Speech Disfluencies in Bilingual Lebanese Speakers: Preliminary Findings

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1. Introduction

More than half of the world population is bilingual. However, research on the diagnosis and intervention of fluency disorders primarily concerns the monolingual population. It is nevertheless important to know whether early exposure to many languages has a permanent impact on the fluency of young children. Some researchers found that bilingual children had an increased risk of stuttering compared to monolingual children (Howell et al., 2009). However, such findings are rare and typically based on small samples. Theoretically, the diagnosis of stuttering is based on the type and frequency of disfluencies (Conture, 2001). Disfluencies are usually divided into 'stuttering-like disfluencies' (SLD), i.e., part-word repetitions, and 'other disfluencies' (OD), i.e., phrase repetitions. Speech disfluencies typically occur in all children (Ambrose & Yairi, 1999; Eggers & Elen, 2018), but children with 3 or more SLD per 100 syllables or words of speech are typically diagnosed as children who stutter (CWS) (Ambrose & Yairi, 1999; Conture, 2001; Yairi & Ambrose, 2013). This internationally used 3%-criterion is primarily based on data from monolingual, English-speaking children. Bilinguals who speak a variety of languages may produce a higher rate of mazes, (Bedore et al., 2006) and are more likely more likely to experience an increased level of linguistic uncertainty (Byrd et al., 2015). Pilot data in English- Spanish (Byrd et al., 2015) and Yiddich-Dutch (Eggers et al., in prep.) show that bilingual children produce significantly more SLD than what is considered indicative of stuttering in monolinguals, and that speech-language pathologists have difficulty in distinguishing between typical and abnormal disfluencies of bilinguals. It is therefore very likely that bilingual children are at risk of being wrongly identified as CWS (Byrd et al., 2015). Researchers and clinicians have been discussing the cross-linguistic characteristics that can differentiate bilingual CWS/CWNS from their monolingual stuttering and non-stuttering peers (Finn & Cordes, 1997; Roberts & Shenker, 2007). The recurring theme remains the critical need for empirical-based data on the linguistic disfluencies of non-stuttering bilinguals in each of their two languages (Tetnowski et al., 2012). Therefore, the current project's aim with bilingual Lebanese CWNS to study speech disfluencies in a significantly larger group than typically used in other studies clearly fulfills a need.

2. Participants

The participants were recruited through an open call sent to private schools of different areas of Lebanon. The inclusion criteria for CWNS were (a) speaking 2 languages, (b) no parental or teacher concern regarding stuttering, (c) age equivalent speech-language skills based on PABIQ questionnaire, teacher's observation and the finding of the Ph.D. student through the samples analysis, (d) no parental or teacher concern regarding learning abilities, (e) no family history of stuttering and (f) no history of speech-fluency intervention or psychotherapy intervention.
After obtaining parents' agreements, 30 Lebanese bilingual CWNS were recruited between January and April 2019. They were divided equally into 2 age groups (5;00-5;11 and 6;00-7;00). All of them speak Lebanese Arabic and French. 29 participants were dominant in Lebanese Arabic compared to French, and 1 was a balanced bilingual according to the *PABIQ* questionnaire results.

Age & Gender

	Participants	Range	Average age	Min.	Max.	S.D.
G1	15 (8M, 7F)	60.00 – 71.00	67.33	61.00	71.00	7.57
G2	15 (7M, 8F)	72.00 – 84.00	79.33	73.00	84.00	4.16
Total	30 (15 M, 15 F)	60.00 – 84.00	73.28	61.00	84.00	7.07

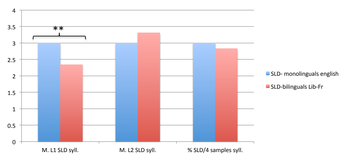
Pabiq – Language input and output
Lib-FR CWNS ($M_{(Lib)}$=70.97%, *SD=10.1;* $M_{(Fr)}$=34.88%, *SD=10.12;* $M_{(Eng)}$=10.12%, *SD=13.19*). Accordingly, all participants were fluent in Lebanese and French, with higher language dominance in Lebanese compared to French. A few participants had also a minor exposure to English language, insufficient for communication. The whole group was therefore labeled as Lib-FR, with dominance for Lebanese.
Pabiq – No Risk index score in Language
According to *Pabiq* questionnaire, a child is considered to have unremarkable language skills if he obtained a score ≥19 on the *No Risk Index*. Lib-FR CWNS: *M=22.3, Min=19, Max=23, SD=1.24*. In addition, all participants had no known or reported hearing, neurological, developmental, academic, intellectual or emotional problems.
Parents' SE level
Mothers number of years of education (*M=15.97, SD=1.96*), Fathers number of years of education (*M=14.69, SD=2.78*).

3. Measures and Materials

The *Parents of bilingual children questionnaire* PaBiQ was administered to all bilingual children (Tuller, 2015). The questionnaire allows for the following assessments: (1) No risk for language disorders index, (2) Quantity and quality of early exposure before the age of 4, (3) Exposure duration to each language, (4) Parent's estimation of the child's current language abilities, (5) Comparison between the quantity and the quality of exposure to each language, and (6) the current use of languages. By the end, a final score was obtained to determine language dominance. The disfluencies of the participants were analyzed on the basis of narrative and spontaneous samples. A telling and a spontaneous speech sample were collected for each language via video recordings (min. 100 words). For the telling elicitation, two different *Frog stories* were used, one for each language: *Frog goes to dinner and Frog on his own*. To avoid bias, half of each group started with L1 and the other half with L2, and *vice versa*. The language used per book was also counterbalanced for each group to avoid the bias of difference in story complexity. Two examiners interviewed each child the same day, one for each language. After collecting videos, the speech samples were transliterated. Based on Byrd et al. (2015) and Yairi and Ambrose (1999), the disfluencies were categorized as following: SLD (MonoWR, SndR and SylR, and dysrhythmic phonation: P, B and BW), OD (UW/S, PhR, I, MultiWR), and revisions.

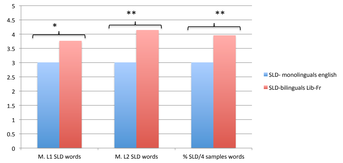
4. Results

Figure 1: SLD per number of syllables



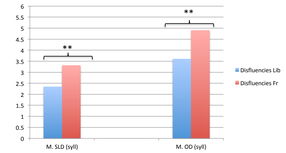
Lebanese Ar-Fr speaking participants scored on average 2.83% of SLD (per number of syllables) on the 4 collected samples (t=-.759, p=.454), and 2.34% of SLD in their L1 (t=-2.821, p=.009). In their L2, they obtained 3.31% of SLD with no statistical difference (t=1.074, p=.292).

Figure 2: SLD per number of words



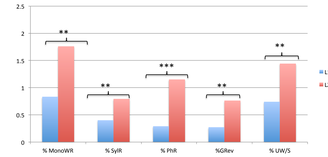
Lebanese Ar-Fr speaking participants scored on average 3.9% of SLD (per number or words) on the 4 collected samples (t=3.104, p=.004), 3.75% of SLD in their L1 (t=2.14, p=.041) and 4.14% in their L2 (t=3.1, p=.004).

Figure 3: Difference between the means of % of SLD & OD in L1 & L2



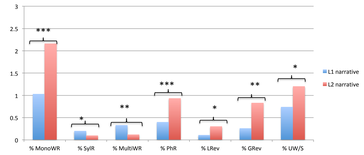
Lebanese Ar-Fr speaking participants obtained on average 2.34% of SLD in their L1 (min=.537, max=7.01, Std.D=1.27) and 3.31% of SLD in their L2 (min=.726, max=7.16, Std.D=1.6). The Wilcoxon test indicated a significant difference (Z=-3.03, p=.003). They scored an average of 3.6% of OD in their L1 (min=1.21, max=9.16, Std.D=1.77) and 4.98% of OD in their L2 (min=1.3, max=9.2, Std.D=2.21). The Wilcoxon test indicated a significant difference (Z=-3.36, p=.001).

Figure 4: Differences in the types of disfluencies L1 sp/L2 sp



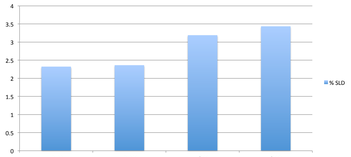
Lebanese Ar-Fr speaking participants showed significant differences between L1 and L2 for the following types of disfluencies in their spontaneous speech: % MonoWR L1 sp/L2 sp (Z=-3.34, p=.001), % SylR L1 sp/L2 sp (Z=-3.20, p=.001), % PhR L1 sp/L2 sp (Z=-3.5, p=.000), % GRev L1 sp/L2 sp (Z=-2.77, p=.006) and % UW/S L1 sp/L2 sp (Z=-3.15, p=.002).

Figure 5: Differences in the types of disfluencies L1 /L2 nar



Lebanese Ar-Fr speaking participants showed significant differences between L1 and L2 for the following types of disfluencies in their narrative samples: % MonoWR L1 nar/L2 nar (Z=-3.9, p=.000), % SylR L1 nar/L2 nar (Z=-1.86, p=.063), % MultiWR L1 nar/L2 nar (Z=-2.72, p=.006), % PhR L1 nar/L2nar (Z=-4.26, p=. 000), % LRev L1 nar/L2 nar (Z=-2.09, p=.036), % GRev L1 nar/L2 nar (Z=-3.29, p=. 001) and % UW/S L1 nar/L2 nar (Z=-2.23, p=.025).

Figure 6: Comparison of % SLD between nar and sp speech in L1 and L2



Lebanese Ar-Fr speaking participants showed no significant differences between narratives and spontaneous speech samples in their L1 and L2: % SLD L1 sp/% SLD L1 nar (Z=-3.81, p=.704), %SLD L2 sp/%SLD L2 nar (Z=-1.26, p=.206).

Figure 7: Correlation between the percentage of disfluencies and age

		Age months	Percentage OD – L1 Sp Syll.	Percentage OD – L1 Frog Syll.	Percentage OD – L2 Sp Syll.	Percentage OD – L2 Frog Syll.
Age months	Correlation Coefficient	1.000	-.149	-.163	.000	-.258
	Sig. (2-tailed)	.	.431	.388	.999	.168
	N	30	30	30	30	30

		Age months	Percentage OD – L1 Sp Syll.	Percentage OD – L1 Frog Syll.	Percentage OD – L2 Sp Syll.	Percentage OD – L2 Frog Syll.
Age months	Correlation Coefficient	1.000	-.149	-.163	.000	-.258
	Sig. (2-tailed)	.	.431	.388	.999	.168
	N	30	30	30	30	30

The Spearman test showed no correlation between age and %SLD, and age and %OD.

5. Discussion

The present study is the first one to be conducted on Lebanese-French bilingual CWNS. There were four main findings. First, the current findings are consistent with Byrd et al.'s findings (2015) in that CWNS exceeded the diagnostic criteria of 3% SLDs (Ambrose & Yairi, 1999) in all their speech samples, when the percentage of SLDs was calculated on the basis of the number of total words (Conture, 2001), as in Byrd's studies. Second, there was a significant difference in %SLD and in %OD as a function of language dominance: all children produced significantly more SLD and OD in French (L2) than in Lebanese (L1). Specific to the types of disfluencies, the participants exhibited significantly more MonoWR, SylR, PhR, GRev and UW/S in their spontaneous speech in French than in Lebanese. With regards to the narratives, they exhibited significantly more MonoWR, PhR, LRev, Grev and UW/S in French than in Lebanese. The current findings are in line with other studies that report an increased level of stuttering in the non-dominant language (e.g., Lim et al., 2008), although opposite findings are reported as well (e.g., Jayaram, 1983). Third, there was no difference in disfluencies between narratives and spontaneous speech samples, for both L1 and L2. Other studies have reported more SLDs in narratives than in spontaneous speech for CWS and CWNS (Byrd et al., 2012). Future research including more children and different language dominance groups should allow a better understanding of the influence of the type of language elicitation on the production of SLDs in bilinguals. Fourth, the current data did not show any correlation between age and the percentage of ODs, similar to Ambrose and Yairi's findings (1999). In addition, no correlation was found between age and the percentage of SLDs, contrary to Ambrose and Yairi's findings. However, our bilingual participants were aged between 5;00 and 7;00, while Yairi and Ambrose monolingual participants were aged between 2;00 and 5;00, so the results are not directly comparable.
Overall, the current findings provide interesting empirical data supporting the need to consider different factors in order to diagnose stuttering in bilinguals in general. In addition, further research is needed to better understand the manifestations of speech disfluencies in typically developing bilingual children. These findings also support previous studies conducted by Byrd and Eggers warning SLPs against using the 3% criterion established for monolingual English speaking children, when working with bilingual children. The current project will be continued including the following: expanding the sample size, adding children who stutter, and considering different language dominance groups.

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