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The disfluent speech of a Spanish–English bilingual child who stutters

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Abstract
This study provides a detailed description of the disfluent speech behaviours produced by a 6;1-year-old bilingual Spanish–English speaking female with confirmed stuttering. Eight language samples across different contexts (narratives and conversations) with the clinician in English and Spanish and the parent in Spanish were analysed. Language samples were transcribed in the Systematic Analysis of Language Transcripts programme and coded for types of disfluencies based on guidelines for monolingual English speakers. Similarities and differences were noted in speech disfluencies produced in English as compared Spanish. Overall, the participant was more disfluent in English across both her narrative and her conversational output. However, she produced more stuttering-like disfluencies in her Spanish narrative sample than her English narrative sample. Conversely, she produced more nonstuttering-like disfluencies in her English than her Spanish narrative sample. These findings suggest stuttering specific as well as language specific contributors to the fluency breakdowns that characterize the speech output of a bilingual Spanish English child who stutters.

Keywords: Child speech, Spanish–English bilingual, stuttering

Introduction

More than half of the world's population is bilingual and an estimated 1% of the world's population stutters (Bloodstein & Bernstein Ratner, 2008; Van Borsel, Maes, & Foulon, 2001). Some researchers have suggested that exposing a child to another language prior to entering school (approximately age 5) could increase the likelihood that the child will develop stuttering (Howell, Davis, & Williams, 2009; cf. Packman, Onslow, Reilly, Attanasio, & Shenker, 2009; Karniol, 1992). In the United States, Spanish is the most widely spoken language other than English (United States Bureau of the Census, 2009). The majority of Hispanic children are exposed to both Spanish and English from birth (i.e. simultaneous bilinguals). The remainder are considered to be sequential bilinguals because they are exposed to one language in the home since birth and then exposed to a second language when they start school (Bedore et al., 2012).

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At present, there are limited data regarding the manifestation of stuttering in Spanish–English (SE) bilinguals (Ardila, Ramos, & Barrocas, 2011; Bernstein Ratner & Benitez, 1985; Carias & Ingram, 2006; Dale, 1977; Howell et al., 2004). The current case will offer additional insight into the speech behaviours that are indicative of stuttering in this rapidly growing clinical population.

The speech fluency of monolingual Spanish-speaking children appears to be comparable to what has been documented in monolingual English children who do and do not stutter in terms of the types and frequencies of disfluencies. Researchers have documented the presence of non-stuttering like disfluencies (revisions, interjections and multisyllabic word repetitions) and stuttering like disfluencies (single syllable word repetitions, sound repetitions and blocks) in monolingual Spanish-speaking children ranging in age from 2;0 to 5;5 years old (Carlo & Watson, 2003; Watson & Anderson, 2001; Watson, Byrd, & Carlo, 2011). However, the cross language application of disfluency guidelines must be limited to monolinguals as the bilingual speaker's language knowledge differs significantly from the language knowledge of a monolingual speaker. A bilingual child's language knowledge is shared between both languages and their language specific experiences may not be the same in each language (Grosjean, 1998; Kohnert, 2010). For example, a bilingual child may know different words in each of their languages (Peña, Bedore, & Zlatic-Guinta, 2002). This imbalance in language proficiency may manifest in their disfluency characteristics (Nwokah, 1988). That is, the bilingual speaker may be more vulnerable to producing speech disfluencies than the monolingual speaker given the distinct cognitive demand that is inherent to bilingualism. Additionally, the potential for distinct motoric differences in the production of the two languages could also uniquely compromise the bilingual child's ability to establish/maintain fluency.

Insight regarding how bilingualism may compromise speech fluency can be found in Dale's (1977) description of the speech output of four SE adolescent males of Cuban descent who had not been formally diagnosed with stuttering but who also were not considered to be ''typically fluent.'' Dale reported that none of the participants presented with disfluencies when speaking English. Disfluent speech such as groping for words, hesitations and repeating sounds and syllables at the beginning of words was only present when the participants spoke Spanish. The author described these speech behaviours as ''typical'' disfluencies and attributed the production to the participants' loss of Spanish proficiency as they learned English. The participants were described as proficient in English and Spanish. In the study, there was no mention of how proficiency in each language was attained as well as detailed information regarding the levels of language input and output the participants were exposed to in both their languages. This important information has been shown to be lacking and/or inconsistent in studies pertaining to stuttering and bilingualism (Coalson, Peña, & Byrd, 2013). In addition, Dale (1977) proposed that the participants experienced these disfluencies due to environmental pressures from their Cuban community members to retain their native language, Spanish. Dale further noted that the participants were disfluent when they struggled to find words in Spanish or felt shame when they were disfluent in front of their parents.

Bernstein Ratner and Benitez (1985) provided the first published exploration of a bilingual SE speaker with confirmed stuttering. The participant was a 50-year-old SE bilingual male of Cuban descent. Information regarding the input and output of both of his languages was not provided but the participant reported that he felt equally fluent in both languages. The authors analysed spontaneous speech samples in each language. The specific types of disfluencies were not described in detail nor was information provided as to whether the disfluencies produced were considered to be atypical or typical (i.e. stuttering or non-stuttering like). However, the authors reported that the participant was more disfluent (with the number of disfluencies per utterances being nearly twice as much) in English than in Spanish. The authors also reported that more disfluencies were produced on noun phrases in English than they were in Spanish.

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An additional case report of bilingual stuttering in an SE participant was presented at an annual American Speech Language Hearing Association (ASHA) conference by Cabrera and Bernstein Ratner (2000). The details regarding this case are limited to the authors reporting that the child (age 5) was more disfluent when code-mixing. These data lend further support to the notion that linguistic uncertainty can lead to increased disfluency which supports our position that the disfluent speech of bilinguals is unique to bilingualism. In non-stuttering bilingual children that produce typical speech disfluencies such as interjections and phrase repetitions, linguistic uncertainty could be associated with unfamiliarity with vocabulary or difficult language structures (low frequency forms such as subjunctive forms in Spanish or complex forms requiring wh-movement or do-insertion; Bedore, Fiestas, Peña, & Nagy, 2006). That is, the monolingual knows only one language; thus, the demand of navigating more than one language and the subsequent impact on fluency is not a mediating factor in the fluency of their output.

Howell et al. (2004) describe the spontaneous speech of a 11;9 year bilingual SE male with confirmed stuttering in order to explore whether a bilingual with unequal proficiency would show different patterns of disfluency in each language. In addition, differences in patterns of disfluencies were compared to ways in which monolingual present with ''stall'' (silent and filled pauses, whole word repetitions and repetitions of phrases) and ''non-stall'' (sound prolongations, part word repetitions and breaks between syllables) speech behaviours. Details regarding the child's level of bilingual proficiency were limited to that he was more fluent in Spanish than English. The data analysed were a spontaneous conversational speech sample with the clinician and a monologue in each language. The authors analysed the speech samples for the amount of ''stalls'' and ''non-stalls'' present in each language. Results indicated that the child exhibited more ''non-stalls'' in Spanish overall than in English characterizing his stuttering as more severe in Spanish than English.

Carias and Ingram (2006) provide further data regarding the nature of stuttering, again in children who were not formally diagnosed with stuttering but whom the authors described likely presented with the disorder. They analysed spontaneous language samples produced in both languages by four SE bilingual children between the ages of 4 and 10 years old. Results indicated that all of the participants showed a higher proportion of disfluencies in the language in which they had the highest mean length of utterance (MLU). The authors interpreted the higher MLU as an indicator of proficiency in that particular language and from that made the argument that with increased linguistic output there was increased disfluency. The authors also reported that though these children were not confirmed stutterers, the frequency of stuttering ranged from 37% to 72%, percentages that are markedly higher than the diagnostic guidelines for stuttering in monolinguals. These results lend further support to our premise that bilingual speakers may be more susceptible to fluency breakdowns.

More recently, Ardila et al. (2011) examined the fluency characteristics of a SE bilingual 27-year-old adult male of Cuban descent who had been formally diagnosed with stuttering. The participant is described as being English dominant with reportedly only 10% of his output being Spanish. The authors analysed the participant's disfluent speech production in picture description and conversational samples in each language. The authors described the following disfluencies as stuttering like: phonemic prolongations, phonemic repetitions, part word repetitions and whole word repetitions. In addition, the participant reportedly produced significantly more words overall in English than Spanish; yet, he produced significantly more stuttering behaviours in Spanish than English. The authors concluded that the participant stuttered more in the non-dominant language, Spanish, because of the linguistic differences between English and Spanish.

Most studies pertaining to stuttering and SE bilinguals provide descriptions of how stuttering differs relative to the nature of the language and/or the speaker's linguistic proficiency yet most cases pertain to cases of non-confirmed stuttering. In addition, they are not well defined in terms

of the individual's linguistic profile with regards to language input and output (e.g. Bernstein Ratner & Benitez, 1985; Dale, 1977; Howell et al., 2004). Further, within these studies the conflicting manner in which the participants' bilingualism has been defined makes it challenging to interpret the limited bilingual stuttering data we have collected thus far (Coalson et al., 2013). We propose that for bilingual children who stutter the critical focus should be on the type and frequencies of disfluencies that they produce as we cannot understand fluctuations across languages without first understanding the nature of the primary behaviour of stuttering in this unique clinical population. Our case study is distinct from past research in (at least) three key ways. First, we will offer a detailed description of fluency characteristics in a confirmed case of stuttering in a younger bilingual SE child nearer to age of onset of stuttering whereas past research has focused on an older school age child, adolescents, or an adult. Second, the data were collected across a variety of contexts (narrative re-tell, narrative tell and conversation) with both the bilingual SE speech-language pathologist (SLP) and the child's parent to ensure an adequate representation of the child's speech in both languages. Third, we provide more detailed information regarding language dominance including the procedure used for determination of dominance as well as the language proficiency of the SLPs who confirmed the diagnoses of stuttering than has been reported in previous studies. The following research questions will be considered relative to the guidelines that have been established in the monolingual literature:

(1) What types of disfluencies characterize the speech of an SE bilingual child who stutters?
(2) What are the frequencies of occurrence of stuttering and non-stuttering like characteristics in an SE bilingual child with stuttering?

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Method

This project received dual approval from the Internal Review Board at the three authors' university as well as the first author's medical placement. Parental consent was obtained in Spanish. The data analysed for this study was part of a larger study for a bilingual fluency intervention.

Participant

The participant in the study is a 6-year and 1-month-old Hispanic female who was attending a local public school where she was enrolled in an English only Kindergarten classroom. Per parent report the child started stuttering at 3 years of age. Her mother described her stuttering significantly in the home. Her mother was specifically asked whether she knew of any family history of stuttering on her side or on that of her daughter's father. She reported, to her knowledge, there was no family history of stuttering. She further reported that the child's stuttering appeared to increase with excitement and when she was upset. In addition, she stated that her daughter had the most difficult time starting phrases and words and often gets stuck on the first word of the sentence and repeated it.

Initial diagnosis of stuttering

This participant had previously been diagnosed with stuttering at 3 years 6 months old by her school appointed monolingual SLP. She was not receiving services in the school system at the time of the study. She was referred to the first author with parent and teacher concerns for stuttering. There was no bilingual service provider available at her school so her parent chose to pursue services through the local hospital where the first author was working as a bilingual SLP.

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Confirmation of initial diagnosis

Narrative and play-based conversational samples in English and Spanish were analysed independently by all three authors for presence of stuttering, types of disfluencies, and percentage of stuttered syllables. The author team has expertise in stuttering and communication disorders in SE bilinguals. The first author is an ASHA certified bilingual SE SLP who has also worked as a clinical supervisor in an evidenced-based practice programme for children through adults who stutter. The second author is an ASHA certified/licensed SLP/professor who specializes in stuttering. The third author is an ASHA certified/licensed SLP/professor who specializes in bilingual language development and disorders. The first author is a native Spanish speaker. The second and third author learned Spanish as a second language with formal acquisition extending through doctoral studies. Each author's Spanish and English language competence support reliable identification in both languages (Van Borsel & Pereira, 2005). Detailed information about the percent syllables stuttered and types of disfluencies present in her speech will be reported in the results section. In addition to the primary behaviours of stuttering, our participant also closed her eyes during blocks of stuttering that were longer than 60 s. This secondary behaviour was noted during English and Spanish. Speech behaviours considered to be stuttering like disfluencies for this child were (1) monosyllabic word repetitions (only those monosyllabic word repetitions that were produced with atypical tension and rhythm were included), (2) sound repetitions, (3) syllable repetitions and (4) audible sound prolongations. Speech behaviours considered to be non-stuttering like included: (1) revisions, (2) unfinished words, (3) interjections and (4) phrase repetitions. Classification of these behaviours as stuttering and non-stuttering like as well as consideration of the timing and tension of the productions of the monosyllabic word repetitions were derived from the classification system initially developed by Ambrose and Yairi (1999) with careful consideration given to the critique by other researchers (Brocklehurst, 2013; Einarsodottir & Ingham, 2005; Howell, 2013).

For consideration of timing, the rhythmicity of the repetitions was considered to be typical if the iterations occurred one after the other with no difference in the duration and if there were no rapid bursts of iterations within the repetition set. Tension and rhythm influence each other but in addition to durational differences in the iterations produced, we also listened for pitch changes within each iteration as that type of audible change is also indicative of a change in tension. If the pitch of each iteration was comparable with no audible stress change unique to the iterations within the repetition set, then the tension was considered to be typical. In contrast, those repetitions wherein the rate of each iteration significantly differed, and/or there were rapid bursts of iterations within the repetition set, and the duration of each production differed as well as the pitch from iteration to iteration, the repetition was considered to be atypical in nature. To ensure reliability of the identification of atypical versus typical monosyllabic repetitions, the first authors independently listened, coded and then re-listened and coded these repetitions yielding 100% intra-rater reliability. An undergraduate research assistant also independently listened and coded the repetitions. Her description of each monosyllabic repetition as either atypical or typical was compared to that of the first author's with the comparison yielding 100% inter-rater reliability.

To add additional confirmation that this child stutters, the 3 authors independently analysed one English sample and one Spanish sample in each language using a 9-point stuttering severity rating scale (1 = no stuttering, 2 = extremely mild stuttering. . . 9 = extremely severe stuttering) O'Brian, Packman, Onslow, and O'Brian (2004). This scale is considered to be reliable and valid (O'Brian et al., 2004) and has been used to describe severity in other recent studies (e.g. Byrd, Logan, & Gillam, 2012; Byrd, Vallely, Anderson, & Sussman, 2012; Sussman, Byrd, & Guitar, 2011). This scale is also used for severity analysis when completing evidence based practice with children (Packman et al., 2011) and adults who stutter (O'Brian, Carey, Onslow, Packman, & Cream, 2009). The average fluency severity rating was 4 in the English sample and 6 in the Spanish sample.

Thus, the overall mean rating for this child was 5, which would correspond to a moderate severity rating. All three authors independently agreed that this rating accurately reflected this child's stuttering severity at the time of the study.

The first author also completed a parent interview in which the child's parent provided detailed information regarding past and present fluency concerns. During this interview, documentation of teacher concerns from the year of her initial diagnosis and the past year were also provided. Taken together, all three authors agreed these data confirm the child's initial diagnosis of stuttering that had been provided by her former school-based SLP.

Speech and language

The participant was administered a variety of speech and language tests to evaluate the presence of a concomitant speech or language disorder. The Contextual Probes of Articulation Competence Spanish (Goldstein & Iglesias, 2009) was administered to evaluate speech production skills in Spanish. The participant earned a standard score of 91 ($M = 100$, $SD = 15$). The Goldman Fristoe-2 Test of Articulation was administered in English to formally evaluate speech skills in English (Goldman & Fristoe, 2000). She earned a standard score of 106 ($M = 100$, $SD = 15$). Articulation errors present in both languages included substitution of /v/ for /g/ in medial and final position and gliding of the /r/ sound. Phonological processes present in her speech were unstressed syllable deletion and cluster reduction. These phonological processes occurred across languages and were more common in connected speech than at the single word level.

An experimental version of the Bilingual English Spanish Assessment* (Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, in press) was used to formally assess language skills in English and Spanish. The morphosyntax test specifically tests a child's syntactic knowledge in each language through age appropriate cloze task and sentence repetition items. Examples of sections of the morphosyntax test include prepositions, past tense and plural marking. The participant earned a 57 ($M = 64.87$, $SD = 23.92$) for the Spanish Morphosyntax test scoring within the average range in comparison to peers her age. On the English Morphosyntax test she earned a 23 ($M = 85.05$, $SD = 23.64$) scoring below the mean in comparison to peers her age.

The semantics test in both languages targets age appropriate semantics items through expressive and receptive language questions. For example, the participant was asked to generate items in a category such as ''tell me all the foods you can think of'' and ''tell me all the ways that you can play at a birthday party'' and receptive items such as pointing to appropriate pictures when read a description. The participant earned a 36 ($M = 30.49$, $SD = 7.94$) on the Spanish Semantics test and on the English Semantics test she earned a 28 ($M = 32.96$, $SD = 5.79$) scoring within the average range for her age and gender in both languages.

She displayed language skills in the average range in Spanish and in the low average range for her age in English. Her linguistic performance in English was expected as the participant was exposed to mostly Spanish in the home and had just started Kindergarten in an English-speaking classroom. Additionally, no past or present parent, teacher, or prior SLP concerns were noted regarding her language. Other researchers have validated the use of the BESA morphosyntax subtests and report the syntax subtests as having good to excellent discriminant classification (Gutiérrez-Clellen & Simón-Cereijido, 2007). Preliminary analysis of the Spanish semantics test data with a group of 284, 4–6 year-old children indicates co-efficient alpha between 0.78 and 0.84. For English, co-efficient alpha ranged from 0.81 to 0.91 with a group of 244 children (Peña, Bedore & Kester, in review).

*Requests for access to the experimental version of the Bilingual English Spanish Assessment may be made directly to the first author of the test via email to Dr. Elizabeth Pena lizp@mail.utexas.edu.

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Socio economic status

The information available for this participant was indicative of low socio economic status (SES). The participant resided with her mother, younger sister and younger brother in a primarily Spanish-speaking home. The participant received free lunch at her elementary school. The participant's mother (primary caregiver) was educated through the 8th grade in Mexico and reported that she did not work outside the home. The participant's paternal educational and vocational history was not known.

Bilingualism

The participant's parent completed a language questionnaire in person with the first author. This questionnaire was used to gather information about the participant's language experience and demographic information such as parental information and SES (Gutiérrez-Clellen & Kreiter, 2003; Restrepo, 1998; Peña et al., in press). The questionnaire included two types of questions about language experience. The first questions pertained to the child's language use on a year-by-year basis and a detailed accounting of the child's current language use. The participant's parent classified her child's language status as ''English,'' ''Spanish'' or ''Bilingual'' for every year up to her child's current age. The parent was then asked starting from when the child was born to 1-year-old what languages were spoken in the home. This question was asked for each year of the child's life up to the present age of the child. The age of first exposure to English was the age at which the parent indicated that English or both (English and Spanish) were first used in the home. The participant's mother indicated that the child was first exposed to English at age 1.

Next, the participant's mother provided hourly information (while the child was awake) regarding the participant's language input and output, so that we could estimate current language use patterns. The parent was prompted with the question ''From 7 to 8 am, who is your child with and what language are you or they addressing your child?'' for each hour of the day until their child was in bed. These questions provided information regarding language input. The parent answered these questions for one weekday and for one day on the weekend. Language output information was gathered in a similar way. For input and output, each hour of the day classified as English, Spanish, or both. English and Spanish hours were summed and hours classified as ''both'' were divided in half between English and Spanish and added to the total for each language. English and Spanish totals were weighted by 5 for week days and 2 for weekend days and summed. This was divided by the number of hours the child was awake and then converted into a percent representing language input and output. From this calculation, the participant was determined to hear and use English 66% percent of the time per the parent questionnaire.

The language questionnaire data indicated more English exposure yet formal testing measures (BESA semantics and syntax) indicated stronger performance in Spanish. Taking into consideration her performance on the language measures and parental responses on the questionnaire, the child showed mixed language dominance. This mixed dominance pattern has been observed in previous studies with SE bilingual children that are shifting from the use of the home language to increased use of the academic language (Bedore, Peña, Gillam, & Ho, 2010; Gutiérrez-Clellen, 2002).

Procedures

The participant completed the pre-treatment protocol across four consecutive sessions. The completion of this protocol (the data analysed for this study) was part of a larger study that this participant is involved in regarding treatment for stuttering in both English and Spanish. Narrative language samples including a retell and tell in both languages using wordless picture books were

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obtained to formally assess the participants speech disfluencies across both languages. In addition, conversational play-based samples with the first author and also with the participant's mother were collected to further assess disfluencies. No parent samples were collected in English as the child's mother does not speak English but the conversational interactions with the first author and the participant were completed in both English and Spanish.

Sessions were held one time a week for 1 h each week in a local hospital clinic room with a one way mirror. All sessions were conducted by the first author and were audio recorded with an Olympus DS 30 audio recorder to be transcribed for analysis.

All audio files were downloaded to PC computers for transcription into the Systematic Analysis of Language Transcripts programme (Miller & Iglesias, 2010). One undergraduate bilingual SE student with native Spanish proficiency trained in phonetic transcription and specifications of the coding scheme phonetically transcribed the samples verbatim (word for word in its entirety) under the supervision of the first author.

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Syllables

Calculations of occurrence of stuttering and non-stuttering like disfluencies were presented as a percentage out of the total number of syllables in the language sample. We selected syllables as opposed to words given the morphosyntactic structure of Spanish (Watson et al., 2011). The trained bilingual research assistant counted syllables for each sample in English and Spanish by hand following the guidelines used by Watson et al. (2011). Examples of how syllables were separated and counted based on vowel combination and stress in Spanish include: (1) combinations of weak vowels, e.g. hau-la (cage) = 2 syllables, (2) one strong vowel, e.g. feo (ugly) = 1 syllable, (3) one strong vowel and one or more weak vowels, e.g. mie-do (fear) = 2 syllables. In English, syllables were defined with similar parameters considering vowel and stress patterns. Some examples of how syllables were separated include: (1) combinations of vowels, e.g. door = 1 syllable, (2) silent /e/ syllables, e.g. bake = 1 syllable, (3) syllables ending with /le/ such as a-ble = 2 syllables. Unintelligible output was marked with an 'X' in the transcript. Utterances were deemed unintelligible when the research assistant had listened to the recording a minimum of 3 times and then consulted with the first author. If after consulting the first author the output could not be definitively understood the utterance was marked as unintelligible. Similar to Watson et al. (2011), syllables were then coded for type and number of disfluencies.

Disfluency coding

Each sample was coded for stuttering and non-stuttering like characteristics, types of disfluencies and percent syllables stuttered in both English and Spanish. Table 1 details the coding scheme used to identify/categorize stuttering like and non-stuttering like disfluencies (Ambrose & Yairi, 1999). Currently, no norms exist for which disfluencies are classified as stuttering like or non-stuttering like for Spanish–English bilinguals; thus, similar to past bilingual research we used these type/category descriptors that have been confirmed in monolingual English children who stutter to explore the disfluent speech of our bilingual child who stutters.

Reliability

Reliability for transcription, coding and syllable counting was obtained. Transcripts were first transcribed, coded and syllable counted for each language sample by a trained SE bilingual research assistant. The assistant then re-listened to each transcript to see if changes needed to be made to the transcript and the codes for each disfluency type. The first author reviewed each transcript after the second round of checking to be certain that all disfluencies were properly coded and counted. This same procedure was followed for the coding of each transcript and the syllable counting for each sample in English and Spanish. Initial reliability obtained for 20% of the

Table 1. Disfluency coding.

Stuttering like disfluencies	Description	Examples
Sound repetition [SDR]	Repetition of a sound that typically appears at the beginning of words.	(W* w*) we will clean up now. (L* l*) la flor es de mi mama.
Monosyllabic word repetition [MWR]	Repetition of a single syllable word.	(The) the boy is looking for the frog. (La) la rana se fue.
Syllable repetition [SYR]	Repetition of a syllable.	The boy was (lo*) looking outside his window. El (ni*) nino estaba buscando su rana.
Audible sound prolongation [ASP]	Prolongation of a single sound.	(Sh>>>>>) She is sitting on the grass. (E>>>>>) El nino fue al parque.
Other Disfluenices	Description	Examples
Revision [R]	Re-start, word usage or grammatical error correction.	The (frog) boy went to the park. El nino (corrio) busco a su rana en el parque.
Polysyllabic word repetition [PWR]	Repetition of a word with more than one syllable.	He was (looking) looking for the frog. El (nino) nino busco a su rana.
Interjection [INT]	Filler words or non-linguistic sounds used within an utterance.	The boy (uh) found his frog. El nino (eh) brinco en el agua.
Phrase repetition [PHR]	Repetition of a phrase (group of words) within an utterance.	The boy (looked over) looked over the log. La rana (se fue) se fue a la casa.
Unfinished word [U]	Words that were not completely articulated, abandoned or unfinished.	The (fr*) boy looked out the window. El (pe*) gato tenia hambre.

Adapted from Ambrose and Yairi (1999) and Watson, Byrd, and Carlo (2011).
The asterisk indicates an unfinished word during a moment of disfluency.

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samples collected was 93% percent point to point for transcription and 94% agreement for coding and syllable counting. Agreement was obtained by dividing the number of disagreements by the total number of agreements and disagreements. All discrepancies were resolved to reach 100% agreement by the first author and the trained graduate research assistant with the second and third author providing additional input as needed.

Results

To review we posed two questions to enhance our clinical decision-making abilities with bilingual SE children who stutter. First, what are the types of speech behaviours that are present in the speech of a confirmed bilingual child who stutters? Second, what are the frequencies of disfluencies that are considered to be stuttering-like and those that are considered to be non-stuttering-like as compared to the monolingual stuttering literature? We collected these data across different contexts within each language to allow for the most representative analysis of type and frequency of the speech behaviours produced.

Table 2 presents the different disfluency types out of the total number of syllables produced per sample by language. Monosyllabic word repetitions (produced with atypical tension and rhythm) were the most frequently produced stuttering like disfluency in both languages (English grand

Table 2. Percentages of disfluency types out of total syllables per sample by language.

	Stuttering like %				Non-stuttering like %			
	[SDR]	[SYR]	[MWR]	[ASP]	[REV]	[U]	[INT]	[PHR]
Spanish								
Clinician Play	0.6	1.8	2.4	0.0	0.6	0.6	1.8	1.2
Clinician Play	0.0	1.2	0.6	0.0	2.4	0.0	0.0	0.0
Parent Play	0.8	1.6	1.6	0.0	2.4	0.0	0.8	0.4
Parent Play	0.0	1.0	2.0	0.0	2.0	1.0	1.5	0.0
Re-tell	0.8	1.2	3.3	0.0	5.9	4.7	0.0	2.5
Tell	0.9	1.6	3.2	0.0	3.6	4.2	0.2	2.7
Grand mean	0.7	1.4	2.0	0.0	3.0	3.6	0.3	2.0
English								
Clinician Play	0.0	0	0.0	0.0	1.7	2.9	0.4	0.8
Re-tell	1.0	5.0	7.8	0.4	5.9	12.8	0.7	3.0
Tell	0.5	2.8	7.1	0.0	9.1	5.8	0.0	2.5
Grand mean	0.6	3.4	4.5	0.2	6.1	8.9	0.5	2.5

SDR, sound repetition; SYR, syllable repetition; MWR, monosyllabic word repetition; ASP, audible sound prolongation; REV, revision; U, unfinished word; INT, interjection; PHR, phrase repetition. These abbreviations are adapted from Ambrose and Yairi (1999) and Watson, Byrd, and Carlo (2011).

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mean = 4.5% and Spanish grand mean = 2.0%) followed by syllable repetitions. The grand mean represents the percentage across all sampling contexts for each particular disfluency out of the total number of syllables in the samples. Audible sound prolongations (English grand mean = 0.2% and Spanish grand mean = 0.0%) and sound repetitions (Spanish grand mean = 0.7% and English grand mean = 0.6%) were the least frequently produced stuttering like disfluencies in both languages.

There were more unfinished words in English than Spanish (English grand mean = 8.9% versus Spanish grand mean = 3.6%), and she produced more revisions in English than she did in Spanish (English grand mean = 6.1% versus Spanish grand mean = 3.0%). She also produced more phrase repetitions (English grand mean = 2.5% versus Spanish grand mean = 2.0%) and interjections (English grand mean = 0.5% versus Spanish grand mean 0.3%) in English than in Spanish.

Unfinished words and revisions were the most frequently occurring non-stuttering like disfluencies in both languages. Interjections (English grand mean = 0.5% and Spanish grand mean = 0.3%) and phrase repetitions (English grand mean = 2.5% and Spanish grand mean = 2.0%) were the least occurring non-stuttering like disfluencies. No polysyllabic word repetitions were noted in either language in any of the samples differentiating this bilingual child's speech from data previously reported for monolingual Spanish speakers with and without stuttering (Carlo & Watson, 2003; Watson et al., 2011). In addition, audible sound prolongations (each lasting one second) were only noted in one sample in English; none occurred in Spanish.

To determine whether the types of disfluencies were comparably distributed across the languages, we completed a Spearman correlation using the grand means of the different dysfluency types in English and Spanish. This analysis yielded a ρ of 0.9625 with $p < 0.001$ indicating a strong positive correlation in the most frequently occurring to least frequently occurring types of disfluencies produced in Spanish and English. Thus, the types of disfluencies and their occurrence from most to least frequent were comparable across the two languages the child spoke.

Table 3 presents information regarding the frequency of occurrence out of total syllables for stuttering and non-stuttering like disfluencies. This information is presented by sample and disfluency type for each language. The percent of stuttering and non-stuttering like disfluencies was calculated by dividing the total number of each category of disfluency type (stuttering and

Table 3. Language sample characteristics.

	Language	MLU	Utterances	Words	Syllables	% SLD	% NSLD
Clinician Play	Spanish	4.55	20	91	165	4.8	4.8
Clinician Play	Spanish	3.42	24	82	166	1.9	2.4
Parent Play	Spanish	3.24	49	159	247	4.0	5.3
Parent Play	Spanish	3.44	36	124	205	2.9	5.4
Re-tell	Spanish	5.86	106	621	1101	5.3	11.1
Tell	Spanish	5.74	91	522	984	5.7	10.6
Grand mean	Spanish	4.40	54	267	478	4.9	8.9
Clinician Play	English	3.77	56	211	238	0.0	5.9
Re-tell	English	5.70	105	598	673	14.1	22.4
Tell	English	6.02	62	373	394	10.4	17.8
Grand mean	English	5.20	75	394	435	10.4	17.9

MLU, mean length of utterance; SLD, stuttering like disfluency; NSLD, non-stuttering like disfluency.

non-stuttering like) by the number of syllables in the sample then multiplied by 100 to yield a percentage. We calculated the grand mean by dividing the total number of disfluencies in each category (stuttering and non-stuttering like) by the total number of syllables in each language.

A chi-square (χ^2) analysis was completed to test the association between the frequency of stuttering-like and nonstuttering-like disfluencies produced during a narrative production depending on whether the child was speaking English or Spanish. We were limited to completing this association in the narrative productions only as the stimuli used to elicit the narrations were comparable as were the resulting output across the two languages. Independence would imply that the frequency of stuttering-like and nonstuttering-like disfluencies were comparable across the two languages. Dependence would suggest that instead of being comparable across the two languages, the child's disfluency patterns differ depending on the language the child is speaking. For the narrative production, the child's disfluency frequency was dependent on the language spoken with more stuttering-like disfluencies observed than expected in the Spanish sample and more nonstuttering-like disfluencies observed than expected in the English sample $\chi^2(1) = 9.965$, $p = 0.0002$.

Discussion

In the current study, we examined the speech disfluencies produced by a 6 year, 1-month-old Spanish–English bilingual child who stutters. Specifically, we identified the types and frequency of occurrence of the disfluencies she produced that are considered to be stuttering versus nonstuttering-like in monolingual English speakers (Ambrose & Yairi, 1999). To review, we did not use these monolingual guidelines to confirm stuttering in this child, rather we used these guidelines to lend further support to the critical need for additional data regarding the manifestation of stuttering SE bilingual children. From these guidelines, we compare the disfluent speech production of our participant to the available bilingual SE participant data that have been reported thus far in the stuttering literature.

What types of disfluencies characterize the speech of a Spanish–English bilingual child who stutters?

In comparing the disfluencies our participant produced in Spanish to those produced in Spanish by the other documented cases of SE bilinguals who appear to be and/or were diagnosed as

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stutterers, there are both similarities and differences. Similar to the four children in the Carias and Ingram (2006) study, the present participant produced repetitions and interjections. Comparable to the child in the Howell et al. (2004) study the current participant produced word repetitions, phrase repetitions and part word repetitions (syllable repetitions). Our participant also produced syllable repetitions and sound repetitions similar to the adult male participant in the Ardila et al. (2011) study and the SE bilingual adolescent participants in the Dale (1977) study. In contrast to the participants in the Carias and Ingram (2006) study, the child described by Howell et al. (2004), and the participant in the Ardila et al. study (2011), our participant only produced audible sound prolongations in English; no such productions occurred in Spanish.

In comparing the disfluencies observed in English to previous research with bilingual SE speakers, the present participant produced repetitions and sound prolongations similar to the types produced in English by the participants in the Carias and Ingram (2006) study and the child described by Howell et al. (2004). In addition, our participant exhibited monosyllabic word repetitions, syllable repetitions and sound repetitions such as the adult SE bilingual male in the Ardila et al. (2011) study as well as interjections similar to the SE bilingual children in the Carias and Ingram (2006) study. The disfluencies for the current participant in English are in contrast to the SE bilingual participants in the Dale (1977) study as they did not exhibit disfluencies at all in English.

As noted above, the production of audible sound prolongations (a harbinger of stuttering monolingual English speakers [Conture, 2001]) only occurred in English during the narrative retell. The case studies of other bilingual SE persons who stutter show both the production of audible sound prolongations in both languages (Carias & Ingram, 2006) as well as a higher percentage of audible sound prolongations in Spanish than English (Ardila et al., 2011). Howell et al. (2004) reported that the child they observed produced more ''non-stall'' (sound prolongations, part word repetitions and breaks between syllables) disfluencies in Spanish than English but did not report percentages for each specific type. In the present study, there were three English samples analysed (narrative re-tell, tell and a play sample with the clinician) while there were 6 Spanish samples analysed (narrative retell, tell, two play samples with the clinician and two play samples with the child's parent) which would presumably allow for more opportunity for this disfluency to manifest in Spanish than English, however that was not the case. The language specific manifestation of audible sound prolongations may be unique to this SE bilingual participant further highlighting the variable nature of stuttering which has been well documented in monolingual speakers. This finding warrants further investigation with more data across contexts and with more participants.

In the current case, there is synchrony in the order of frequency of occurrence of disfluencies across languages. That is, although there were differences in the percentages for each disfluency type across languages, the order in which they appeared in both languages in terms of most commonly occurring to least commonly occurring was similar. This similarity across languages is similar to the data presented for the participant in the Ardila et al. (2011) study where the authors reported that disfluencies manifested similarly across languages in terms of most frequently occurring to least frequently occurring in Spanish and English. Further, in the present participant's production of English, the order of frequency of occurrence for disfluency types differed only slightly from what was observed in her Spanish output. In English, she produced more syllable repetitions than phrase repetitions and sound repetitions. In Spanish, she produced more phrase repetitions than syllable repetitions and sound repetitions. However, unlike the present study and also the study by Ardila et al. (2011), Carias and Ingram (2006) found that their 4 SE bilingual participants showed individual patterns of frequency of occurrence of disfluency types for each language with some participants showing more of a certain disfluency type over another in each

language. Potential reasons for these differences such as influences of stuttering severity and language proficiency will be discussed further in this report.

What are the frequencies of occurrence of stuttering and non-stuttering like disfluencies in a Spanish–English bilingual child with stuttering?

Difficulties arise in directly comparing frequency data given the variability with which these frequencies have been calculated. For example, authors have calculated the percentage of disfluencies per number of utterances (terminable units see Ardila et al., 2011 for review), per number of words (Ambrose & Yairi, 1999), per number of syllables (Carlo & Watson, 2003) or have not included details as to the way that disfluency frequencies were calculated (Dale, 1977). Given the morphosyntactic structure of the Spanish language, we calculated percent disfluencies per total syllables. Our participant produced a higher percentage of stuttering-like disfluencies per total disfluencies as well as a higher percentage of nonstuttering-like disfluencies in English than she did in Spanish. This production of more disfluencies in her dominant language concurs with the report by Howell et al. (2004) as the child they observed was more disfluent overall in the dominant language, Spanish, yet conflicts with past research where bilingual speakers were reported to be more disfluent in their non-dominant language (Dale, 1977; Lim, Lincoln, Chan, & Onslow, 2008; Nwokah, 1988). Although our data cannot be generalized to the population of SE bilingual stutterers, this result may highlight an important difference which warrants further study between fluent SE bilinguals and those that stutter.

Stuttering severity (among other factors) may have contributed to the differences noted in the disfluency type and frequency for both languages produced. Using a modified version of the stuttering severity rating scale developed by O'Brian et al. (2004) the present participant's stuttering was considered to be moderate in nature in English as well as in Spanish. Description and/or the associated measurement of stuttering severity is not provided in detail in previous studies. Some authors such as Dale (1977) reported that their participants' stuttering likely began with what would be considered normal language disfluencies such as when trying to remember words and progressed to more severe disfluent speech in Spanish. Dale (1977) further reported that as a result of the pressures from parents to speak fluent Spanish, their speech fluency deteriorated and one participant showed severe stuttering behaviours with accompanied facial grimaces. Bernstein Ratner and Benitez (1985) stated that their 50 year old male participant was a moderate to severe stutterer with no subsequent details provided as to how that severity rating was reached. In addition, Ardila et al. (2011) did not provide a severity rating for the participant but did note that the participant's severity of stuttering had decreased from when he was a child. Carias and Ingram (2006) described their four participants as being highly or moderately disfluent based on rates of disfluencies produced during their study. Table IV on page 155 of the Carias and Ingram (2006) paper describes the overall disfluency rates for the children in the study ranging from ''moderate'' to ''high''. Howell et al. (2004) described their participant as stuttering more severely in Spanish due to the presence of more ''non-stall'' speech behaviours in Spanish than English. This lack of specificity and consistency in the description/analysis of stuttered speech across the limited bilingual data may explain the type/frequency difference between the present study and past similar studies.

Differences in language proficiency between the current participant and bilingual participants previously studied could be another potential factor impacting the differences in the stuttering types observed. Coalson et al. (2013) explored the descriptions of language proficiency across articles pertaining to fluency and bilingualism and found conflicting ways in which participants levels of bilingualism were described. Accurate assessment of language dominance continues to be a challenge for researchers studying bilingual speakers. In the case of the current SE child we

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used available data from the parent interview to calculate the participant's language dominance as this method has been shown to be a reliable indicator of language performance in SE bilingual speakers (Gutiérrez-Clellen & Kreiter, 2003). Her language questionnaire revealed data indicating more English exposure yet formal testing measures indicated stronger performance in Spanish. Closer examination of variables such as language sample characteristics, parent interview, teacher interview and formal language measures should be considered when compiling the linguistic profile for a bilingual child.

In considering these possible sources of information about the linguistic characteristics of a bilingual child, it is possible that the information gathered from these sources indicates mixed language dominance. Mixed language dominance is typically seen in bilingual children that are shifting from demands of the home language to becoming proficient in a second language through school (i.e. a child that comes from a primarily Spanish-speaking home now immersed in an English-speaking classroom; Bedore et al., 2010; Gutiérrez-Clellen, 2002). The latter example may be relevant to the current case study as this child was immersed in an English-speaking classroom at the same time having increased English-speaking relatives present in the home. This shift in language input and opportunities for language output (school) could have played a part in this child's performance on language measures and disfluency characteristics.

In addition to the child's language proficiency, the proficiency of the person or persons who provided the descriptions of the disfluent speech behaviours of the bilingual SE participants have not been provided in past research. Van Borsel and Pereira (2005) discussed the need to provide information regarding the proficiency of individuals making a stuttering diagnosis in the language the client speaks. Individuals making diagnostic decisions about stuttering may differ in their training and cultural background potentially leading to false positive or false negative identifications of stuttering. The authors found that Dutch and Brazilian Portuguese speakers were more accurate in their identification of stutterers in their native language than in clients who spoke the other language highlighting the need for authors to adequately describe the proficiency levels of those making diagnostic decisions about stuttering in a certain language.

Researchers have also attributed a higher MLU to more disfluent speech (Bedore et al., 2006). Bedore et al. (2006) found that typically developing monolingual and bilingual speakers' rate of typical disfluencies was correlated with a higher MLU. In the current case, from a descriptive perspective, the participant was more disfluent overall in English. The participant's MLU was longer in English (MLU English grand mean = 5.2) than in Spanish (MLU Spanish grand mean = 4.4). In addition, higher rates of disfluency were observed in both languages in the samples with the highest MLU. The task for which the child produced the highest MLU for both languages was the narrative task. Detailed analysis of the task demand and the specific role that MLU may have played in the disfluent speech of this participant is beyond the scope of this report because the conversational samples were not equally distributed across languages and in contrast to the narrative productions the conversational interactions varied significantly in context and content. Nevertheless, these findings are noteworthy and should be taken into consideration when evaluating a bilingual stutterer as MLU as the specific task may play a role in the manifestation of disfluent speech of SE bilinguals that stutter.

For the present study, we can however consider the narrative task and the association to stuttered speech in Spanish but not in English. When considering the complexity of the linguistic task coupled with the complexity of the language being spoken, it is not surprising that the present participant's production of stuttering-like speech disfluencies were associated with her narrative production in Spanish not in English. The morphosyntactic structure of Spanish is considered to be more complex than that of the English language (Bedore & Leonard, 2000). In narrative productions, the speaker has to use more elaborated noun phrases to tie multiple actions and characters together and the speaker has to assume sole responsibility for planning and conveying

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the information to the listener (Johnston, 1982; Stadler & Ward, 2005; Westby, 1984). Therefore, it could be argued that narration places maximal linguistic, cognitive and communicative demands on speakers. In fact, recent research in the monolingual English-speaking literature support this argument with children comparable to the age of the child in the present study producing more stuttered speech in the narrative than structured conversation task (Byrd, Logan, et al., 2012). The present participant's production of more stuttering-like disfluencies in her Spanish narrative output would support these arguments regarding the language structure and task but to confirm such a relationship we would need to have a conversational task that is structured to allow for meaningful comparison between the two languages.

Future directions

This case report is part of an ongoing study of bilingual children with confirmed stuttering. We are in the process of recruiting additional children such that we can acquire a corpus of data that can be used to establish diagnostic guidelines for bilingual children. We are also currently completing a multiple baseline study with an alternating treatment design such that both languages are addressed in each session. The data from the current case study and the treatment study in progress are necessary to answer questions pertaining to differences in fluency characteristics between monolingual and bilingual SE speakers. We hope that these descriptive data will enhance our understanding of how stuttering manifests in bilingual SE children which will in turn increase our ability to implement evidence based practice with this rapidly increasing clinical population.

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Conclusion

In this study, we analysed the speech of a Spanish–English bilingual child with confirmed stuttering. Overall, the participant was produced the most disfluencies in the language she used the most, English. She produced more non-stuttering like than stuttering-like disfluencies in both languages, specifically revisions and unfinished words. The participant was also more disfluent in both languages when she completed the tasks for which she produced the longest MLU – the narrative tasks. The participant's production of stuttering-like disfluencies was uniquely associated with her Spanish narrative output. Thus, these preliminary data suggest that the linguistic task and the language spoken during the task may be similarly compromising across monolingual and bilingual speakers but additional research allowing for comparison of disfluencies produced in more structured conversation tasks to disfluencies produced in narrative tasks is warranted. The results of this study add important information about the types and frequencies of occurrence of stuttering and non-stuttering like disfluencies to the limited studies available about bilinguals with confirmed stuttering. This information serves as a platform for additional research with this dataset pertaining to other factors that have the potential to impact fluency such as complexity of utterances, grammaticality and the description of disfluencies in SE speakers that stutter over time.

Requests for access to the experimental version of the Bilingual English Spanish Assessment may be made directly to the first author of the test via email to Dr. Elizabeth Pena lizp@mail.utexas.edu.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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