# Patterns of Stuttering Comparing two Languages: A Case Report

## Comparación de los patrones de tartamudez en dos lenguas: un reporte de caso

## Comparação dos patrões de tartamudez em duas línguas: um reporte de caso

**Janeth Hernández-Jaramillo[1], Katherine Velásquez Gómez[2]**

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*Abstract*

In bilinguals, specific patterns of stuttering in each one of the languages may be different. This study reports on the case of a bilingual adult who speaks Spanish and English simultaneously and whose dominant language is Spanish. Speech and language testing was performed in both languages. The samples chosen for the analysis of speech corpus were: spontaneous speech, description of the picture and reading. Some differences in the stuttering distribution were found. Of the disfluent instants, 61.39 % of the total was presented in English and the other remaining 38.61 % in Spanish. In both languages, stuttering by word type was more frequent in function words (i.e. prepositions, pronouns, conjunctions, particles and infinitive forms) than in content words (i.e. verbs, nouns, adjectives). As observed, dysfluency types were similar in Spanish and English, with the greatest percentage being word repetition, followed by phonemic prolongations. These were more frequent in English than in Spanish. Although it is possible to find similarities in the stuttering pattern suggesting general stuttering laws, differences associated not only with language-specific idiosyncrasies but also with the individual's bilingualism characteristics were also found.

*Key words:* Stuttering, bilingualism, lexical frequency, syllable frequency.

1 Profesor e investigador, Programa de Fonoaudiología, Escuela de Medicina y Ciencias de la Salud. Universidad del Rosario, Bogotá (Colombia). Correo electrónico: blanca.hernandez@urosario.edu.co

2 Fonoaudióloga, Programa de Fonoaudiología, Escuela de Medicina y Ciencias de la Salud. Universidad del Rosario, Bogotá (Colombia).

## *Resumen*

En las personas bilingües, los patrones específicos de la tartamudez en cada una de las lenguas pueden ser diferentes. Este estudio informa sobre el caso de un adulto bilingüe español/inglés cuyo idioma dominante es el español. Pruebas de habla y lenguaje se llevaron a cabo en los dos idiomas. Las muestras seleccionadas para el análisis de corpus de habla fueron: habla espontánea, descripción de la imagen y lectura. Se encontraron algunas diferencias en la distribución de la tartamudez. De los instantes disfluentes, 61,39 % del total fue presentado en inglés y el otro restante, 38,61 %, en español. En ambas lenguas, la tartamudez por tipo de palabra fue más frecuente en las palabras de función (preposiciones, pronombres y conjunciones) que en palabras de contenido (verbos, sustantivos y adjetivos). Para los tipos de disfluencia se observó que fueron similares en español e inglés, con el mayor porcentaje en el tipo repetición de palabras, seguido de prolongaciones de fonemas. Estos errores fueron más frecuentes en inglés que en español. Aunque es posible encontrar similitudes en el patrón de tartamudeo, es posible sugerir, frente a las leyes generales para la disfluencia en bilingües, que las diferencias pueden asociarse, no solo con la idiosincrasia específica del idioma, sino también con las características del bilingüismo propio de la persona.

*Palabras claves:* Tartamudez, bilingüismo, frecuencia léxica, frecuencia silábica.

## *Resumo*

Nas pessoas bilíngues, os patrões específicos da tartamudez em cada uma das línguas podem ser diferentes. Este estudo informa sobre o caso de um adulto bilíngue espanhol/inglês cuja língua dominante é o espanhol. Provas de fala e linguagem se levaram a cabo em ambas a línguas. As amostras selecionadas para a análise de corpus de fala foram: fala espontânea, descrição da imagem e leitura. Encontraram-se algumas diferenças na distribuição da tartamudez: dos instantes difluentes, 61,39% do total foi apresentado em inglês e o outro restante 38,61% em espanhol. Em ambas as línguas, a tartamudez por tipo de palavra foi mais frequente nas palavras de função (é dizer, preposições, pronomes, e conjunções) que em palavras de conteúdo (é dizer, verbos, substantivos e adjetivos). Para os tipos de difluência se observou que foram similares em Espanhol e Inglês, com a maior percentagem no tipo repetição de palavras, seguido de prolongações de fonemas. Estes erros foram mais frequentes em inglês que em espanhol. Ainda que seja possível encontrar similitudes no patrão de tartamudeio, é possível sugerir frente às leis gerais para a difluência em bilíngues que as diferenças podem se-associar não só com a idiossincrasia específica da língua, mas também com as características do bilinguismo próprio da pessoa.

*Palavras-chave*: tartamudez, bilinguismo, frequência léxica, frequência silábica.

## *Introduction*

Bilingual stutterers is a matter of clinical and research interest little explored in the present, that may be ideal for proving that linguistic factors play a role in the appearance of stuttering moments. Still not clear the association between stuttering and bilingualism, as well as not entirely explicable on the role of linguistic factors in stuttering but there is current evidence to support this affirmation.

In science in the last ten years, research reports that the incidence of stuttering in bilinguals is bigger than in monolinguals (1). This is rather important considering that over 50 % of the world population is bilingual and that about 1 % of the world population stutters (2, 3).

Psycholinguistic proposals suggest that stuttering starts during speech planning, this means much before oral production (4). Among these approaches, the "covert repair hypothesis" proposes that disfluencies are the result of a shortage in language-speech planning, and that in fact a slow phonologic system triggers a higher number of phonologic mistakes and a high demand of auto-repairs that interrupt speech fluency (5). Thus, children with stuttering would have a less-developed or a less-organized phonological system than those with normal fluency, stuttering being the result of a problem in the phonologic coding (6, 7). Descriptive studies have also showed an association of phonologic disorders with the amount and burden of disfluencies and stuttering severity (8).

Currently, there is evidence supporting the connection between stuttering and language processing. Some examples are: (a) The fact that stuttering onset coincides with the moment of higher linguistic expansion in the child (9, 10). (b) The clear influence of linguistic factors —such as frequency, length and prosodic patterns in words— on fluency (11-16). And (c) The concomitance between stuttering and language disorders, mainly with phonologic and articulation ones (17, 18).

The stuttering as a pre-articulator disorder is also supported by some few experiments using the silent speech to determine the relative importance of speech planning and execution (19). Postma and colleagues used tongue-twisters and control sentences in three reading conditions: Silent, sub-vocalization and loud voice, and recorded the time spent by stutter and non-stutter subjects (20). Individuals with stuttering were slower than those without stuttering in all conditions, even for the silent speech. This difference between groups in the silent reading condition execution suggests that subjects with stuttering require more time for motor planning.

Today scarce literature has analyzed stuttering in a Spanish / English bilingual in particular, and this suggests associations between the introduction of bilingualism and the occurrence of failures in fluency (21). The authors of these studies suggest that differences in the characteristics of fluency patterns between English and Spanish may be associated with structural syntactic differences between the two languages.

Others studies, few in Spanish have shown that the patterns of stuttering can differ when comparing two languages, depending on (a) word class (content words are most prone to stuttering tan function words) (b) word length (long words are more difficult) (c) sentence position (words that appear in early position are more likely to be stuttered) and (d) phoneme with which the word starts (words starting with consonant are more difficult than those that start with vowels) (22-25).

Au-Yeung et al. divided 46 Spanish speakers into five age groups (22). They were interested in knowing if the developmental change in loci of dysfluency from mainly function words to mainly content words, observed for English speakers who stutter, also occurs for comparable Spanish speakers who stutter. It was found that the rate of dysfluency on function words was higher than that on content words, particularly in the youngest speakers. Function word dysfluency rate dropped off and content word dysfluency rate increased throughout age groups. In the Howell's research it was observed that the correlation between word type and stress does not apply to the same extent in Spanish as in

English; in Spanish it was found that both phonetic and metrical factors are important and independent determinants of stuttering in adults who stutter: non-stressed content words had higher stuttering rates than non-stressed function words. In English it is difficult to dissociate the influence of syllabic and metrical factors, given that content words tend to weigh highly on indexes of phonetic complexity and stress is also carried almost exclusively on these word types. Other study analyzed if the phonetic complexity affected stuttering rate for Spanish speakers (24). The analysis was performed using Jakielski's Index of Phonetic Complexity (IPC) scheme in which each word is given an IPC score based on the number of complex attributes it includes for each of eight factors (26). Stuttering on function words for Spanish did not correlate with IPC score for any age group. This finding for English speakers that stutter on these words is not affected by phonetic complexity. The IPC scores of content words correlated positively with stuttering rate for 6-11-year-old and adult speakers. Evidence was obtained that the factors found to be important determinants of stuttering on content words in English for speakers aged 12 and above also affected Spanish speakers. The study reports on the case of a 27-year-old Spanish/English simultaneous bilingual whose dominant language is English of Ardila et al. Some differences in the stuttering distribution were found: stuttering in adjectives, adverbs and conjunctions occurred at least twice as much in Spanish as in English; stuttering was also more frequent in verbs in Spanish.

Indeed, some factors may contribute to the apparently increased stuttering frequency reported in bilinguals, such as the characteristics of the languages (i.e. similarities and differences between both languages), the type of bilingualism (simultaneous, successive, etc.), the mastery of the two languages, etc.

This study reports on the case of a 33-year-old Spanish/English bilingual man whose dominant language is Spanish with the purpose of analyzing the pattern of stuttering through two different languages. An analysis of speech corpus and the performance in the different formal tests that were administered are added.

## *Method*

### Subject

The case report is about a 33- year-old male with stuttering diagnosis, right- handed, Latin-American, exposed to English since the age of 10. The subject does not speak any other language. The majority of the subject´s schooling was received in English, except the universities studies. The onset of stuttering was at ~ 6 years of age. The subject's mother and his brother are also dysfluent. The subject received speech therapy until ~ 7 years of age. The therapy was provided only in Spanish. Additionally, the subject has engaged in several years of self- control of his dysfluency. The subject refers a decrease in the severity of his stuttering in dealing with friends and an increase in these episodes at their work and in situations of anger.

The subject currently speaks English ~ 25 % of the time and acknowledges that he prefers to use Spanish in family situations.

### *Testing procedure*

The participant was exposed to an initial assessment protocol based in the guidelines for practicing in stuttering treatment, by the American Hearing Association (27). At the same time within the testing protocol it was necessary to apply a tool to establish the sufficiency of the user's language. For this reason parts of L2 Language History Questionnaire Version 2.0 are extracted and adapted (28). This questionnaire

incorporates items from the language background and the history of bilingualism; these were based on the participants' self-ratings. Participants reported on how their language performance throughout the four language modalities: speaking, understanding, writing and reading. The tools found provided specific information in five aspects of bilingualism: age of acquisition for each language, method of acquisition (informal acquisition through exposure to the language and classroom instruction), use of language and level of proficiency in each language (information about international examination for each language).

The following tests were administered in a single session in Spanish and English:

1. Spontaneous speech test 1 using the description of a picture from the Boston Diagnostic Aphasia Examination (29).
2. Spontaneous speech test reporting something about his stuttering history.
3. Silent reading, sub-vocalization and loud voice reading of the same text in Spanish and English "Rainbow" (30).
4. Boston Naming test in Spanish and English (29).
5. Verbal fluency a) semantic and b) letter/ phonological from the Boston Diagnostic Aphasia Examination (29).
6. Language repetition a) words b) sentences from the Boston Diagnostic Aphasia Examination (29).
7. Singing voice.

All tests were recorded using an audio recorded®, simultaneously the samples were registered in the Speech Analyzer 3.0 software (Summer Institute of Linguistics).

The order of administration was selected according to the goals of the initial assessment protocol.

## *Statistical and data analysis*

The samples chosen for the analysis of *speech corpus* were: spontaneous speech, description of the picture and reading. These were transcribed by a bilingual Spanish/English assistant and checked by one of the authors with more experience in stuttering. The transcription was done using like analysis unit the sentence (with all of its subordinate clauses). Were counted the number of the words stuttered, number of words stuttered in each clause, grammatical category of each word stuttered, lexical frequency of each word stuttered (high or low frequency), syllable frequency of each word stuttered (high or low frequency) number of stuttering events, type of stuttering (phonemic prolongations, phonemic repetition, part-word repetitions, complete word repetition, part- sentence repetition, complete sentence repetitions, pauses, blocks. Independently of the number of repetitions each repetition was counted only once.

In the account of the errors high number of disfluencies in function words in English was observed. These errors were mostly repetition rate of speech, so making a Segmentation Into Phonological Words Based (PW) similarly to the used by Au-Yeung, Howell y Pilgrim, to identify the content word and its location inside the PW was needed (31). With this division the error words as the content words that operate as the nuclei were analyzed, based on word frequency, syllable frequency, phonetic complexity, type of error and the beginning phoneme of the word.

The errors distribution according to language was compared using the Pearson chi-square test and Fisher exact test as appropriate and the level of significance was accepted as $p < 0.05$. SPSS for Windows 11.0 (SPSS Inc., Chicago, IL) program was used in all analyses.

The analysis of the lexical frequency was performed with the software ADELEX ANALYSER (Granada University). It establishes the Lexical Profile on the basis of information contained in a 7,000-word frequency list drawn from the *British National Corpus*, the *Bank of English* and the *Longman Corpus Network* databases (32). The scores are given based on the Lexical Frequency Profile defined as the percentage of words according to different frequency levels (usually established in bands of 1,000 words each). The lexical frequency analysis of words in Spanish is conducted based on LEXESP *(Spanish Computerized Lexic)* (33).

## *Results*

The application of standardized tests in language assessment confirms the dominance of Spanish over English. All assessment scores can be considered as normal. The general results in the different formal tests that were administered scores showed higher in Spanish than in English.

The total of the three samples chosen for the analysis of speech corpus (description, spontaneous speech and reading) was 2318 words, of these 1187 were Spanish and 1131 were English. We detected 101 disfluent errors, 62 in English and 39 in Spanish. As observed, the amount of speech produced was higher in Spanish than in English although this difference is not really significant. 48.79 % of the sample was spoken in English and 51.21 % in Spanish. In terms of disfluent instants the 61.39 % of the total is presented in English and the other remaining 38.61 % in Spanish.

Table 1. General characteristics of the samples for the analysis of speech corpus

| | Reading | | Description | | Spontaneous speech | | Total | |
|---|---|---|---|---|---|---|---|---|
| | Eng | Span | Eng | Span | Eng | Span | Eng | Span |
| Total number of words | 253 | 257 | 305 | 334 | 573 | 596 | 1131 | 1187 |
| % number of words | 10.91 | 11.08 | 13.15 | 14.40 | 24.71 | 25.71 | 48.79 | 51.21 |
| number of stuttered words | 22 | 13 | 9 | 5 | 30 | 22 | 62 | 39 |
| % of stuttered words | 21,8 | 12.9 | 8,9 | 5,0 | 29,7 | 21,8 | 61.39 | 38.61 |

Note: Eng = English; Span = Spanish.

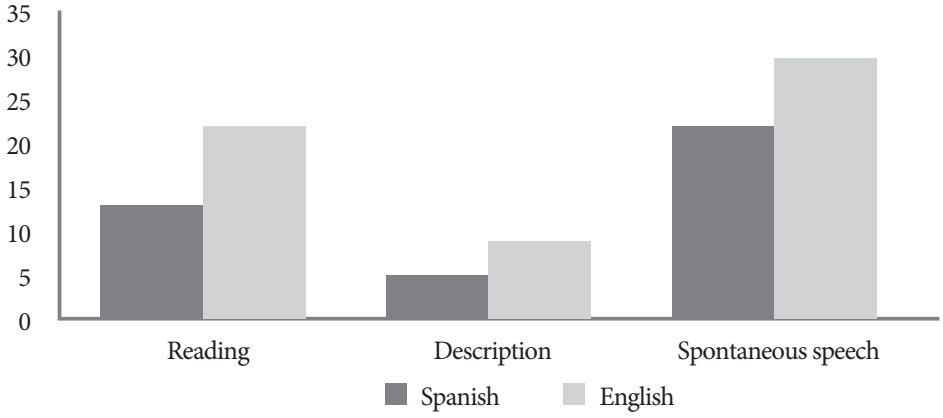


Figure 1. Percentages of stuttered words according to sample comparing English and Spanish

### *Function words and content words*

In both languages, stuttering by word type was more frequent in function words (i.e. pronouns, quantifiers, conjunctions, prepositions and particles and infinitival) than in content words (i.e. verbs, nouns, adjectives). The percentage of stuttering by type of word was: 52.4 % (51.28 % of words stuttered in Spanish and 53.22 % of words stuttered in English) for function words, 36.63 % (33.33 % of words stuttered in Spanish, 38.7 % of words stuttered in English) for content words and 10.8% (15.39 % Spanish, 8.08 % English) were interjections. These differences were not statistically significant (X2 = 26, 72, p = 2,02).

Table 2. Percentage of stuttering by type of word for each language

| Word type | Frequency | | Percentage | |
|---|---|---|---|---|
| | Eng | Span | Eng | Span |
| Content words | 24 | 13 | 38.7 % | 33.33 % |
| Function words | 33 | 20 | 53.22 % | 51.28 % |
| Interjection | 5 | 6 | 8.08 % | 15.39 % |
| Total | 62 | 39 | | |

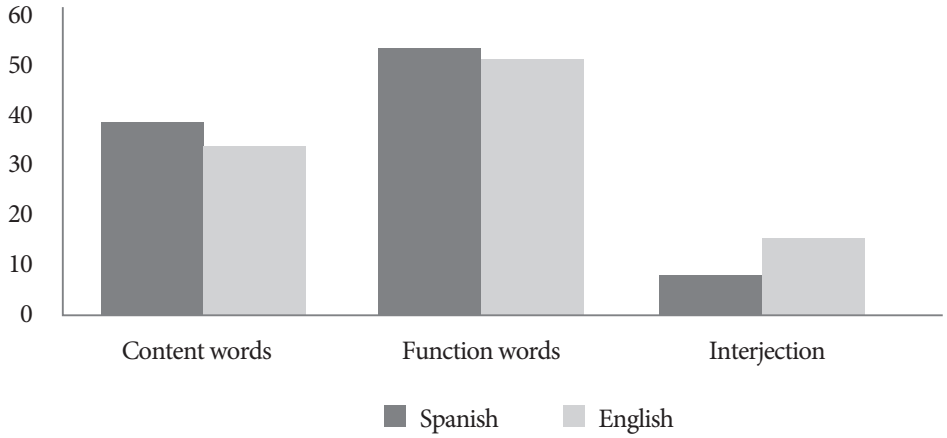


Figure 2. Percentages of stuttered words according error type

### Errors distribution according to language

Regarding the error type of the moments of stuttering the Table 3 shows the distribution of these to each language. As observed dysfluency types had a different behavior in Spanish and English, with the greatest percentage being the word repetition, 26.73 % followed by phonemic prolongations, 22.77 % related to the total sample. The distribution between these two types of errors was inversely proportional to both languages assessed, recording a larger number of type errors repeat word for English for 39 % and Spanish for 8 %, with a statistically significant difference (X2 = 26, 72, p = <0.00) and in turn there is a greater number of moments of stuttering-like extension of phonemes for Spanish 38 % and English 13% for this being significant (X2 = 16.449, p = <0.000), so the characteristics show significant variation more frequent in English than in Spanish.

Table 3. Percentage of stuttering by type of word for each language

| Error type | Frequency | | Percentage | | Percentage sample | Difference |
|---|---|---|---|---|---|---|
| | Eng | Span | Eng | Span | | |
| Words repetition | 24 | 3 | 39 % | 8 % | 26.73 % | X2 = 26, 72, p = <0.00 |
| Phonemic prolongations | 8 | 15 | 13 % | 38 % | 22.77 % | X2 = 16.449, p = <0.00 |
| Interjections | 6 | 3 | 10 % | 8% | 8.91 % | X2 = 0,244, p = < np |
| Word change | 4 | 4 | 6 % | 10% | 7.92 % | X2 = 0,244, p = < np |
| Sentence repetition | 7 | 1 | 11 % | 3% | 7.91 % | X2 = 4,76, p = <0,02 |
| Part-word repetitions | 7 | 0 | 11 % | 0 | 6.93 % | X2 = 11,33, p = <0,00 |
| Pause | 0 | 6 | 0 | 15% | 5.94 % | X2 = 16,07, p = <0.00 |
| Word addition | 1 | 4 | 2 % | 10% | 4.95 % | X2 = 5,49, p = <0.01 |
| Phoneme repetition | 2 | 1 | 3 % | 3% | 2.97 % | X2 = 0, p = < np |
| Part-word change | 0 | 2 | 0 | 5% | 1.98 % | X2 = 4,717, p = <0.02 |
| Block | 2 | 0 | 3 % | 0 | 1.98 % | X2 = 3,04, p = < np |
| Syllable repetition | 1 | 0 | 2 % | 0 | 0.99 % | X2 = 2,02, p = < np |

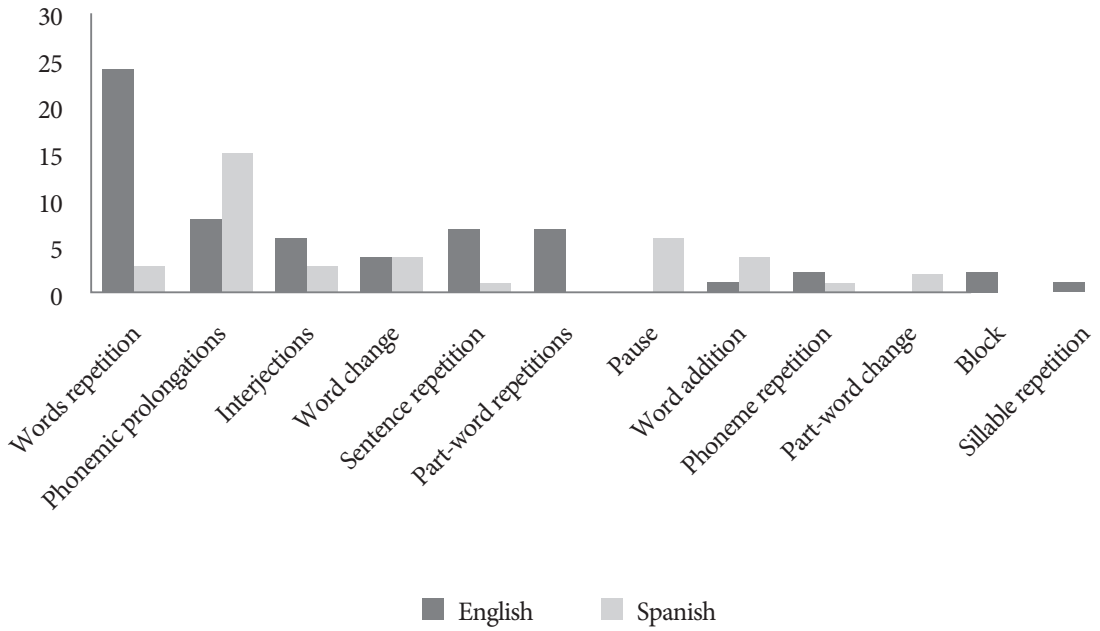


Figure 3. Differences between percentages by type of error for each language

## *The lexical and syllabic frequency*

After discarding the interjections without meaning, fluency errors analyzed showed a similar behavior for both English and Spanish, English for 86.1 % of the errors were of high lexical frequency and 13.9 % low lexical frequency, for Spanish 78.3 % of the stuttering moments were high lexical frequency and

the other remaining 21.7 % were words of low lexical frequency.

In the results and in line with the tenets of the recent literature for both English and Spanish for the index of complexity it was not a predictor that function words are stuttered. In adults there were no effects for function words, but it is clear that the content words that were been stuttered had higher IPC scores than content words that were not stuttered (Howell et al., submitted).

## *Discussion*

There has surged recently a theory that states that Bilingualism is a factor that can modify stuttering patterns (Howell et al, 2009). However, available data currently isn't enough to confirm or deny this idea about the disffluent speech of bilingual people. In the present study, the disfluent speech was analyzed in a bilingual stuttering man. Results are discussed according to the implications in the identification of stuttering in bilingual people.

## *Bilingualism type*

Bilingualism can be classified according to several criteria, especially the age of bilingual acquisition; the order of acquisition of both languages and the use of these by the bilingual person. These elements will be key factors to determine dominance of a language or not. In our study the patient was an Spanish/English bilingual speaker of successive early learning and frequent use of both languages although one is used at work and the other in the family context. For not simultaneous learning of both languages and more daily use of Spanish, this language is defined as dominant.

That is how from this observation errors from the bilingual participant are analyzed on the basis of Nwokah (21) to describe the patterns of stuttering: (a) that stuttering is produced in both languages, but it varies from a language to another (b) stuttering is produced in one language, but not in the other and (c) stuttering is produced in both languages with similar disfluent behavior patterns in each one, finding that for our participant the failures are present in both languages but behave in different ways, being evident that stuttering was more frequent is Spanish than in English. In this regard, several explanations can be established: first stuttering, in general, is more serious in the less dominant language since being successive learning in this case it behaves similarly to child stuttering and on the other hand the subject received therapy in Spanish and therefore, he has generated strategies in this language. Van Borsel's studies (1) point a greater incidence in stuttering for bilingual people, which can be related to difficulties generated from the use of a mother tongue different to the linguistic code. Results shown in our study, in the rise of the number of failures of fluency for L2 (English) support this theory.

## *Lexical and syllabic frequency*

For the syllabic frequency in adults, an inhibitory effect has been found in the access to lexicon, as in the case of the task of lexical decision: words compound by frequent syllables produce more errors than those with low frequency syllables. For this study it was found that there was no significant association between the IPC and the errors in fluency. The sample of language taken from the participant based on the presence of errors used for this analysis was compound mostly by function words that according to what is reported by Au-Yeung (2007) are not affected by the phonetic complexity for none of the mentioned languages.

On the other hand, for lexical evidence it was evident that both for English and Spanish the biggest number of errors was produced in high frequency words (86,1 %: English and

78,3 % Spanish), this finding could relate to the idea stating that high frequency of disfluent speech in bilingual speakers is inherent to the process involved in language production. It could be argued that as we go towards knowledge and use of both languages, more options to choose an exit are found, that is, lexical candidates increase.

Therefore, bilingual people are more prone to experiment a level of linguistic uncertainty that to a large extent could become an increase of moments of disfluent speech

## *Types of errors in fluency*

Results for other types of errors in our study suggest that failures of fluency behave differently to L1 and L2 which could be explained with typical characteristics of language and successive acquisition of this. Most common errors in mother tongue, in this case Spanish, were the type of extension of phonemes and pauses. This observation can be explained as the subject has developed linguistic strategies such as extension or prolongation of phonemes and rework of sentences which means make pauses. On the other hand, errors produced in L2, English in this case, fit the typical pattern of an immature linguistic system.

In both languages the percentage of interjections used was high noticing that these linguistic strategies are used by adults to decrease the impact of moments of harsh expression.

## *Errors according to the type of Word*

As it was observed, the number of moments of stuttering for both languages was higher in function words, which anyway does not fulfill what was stated by Brown (25) regarding the four basic factors to determine if a word will be stuttered, according to which content words present more stuttering than function words. Findings of this study relate to current data provided by Howell and Sackin in the EXPLAN theory which suggests that fluency failures in function words are a way to brave difficulties in the production of next content words, being the repetition of function words a consequence of the lack of availability of a plan for the next content word (34). This is reinforced considering the disfluency in function words being more likely at the beginning of phrases or expressions, possibly the spot of more linguistic uncertainty.

Another connection that can be established upon the basis of the superiority of moments of stuttering in function words as mentioned by Howell, is that patterns of lack of fluency in the bilingual adult for the non-dominant language occur similarly to the patterns found in a stuttering child, which means longer planning time in content words and therefore, the appearance of a disfluent moment in function words to delay the stress moment.

## *Conclusion*

Our study of bilingualism Spanish-English showed that stuttering occurred in both languages but was found to be more affected in one language relative to the other. Particularly, were found to stutter more frequently in the language that was less dominant. On the other hand our corpus of data is not enough to establish a cut off point for speakers of both languages. Nevertheless, prevalence data reported on stuttering in bilingual speakers must be taken into account, which could suggest an indicative in the presence of moments of stuttering according to variations of linguistic order nature. So when comparing stuttering in two different languages, similarities and differences can be established in stuttering patterns, related not only to linguistic characteristics typical to each

language, but also with the proficiency of each individual in each language.

Our findings have clinical evidence and suggest that Speech Language Pathologists should evaluate the language proficiency in bilingual people in addition to performing routine evaluation of stuttering as such provides differential information in the understanding of nature of failures and their treatment.

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