Identification of Stuttering in Bilingual Spanish English Speaking Children

Courtney T. Byrd, Ph.D. [1], Jennifer B. Watson, Ph.D. [2], Lisa M. Bedore, Ph.D. [1], Anna Mullis, M.A.[1]

The University of Texas at Austin[1],Texas Christian University[2]

IFA 2012 World Congress – Tours, France

Background

- Many of the diagnostic indicators of stuttering in children are based on the study of stuttering in monolingual English speakers. Cross language and bilingual comparisons suggest that the expected rate of disfluency and the types of speech disfluencies that are observed over the course of development are likely to vary both as a function of the language the child speaks and the child's proficiency in that language (Bedore, Fiestas, Peña & Nagy, 2006; Carlo & Watson, 2003; Shenker, 2011; Watson & Anderson, 2001; Watson, Byrd & Carlo, 2011).
- Such variation in bilingual development is often misinterpreted as disorder. Consequently, English language learners are regularly under or over diagnosed as having speech and language disorders (Artiles, Rueda, Salazar, & Higareda, 2005). Some researchers have proposed that a speaker's exposure to two languages may uniquely increase risk for communication impairment.
- For example, Howell, Davis, and Williams (2009) suggested that exposure to a second language prior to 5 years of age may make a child more vulnerable to the development and persistence of stuttering. This suggestion is significantly compromised by the paucity of data regarding the development of normal fluency patterns *and* the manifestation of stuttering in bilinguals.
- Further, although the types of speech behaviors produced by monolingual English and monolingual Spanish children who stutter appear to be somewhat similar (Watson, 2001; Watson et al., 2011), there are data to suggest that the speech behaviors characteristic of stuttering in monolingual children may differ in bilinguals and that the application of those monolingual guidelines to bilinguals may lead to a false positive diagnosis of stuttering (Finn & Cordes, 1997; Carias & Ingram, 2006; Fiestas, Bedore, Pena, & Nagy, 2005).
- Specifically, unlike their monolingual Spanish and monolingual English peers, bilingual Spanish English (SE) children who do not stutter often exhibit an atypically high rate of mazes, which include interjections, repetitions of beginning sounds, and strings of speech (including repetitions) that disrupt the forward flow of speech and do not contribute to the meaning of the message (Bedore et al., 2006; Carias & Ingram, 2006; Fiestas et al., 2005; Mattes & Omark, 1991).
- Given that stuttering is also a disruption in the forward flow of speech, characterized by sound and syllable repetitions, and audible and inaudible speech prolongations (Ambrose & Yairi, 1999), there is potential for misidentification of stuttering that may be unique to bilingual SE children.
- The purpose of the present study is to explore the identification of stuttering in bilingual SE children by bilingual SE speech-language pathologists (SLPs).

Method

- *Stimuli*
- The stimulus materials for this investigation were audio recordings of the narrative productions (in English and Spanish) of a bilingual SE child diagnosed with a stuttering disorder and a typically fluent bilingual SE child matched for age, gender, language dominance, and language abilities.
- The child who stutters and the child who does not stutter produced audio samples with varying lengths and word counts. Since reducing the samples to match exactly for length would have compromised the amount of disfluent speech production allowed for analysis and children do not typically produce samples of equal length to other children, the full production of their samples using the same books and same protocol was analyzed and deemed to be the most ecologically valid choice.
- The child who stutters provided a 7 minute, 16 second audio sample in English consisting of 1055 words; the Spanish sample contained 502 words and was 4 minutes, 9 seconds in duration. The child who does not stutter produced a 4 minutes, 3 second English sample with 297 words and a Spanish sample of 231 words that was 4 minutes, 51 seconds in time length.
- The fourth author coded the following disfluencies (listed in order of frequency of occurrence) in each child's English and Spanish sample: whole-word repetitions (WWR) (i.e., whole word repetitions), sound and syllable repetitions (SSR), revisions (REV), phrase repetitions (PR), interjections (INJ), inaudible sound prolongations (ISP) and audible sound prolongations (ASP). For the Spanish and English samples from each child, percentages for each type of disfluency were calculated based on how many times they occurred over total number of words in the sample (See Table 1).

Table 1. Disfluency data in the English and Spanish narrative samples

	Child who stutters		Child who does not stutter	
	English (297	Spanish (231)	English (1055)	Spanish(502)
WWR	21(7.1%)	14(6.1%)	84 (7.96%)	24(4.8%)
SSR	2 (0.67%)	9 (3.9%)	34 (3.22%)	15 (3%)
REV	16(5.19%)	6(2.6%)	22(2.08%)	10(2%)
PR	7 (2.4%)	2 (0.87%)	27(2.56%)	30 (5.98%)
INJ	3(1%)	6(2.6%)	7(0.66%)	-
ISP	1(0.34%)	1(0.43%)	3(0.28%)	-
ASP	-	-	2 (0.18%)	1 (0.02%)
% TDs	16.7%	16.7%	16.67%	17.82%

Note: WWR-whole word repetition SSR-single syllable repetition; REV-revision; PR-phrase repetition; INJ-interjection; ISP-inaudible sound prolongation ASP-audible sound prolongation

- *Listening and survey tasks*
- Both samples from each child were uploaded to a password-protected "Wordpress" (http://wordpress.com/) webpage so that the participants could easily access, once provided the password, the recordings in any location that had Internet access. To present the recordings in a Wordpress blog page, they were converted into MP3 audio format and uploaded to a private Internet storage space only available to the first and fourth author through a "Soundcloud" (http://soundcloud.com/) page. The samples were labeled as "C1 Audio Clip English", "C1 Audio Clip Spanish", "C2 Audio Clip English" and "C2 Audio Clip Spanish".
- In order to counter-balance the order of listening, half of the participants were instructed to listen to the "C1" clips first and answer related questions, and the other half to first listen to the "C2" clips. Languages of the speakers were also counter-balanced. For example, half of the subjects who were assigned to listen to the "C1" clips first were also assigned to listen to C1's Spanish sample first and then C1's English sample and the other half were instructed to listen to English first, then Spanish.
- Participants were asked to provide a list of any speech characteristics that influenced their decision about the child's level of fluency. Listeners also were asked to rate each child on a 6-point scale ranging from no stutter to severe stutter. After completing the initial questions pertaining to speech characteristics of the first two audio samples, the participants listened to their next assigned two clips and answered the same three questions about the other child.
- Following the listening tasks, participants completed a questionnaire wherein they were required to provide certification status as an SLP, education background in stuttering and in bilingualism, the number of bilingual SE clients they had diagnosed with stuttering, and the number of bilingual SE children who stutter they had treated during their careers.
- Each participant was also asked to provide a self-rating of their confidence in their ability to accurately diagnose children who stutter for English-speaking, Spanish-speaking, and bilingual SE children.

Results

What is the accuracy with which bilingual SE SLPs are able to identify stuttering in bilingual SE children as compared to their years of experience, educational background and clinical experiences?

Table 2. Participant characteristics and accuracy of identification

Participant	YS or AC	YE-BSLP	NC-ST	NC-BI	CL-MS	CL-ME	CL-BSE	NBSE-Dx	NBSE-Tx	Accurately identified CWS	Accurately identified CWDNS
1	2005	10	4	1	3	3	3	~5	~10	N	Y
2	1980	37	5	26	4	4	4	>50	>50	N	N
3	2011	<1	1	3	3	3	2	0	1	Y	Y
4	1998	13	3	5	3	3	3	10	10	Y	N
5	2003	9	3	11	3	3	3	4	~8	Y	N
6	2000	12	>5	>5	4	4	3	30-40	8-10	Y	N
7	2003	9	1	8	3	3	3	7-8	4-5	N	N
8	1st year	-	0	1	2	2	2	0	0	Y	N
9	1997	14	NR	NR	NR	4	4	>30	>30	Y	N
10	1999	15	>10	>10	4	4	4	16	16	Y	N
11	2011	1	3	2	3	3	2	0	1	Y	N
12	1st year	-	0	1	3	2	2	0	0	N	N
13	2009	3	1	7	3	3	2	<5	<5	Y	N
14	2004	8	2	8	3	3	3	15-18	12-15	Y	N

Note: year of current study (YS) or ASHA certification (AC), years of experience working as a bilingual speech-language pathologist (YE-BSLP), number of bilingual undergraduate, graduate and/or continuing education courses related to stuttering (NC-ST) and bilingualism (NC-BI), self-reported confidence level when working with monolingual Spanish (CL-MS) or English-speaking children who stutter (CL-ME) and also bilingual children who stutter (CL-BSE), as well as number of bilingual Spanish-English children who stutter assessed (NBSE-Dx) and treated (NBSE-Tx) thus far in career; CWS = child who stutters; CWDNS = child who does not stutter; Y = yes; N = no.

What is the confidence level with which bilingual SE SLPs rate their ability identify as compared to their actual accuracy?

Table 3. Participant confidence level in ability to accurately identify and accuracy of identification

Participant	English CWS	Spanish CWS	Bilingual SE CWS	Accurately identified CWS	Accurately identified CWDNS
1	GC	GC	GC	N	Y
2	VC	VC	VC	N	N
3	GC	GC	SC	Y	Y
4	GC	GC	GC	Y	N
5	GC	GC	GC	Y	N
6	VC	VC	GC	Y	N
7	GC	GC	GC	N	N
8	SC	SC	SC	Y	N
9	VC	NR	VC	Y	N
10	VC	VC	VC	Y	N
11	GC	GC	SC	Y	N
12	SC	GC	SC	N	N
13	GC	GC	SC	Y	N
14	SC	SC	SC	N	N

Note: NR = no rating provided; SC = sort of confident; GC = generally confident; VC = very confident; CWS = child who stutters; CWDNS = child who does not stutter; Y = yes; N = no.

What are the types of disfluencies (and the associated severity ratings) bilingual SE SLPs take into account when they make clinical decisions about whether or not the child stutters?

Table 4. Speech disfluencies identified and accuracy of identification

	False positive identification	True negative identification	False negative identification	True positive identification
SSR	9 (22.5%)	-	-	6 (15.38%)
WWR	8 (20%)	-	-	5 (12.82%)
ASP	3 (7.5%)	-	-	7 (17.95%)
ISP	4 (10%)	-	-	6 (15.38%)
PR	8 (20%)	1 (50%)	-	7 (17.95%)
REV	6 (15%)	1 (50%)	-	4 (10.26%)
INJ	2 (5%)	-	-	4 (10.26%)

Table 5. Participant severity rating assigned to each child

Severity rating	Child who does not stutter	Child who stutters
No stutter	2 (14.29%)	4 (28.57%)
Mild	5 (35.71%)	2 (14.29%)
Mild-moderate	1 (7.14%)	-
Moderate	6 (42.86%)	6 (42.86%)
Moderate-severe	-	1 (7.14%)
Severe	-	1 (7.14%)

Discussion and Conclusion

- A false positive and a false negative identification was provided by the participant who had been practicing the longest and who had the most extensive clinical and academic background.
- By comparison, the only participant who provided a true negative and true positive rating of the both children was completing his/her clinical fellowship, and had limited experience treating and diagnosing children in this population. However, s/he graduated from a university that offered a bilingual tract hosting a variety of classes on bilingualism as well as a fluency class with the most current evidence-based practice research.
- Thus, these preliminary findings suggest that identification of stuttering in bilingual SE children may be uniquely compromised.
- Further nationwide investigation of identification accuracy, with specific immediate focus on states that have a particularly high prevalence of bilingual children is warranted.
- Above all, these data stress the critical need for collection and dissemination of bilingual fluency data to enhance the cross-linguistic competence and decision-making abilities regarding stuttering in this rapidly growing clinical population.