-

speaking father. She practices her profession mainly in Barcelona. She prefers using Spanish for communicative purposes with her children and colleagues. She nevertheless considers herself perfectly bilingual, and rates her proficiency in French and Spanish identically.

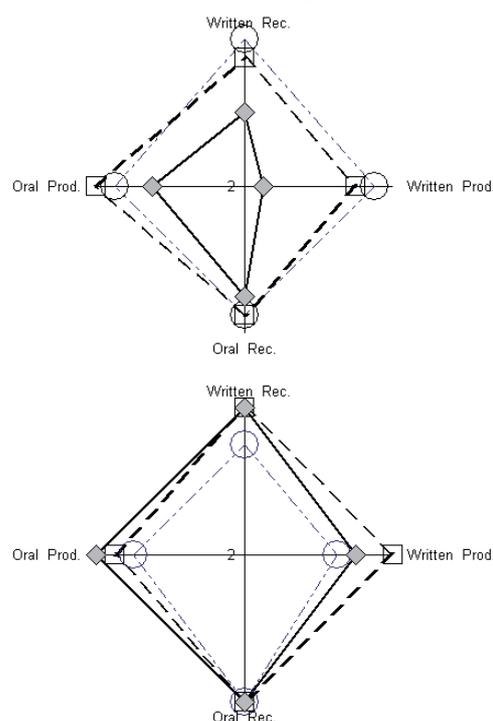


Figure 1: Examples of self-ratings of proficiency (on a 0-10 scale) in Spanish (squares), French (circles) and Catalan (diamonds), in written and oral production ('Prod.') and reception ('Rec.'), for subjects S1 (top) and S4 (bottom). The 4 scales originate from 2 (center) and extend up to 10 (periphery)

As Barcelona residents, S2 and S1 are frequently exposed to the Catalan language, which they understand quite satisfactorily and which they can speak too. In everyday life situations, they nevertheless use Catalan neither in family relationships nor in business or in leisure contexts. S2 feels more secure in Catalan than S1, but both speakers rate their proficiencies in French and Spanish clearly higher than in Catalan. As showed in fig. 1, S1 self-evaluative profile suggests a slight dominance of French over Spanish, and of both over Catalan. S2 profile suggests a highly balanced French-Spanish bilingualism, with a possible discrete

dominancy of Spanish over French, and of both over Catalan.

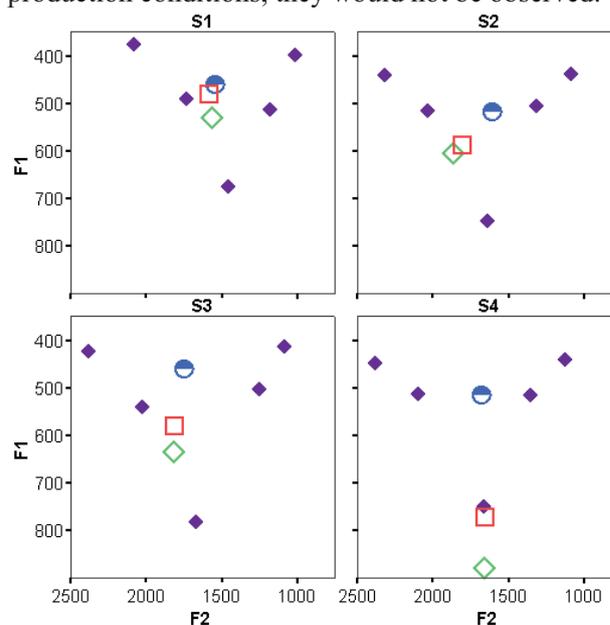
S3 (a 33-year-old female teacher of French in secondary school) was born in Barcelona and still lives there. Her parents were Spanish natives. At school, she was educated exclusively in Spanish. At work, she often uses French, a language that she learnt at university, but also on the occasion of frequent stays in France. Although she considers herself a Spanish native, in everyday life situations with her colleagues and friends, S3 declares that she indifferently uses Spanish or Catalan, depending upon the situation and the interlocutor. In oral production, she thinks that she is equally proficient in Catalan and French, but slightly more proficient in Spanish. In oral reception, she thinks that she is equally proficient in Catalan and Spanish, but slightly less proficient in French. Her profile suggests a highly balanced trilingualism, with a possibly slightly worse mastery of French.

S4 (a 27-year-old female university teacher of French) was raised both in Catalan and Spanish since her early childhood. Her parents are Catalan-Spanish bilinguals (with a strong Catalan dominance as for the father). Her husband is a Catalan-Spanish bilingual and her children are mainly raised in Catalan. She lives close to Barcelona. S4 considers Catalan her mother tongue. She frequently uses French, but mainly in formal and professional situations (i.e., teaching and collaborative work with colleagues). For 3 of the skills, she rates French worse than Catalan and Spanish (see fig. 1). In oral reception only, she considers herself equally proficient in the 3 languages. In all skills but written production, she rates Catalan better than- or the same way as the other languages. Her profile suggests oral dominancy of Catalan over Spanish, and of both over French.

#### 4 Task

In order to collect corpora expected to contain a large amount of filled pauses, we resorted to *simultaneous interpreting*, which is the task of rendering in one language a message that is simultaneously being received in another. As far as pauses are concerned, simultaneous interpreting is a particularly interesting task, because it combines production of the target

language with the preliminary tasks of understanding the source language and translating from source to target. Therefore, the speech production activity is only the last link in a chain of complex processing, during which numerous factors located at various levels can give rise to pauses when, under ordinary production conditions, they would not be observed.



**Figure 2:** average locations in the F1/F2 plane of the French [ə] (half-open circles), of the fillers (in French: open squares; in Spanish: open diamonds) and of the 5 peripheral vowels in French and Spanish (filled diamonds).

In this experiment, each subject was asked to perform two interpreting tasks, each consisting of interpreting a conference speech similar to those usually given during sessions of the European Parliament. The speeches were about issues of general policy and did not involve specialized vocabulary. Each subject had to perform an interpreting task in each of the two combinations: French/Spanish and Spanish/French.

#### 5 Results

The first and second central formant values of 287 fillers (of both languages) and of 189 realizations of the /ə/ phoneme (in French only) have been evaluated. We moreover took into account, for each

subject, the formant frequencies of 30 Spanish and 30 French tokens of the peripheral vowels /i/, /e/, /a/, /o/ and /u/ (see average values in fig. 2).

They show that in general, all subjects tend to realize the French phoneme /ə/ in a region that corresponds to the center of their phonetic space. Broadly speaking, the sounds fall in the 500-1500 Hz region of the F1-F2 plane: this is in good agreement with the French expectancies in this case. When speaking French, S1 produces filled pauses that have the same acoustical quality as his [ə] vowels. In Spanish, the fillers he produces are slightly different, and one may notice a discrete shift towards higher F1 and F2 values, therefore tending to a [e-ε] quality. In S2 productions, no between-language differences of the fillers can be observed, and their acoustical quality is in all cases quite different from [ə]; on the contrary, they show a very clear tendency towards a [ε] quality. In S3, the fillers F1 and F2 values are also greater than those of the [ə] vowels; the Spanish fillers have nevertheless even greater F1 values: their quality is the one of a very open [ε], possibly tending towards [a]. In S4, the fillers strikingly shift towards the [a] region, even falling beyond, in the case of Spanish.

## 6 Conclusions

A first observation is that all subjects are able to realize in a consistent way the schwa-like quality. A question to address is therefore: do they use that competence when performing filled pauses?

On the one hand, when speaking French, S1 produces filled pauses that have the acoustical quality of the usual French “*e d’hésitation*” ([ə]); S2 produces fillers tending to [ε], although S4 exhibits a very strong [a] tendency. Thus, S1 manifests hesitation like French-speaking natives do, though S2 seems more to behave like a Spanish-speaking native (as far as data are available) [2,4]. In the case of S4, the [a] quality of the fillers is in strong contrast with these findings; it is important here to recall that in S4 Catalan dialect, the effect of phonological reduction is precisely a tendency towards [a], rather than towards [ə] (which is the usual reduction target in

most Eastern Catalan dialects). It is to be noticed, too, that if S3 French fillers are close to [ε], the corresponding cluster (not showed in this paper) extends up to the [a] area.

On the other hand, when speaking Spanish, the subjects produce fillers with qualities close to the ones that can be observed in French. Thus, the results do not suggest that speakers are able to change the characteristics of their fillers when they switch from a language to another. On the contrary, it seems that fillers strongly depend upon a rather stable speaker-dependent structure. This may involve *1. categories of the language in active use*: [ə] fillers in S1 French, *2. categories of the language in passive use that do not exist in the language in active use*: [ε] fillers in S2 Spanish, and may lead to *a. productions well in line with the expected fillers quality in the target language*: [ə] fillers in S1 French, *b. productions not in line with the expected fillers quality in the target language*: [a] fillers in S4 French. Clearly, one can conclude neither that the fillers qualities are simply determined by an overtly active language, nor that they simply derive from a covertly active one.

In further research, these observations, if confirmed on stronger statistical bases, should raise questions about the cognitive control mechanisms of speech production at least in bilinguals: do they involve one or several phonological representations, or rather a control system with a granularity different from those of the phonological systems of the languages involved? And finally, how are they linked to the concepts of linguistic dominance, language activation and inhibition?

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