

Code-switching in Bilingual Children With and Without Language Disorders

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ABSTRACT

Due to increasing linguistic diversity across caseloads in the United States, it is important for speech-language pathologists (SLPs) to understand code-switching as it relates to typically developing children and children with language disorders. When analyzing language samples, SLPs may be unsure of how to analyze samples when code-switching is present. Because children with language disorders demonstrate difficulty with grammar, syntax, and vocabulary, this may impact the patterns of code-switching that we see in their everyday language. Much of the research on bilingualism involves typically developing children. This presents challenges when appropriately assessing bilingual children with language disorders or other communication deficits. This study aims to address code-switching as it relates to bilingual children with and without language disorders, to appropriately address ramifications for assessment and treatment.

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Introduction

According to Census data from 2018, approximately 18.3% of the United States population is of Hispanic or Latino descent. Children growing up in these Latino homes are often exposed to both Spanish and English either simultaneously (learning both language 1 (L1) and language 2 (L2) from birth) or sequentially (learn L1 from birth and then are exposed to L2 later in their development). Most bilingual children in the United States are exposed to their parent's native language at home and then, as they enter the education system during preschool and Kindergarten, are exposed to English through their teachers and peers (Lee, 2013).

Bilingual speakers often engage in code-switching. Code-switching is a linguistic behavior involving the alternation of one language to another within discourse, sentences, or phrases (Poplack, 1980). Spanish-English code-switching is the most common type of code-switching in the United States due to the growing Hispanic population. However, code-switching can also occur at the dialectal level (Terry et al., 2010). A common example of dialectal code-switching in the United States is code-switching between African American Vernacular English and Standard American English. There are various ways to code-switch as well as various languages that can be exchanged.

When describing adult code-switching patterns, researchers have analyzed these behaviors from a sociolinguistic lens or how societal implications impact language behavior (Poplack, 1980) (Myers-Scotton, 1993). Socioeconomic status, education level, gender, and religion are examples of sociolinguistic factors. Communication partners, context, and topics are all factors that impact code-switching (Heredia & Altarriba, 2009). When conversing with peers, an individual may choose a word that is better explained in one language over

another, which enhances the meaning of the message and caters to the listener's comprehension. One must also consider the context of the code-switch. An individual may not code-switch with all communication partners and may not code-switch in every conversational setting. Proficient speakers must consider the listener's knowledge of both languages, where the code-switching is taking place, and the potential stigmatization of code-switching (Heredia & Altarriba, 2009).

There is debate as to whether children code-switching and adult code-switching derive from the same factors (Montanari et al., 2019). This raises the question as to whether children are aware of these sociolinguistic factors when code-switching or if code-switching is simply related to multilingual language development. Some researchers have coined the term code-mixing which is the fusion of two grammatical systems (Quin Yow et al., 2016). From this perspective, children are not aware of the grammatical systems of each language that they are producing, therefore implying that code-switching is not deliberate or systematic (Quin Yow et al., 2016). Previous research has argued that children may code-switch to fill in language/lexical gaps when using their non-dominant language. However, current research has suggested that code-switching is not an indication of language insufficiency, but rather a normal and systematic behavior that conforms to grammatical constraints of language (Quin Yow et al., 2016).

Meisel (1994) suggests that children may begin code-switching as early as two years old. Therefore, code-switching behaviors coincide with a bilingual child's language development as they develop skills in both languages. Some proposed theories of code-switching in children suggest that code-switching may be related to language loss, as children become more proficient in one language due to a discrepancy in exposure between the two

languages. Other theories suggest that children as early as 2.5 years old emulate the speaking patterns of their communication partners, therefore imitating patterns of code-switching that they are observing. All in all, an overarching theory of code-switching patterns in children is still up for debate (Quin Yow et al., 2016).

It is important to acknowledge that there are additional schools of thought that analyze code-switching from other viewpoints besides sociolinguistic contexts. Psycholinguistic research focuses on the cognitive mechanism and knowledge structures underlying specific language patterns. For example, Koostra (2015) suggests that languages can never be completely turned off, indicating that a bilingual speaker is cognizant of both languages even if only one is being spoken at a time. On the other hand, structural research analyzes code-switching as it relates grammatical patterns and constraints of code-switching (Koostra, 2015).

Purpose

Due to increasing linguistic diversity across caseloads in the United States, it is important for speech-language pathologists (SLPs) to understand code-switching as it relates to typically developing children and children with language disorders. When analyzing language samples, SLPs may be unsure of how to analyze samples when code-switching is present. Because children with language disorders demonstrate difficulty with grammar, syntax, and vocabulary, this may impact the patterns of code-switching that we see in their everyday language. Much of the research on bilingualism involves typically developing children. This presents challenges when appropriately assessing bilingual children with language disorders or other communication deficits. This study aims to address code-

switching as it relates to bilingual children with and without language disorders, to appropriately address ramifications for assessment and treatment.

Bilingual Children with Language Disorders

The American Speech-Language-Hearing Association (ASHA) defines a language disorder as “a significant impairment in the acquisition and use of language across modalities due to deficits in comprehension and/or production across any of the five language domains (i.e., phonology, morphology, syntax, semantics, pragmatics).” Other terminology used to describe language disorders includes specific language impairment (SLI) and developmental language disorder (DLD). Both monolingual and bilingual children may present with a language disorder. Overall, bilingual children with language disorders are still able to develop both languages but will do so much less efficiently than bilingual children without language disorders (Kohnert, 2010).

In order to properly diagnose a bilingual child with a language disorder, it’s important to understand how these children differ from their typically developing bilingual peers. Research shows that there are measurable differences between narrative samples of typically developing children and children with language disorders. These discrepancies are found in both the macrostructure (elements of story, character, setting) and microstructure (grammar, syntax, morphology) of children’s narratives. Children with language disorders lack elements of story grammar (Govindarajan & Paradis, 2019) and proper use of syntax and morphology (Altman et al. 2016). Research also shows narrative assessments are good tools for assessing bilingual children. By comparing narratives of typically developing children and children with language disorders, one can establish discrepancies in the child’s language skills related to microstructural and macrostructural elements.

Code-switching

Code-switching may occur at the intrasentential level (within the sentence) or at the intersentential level (between sentences) (Smolak et al., 2019). It is also common for children to only code-switch single words within an utterance (insertional). Typically, bilingual speakers use a combination of these types of code-switching when communicating. This study examined five different types of code-switching to determine if there were differences in patterns of use across groups. This included three overarching categories of code-switching (intrasentential, intersentential, and insertional) with alternational and “other” code-switches falling under the category of intrasentential.

The category of intersentential switches involves code-switching across two or more sentences/phrases. In this case, an individual produces a sentence/utterance in one language and the next sentence/utterance in a different language.

Example of intersentential code-switching (Bail et al., 2015): I like the red house! //
A ti cual te gusta (which do you like?)?

The category of intrasentential code-switches contain switches that occur when a speaker switches language within a sentence or phrase. Intrasentential code switching can occur within a sentence at various phrase and clause boundaries (alternational code-switches) but can also occur at random within the utterance (other code-switches). “Other” code-switches are more random in nature, occur at natural language boundaries, and do not follow a typical pattern compared to the rest. Therefore, alternational and “other” code-switches fall under this category. During analysis of transcripts, children produced utterances that contained code-switched dialogue of characters from their stories. As this was an entire clause or phrase, the term alternational dialogue was denoted to code this unique type of

code-switch in the samples. The following example is an utterance that contains a prepositional phrase alternational switch, which is a type of intrasentential code-switching.

Example of intrasentential code-switching (Poplack 1980): Después viví en la ciento diecisiete (Then I lived on 117th) // with my husband.

Insertional code-switching is the last category characterized by single word switches. For example, noun switches are single word switches and typically the most common type of code-switch that a child produces (Gutierrez et al., 2009). The following example is an utterance that contains an insertional code-switch.

Example of insertional code-switching (Poplack 1980): Leo un (I read a) // magazine.

Grammatical Constraints of Code-switching

Poplack (1980) proposed that grammatical constraints could explain linguistic factors behind code-switching. Poplack's (1980) theory of code-switching is governed by a set of grammatical constraints that an adult speaker follows when switching from one language to another. This theory includes two major code-switching constraints: the equivalency constraint and the free morpheme constraint. The equivalency constraint states that code-switches occur at points where juxtaposition of L1 and L2 elements do not violate a syntactic rule of either language, meaning that code-switching should follow the syntactic rules of both languages. The free-morpheme constraint states that "codes may be switched after any constituent in discourse provided that constituent is not a bound morpheme" (Poplack 1980). Therefore, a code-switch cannot occur between a bound morpheme and its free morpheme. All other code-switches at the morpheme level are permissible.

Poplack's theory of code-switching was one of the original theories that described the grammaticality of code-switching behaviors. With continuing data collection and analysis of

code-switching, other studies have shown that Poplack's constraints are perhaps outdated, showing data that frequently contradicts these constraints (Mueller & Cantone, 2009).

Code-switching in typically developing children

Smolak et al. (2020) studied the trajectory of code-switching behaviors in both Spanish-English bilingual children and French-English bilingual children with typical language development from ages two to three. While French and English have equal language prestige in Canada, Spanish and English are unequal in the United States, with English carrying more prestige. This study characterized code-switching as a behavior that is governed by grammatical constraints, can occur within or between utterances, and can vary across contexts. Smolak et al. (2020) addressed language status as a factor of code-switching with English having more prestige over Spanish in sociolinguistic contexts. That is, they found that children were code-switching more to English than to Spanish as children aged. However, the French-English children were more likely to code-switch from French to English than from English to French at 37 months of age which suggests language prestige as a difference across groups as hypothesized by the researchers.

One of the original hypotheses was that language and morphological complexity may drive code-switching behaviors, but their findings indicated that language proficiency, socio-economic status, and exposure are better indicators of code-switching in children (Smolak et al., 2020). Overall, this study found that both French-English and Spanish-English bilingual children children between two and three years decreased in their use of intersentential switches and increased their use of intrasentential switches with age.

Because adults code-switch in a variety of contexts and manners, it is likely that their children are also exposed to code-switching. Bail et al. (2015) offered four possibilities that

explain how children are exposed to code-switching from an adult model (their parents). First, adults may avoid code-switching to avoid confusion when speaking to their children. Another possibility is that parents may still code-switch in front of their children, but to a different degree than normal. Because intrasentential code-switching requires more processing demands, parents may opt to produce more intersentential code-switches in the presence of their child. A third alternative is that parents and caregivers use code-switching as a way of teaching vocabulary translations across both languages. For example, parents may present one sentence in English and then follow with the Spanish equivalent to establish and reinforce the connection in meaning. This possibility embraces the benefits of code-switching to promote language development in both languages. The final alternative is that parents do not avoid or alter their code-switching behaviors at all, therefore fully exposing their children to all types of code-switching. Adults' behaviors play a critical role in their child's language development. For children to begin code-switching, they must have observed this behavior from their parents, siblings, etc.

Current research on code-switching of children with DLD

There is debate as to whether a child code-switching is a result of limited language knowledge or a sign of high language proficiency in both languages. Montanari et al. (2019) suggest that adults code-switching, and children code-switching are two different behaviors altogether. Because bilingual adults typically have advanced language proficiency in both languages, they adhere to the grammatical constraints of code-switching. Research shows that the higher the proficiency in a language, the more advanced types of code-switching will occur (Montanari et al. 2019). Therefore, bilinguals with high proficiency are more likely to produce intrasentential code-switches, which is a more advanced type of code-switch

(Montanari et al., 2019). Children, when compared to adults, do not have high proficiency in both languages because they are still developing both languages. According to this perspective, children code-switch when one language is not sufficient to communicate.

Montanari et al. (2019) examined language mixing patterns of 26 typically developing Spanish-English dual language learners from the beginning of preschool to one year later. Through the collection of language samples in monolingual contexts in each language, researchers compared the number of intrasentential versus intersentential code-switches at both age levels to examine if language proficiency was related to the complexity of the code-switch. The results of this study showed that the participants code-switched to both languages at proportionate rates. However, the Spanish dominant children began to produce more intrasentential code-switches as their proficiency increased. On the other hand, the English dominant children had less switches as age increased, possibly due to the increased language exposure at school.

Gutierrez et al. (2009) hypothesized that code-switching characteristics of children with language disorders would differ from their typically developing peers. Language samples were collected from 58 Spanish-English speaking children with and without language disorders. Of these approximately six-year-old children, eighteen of these children had DLD. Both narrative and conversational samples were collected from children. Overall, the proportion of code-switched utterances was low, regardless of context or language ability. Both groups of children produced relatively the same amount of code-switches regardless of context. Regarding language dominance, English dominant children produced more code-switches when the sample was elicited in Spanish compared to Spanish dominant children tested in English. When comparing the number of code-switches between both groups, there

was no significant difference between groups. Both groups also used noun switches more than any other type of code-switches, with code-switches at the conjunction level being the second most common type (Gutierrez et al., 2009).

Overall, this study demonstrated that there were no significant differences in code-switching behaviors between typically developing children and children with language disorders. Because this sample showed a small proportion of code-switching, it is possible that with a larger data set there would be a more significant difference between typically developing children and children with specific language impairment.

The purpose of this current study is to determine if there is a difference in code-switching patterns between typically developing children and children with language disorders. By calculating the frequency of different types of code-switching across groups, this will assist in determining the underlying processes related to code-switching in bilingual children. This approach analyzes code-switching from a structural perspective, focusing on the form of code-switching as it relates to lexical and syntactic boundaries.

Research Questions

1. Is there a difference in the frequency of production of intrasentential and intersentential code-switches between children with language disorders and children with typical development?

Hypothesis: Both groups of children will use more intrasentential code-switches than intersentential code-switches because as they age, bilingual children decrease use of intersentential code-switching and increase use of intrasentential code-switching (Smolak et al., 2019).

2. Do children with language disorders use more insertional code-switches than typically developing children?

Hypothesis: Since children with language disorders typically have a limited lexicon compared to typically developing children, children with language disorders will use more insertional code-switches.

3. Is there a difference in the frequency of productions of alternational code-switches produced by children with language disorders and children with typical development?

Hypothesis: Typically developing children will produce more alternational code-switches due to their more advanced language skills. (Montanari et al., 2019)

4. Do children with language disorders use more “other” code-switches than typically developing children?

Hypothesis: Since children with language disorders typically have limited grammar skills, they have difficulty understanding natural grammatical boundaries (phrases/clauses) and are more likely to produce “other” code-switches.

Method

Participants

The participants in this study included 98 (44 females; 54 males) bilingual children (English and Spanish) from Houston, TX and surrounding suburbs. The children, ranging from four to eight years old, were recruited through school district and city events. Of these children, 64 were characterized as typically developing (TD) ($M = 6;3$ years old, $SD = 11.66$) and 34 children were characterized as language disordered (DLD) ($M = 5;3$ years old, $SD = 9.108$). The difference in age was statistically significant ($t(96) = 4.94$, $p = .001$) with the TD group comparably older than DLD group. Prior to this study, all children

passed an otoacoustic emission test and scored at 70 or higher on the Non-Verbal Scale of the Kaufman Brief Intelligence Test 2 (KBIT-2, Kaufman & Kaufman, 2014). Results of the independent t-test indicate no statistically significant differences between the TD and DLD group for KBIT-2 standard scores ($t(96) = -0.34, p > .05$). Next, children completed receptive language assessments in both Spanish, Test de Vocabulario en Imágenes Peabody (TVIP, Dunn, 1986), and English, Peabody Picture Vocabulary Test 4th Edition (PPVT-4, Dunn & Dunn, 1981), to evaluate their vocabulary skills. Results of the independent sample t-tests indicated that there were significant differences for TVIP standard scores ($t(96) = 3.89, p = .001$) and PPVT-4 standard scores ($t(96) = 4.54, p = .001$), indicating that the TD group tended to score higher than the DLD group for both Spanish and English. Table 1 lists descriptive statistics for various language assessment measures across groups.

Participants 6;11 years old or younger completed the Bilingual Spanish-English Assessment (BESA, Peña et al., 2018) while children between 7 and 8;11 years old completed the BESAME morphosyntax subtest. These tests were used to categorize participants as TD or DLD. The BESA and the BESAME morphosyntax subtest include a cloze task and a sentence repetition task. Following diagnostic criteria from the manual, children were categorized as DLD using the cutoff scores suggested in the manual. Children scoring above the cutoff score were categorized as TD.

Language Sampling

The data used in the study was originally collected for a longitudinal study analyzing language samples of bilingual children from 2018 and 2019. During the data collection stage, four language samples were collected from each child. On the first day, two narrative samples were collected in the 1st language, a story retell and a story generation. Based on the

language of elicitation, the research assistant prompted the child to complete the task in the corresponding language. Children listened to a script sample of the stories, either “Frog Goes to Dinner” or “Frog on His Own,” while following the pictures in the books. Script samples were chosen from the Systematic Analysis of Language Transcripts (SALT) website and chosen at random for each child. After listening to the sample, the child was prompted to retell the story in their own words. Next, the child was provided with another frog book and prompted to tell their own version of the story. During both samples, the research assistant provided reminders to speak in the target language if the child frequently code-switched to the other language. On a separate day, the child completed an additional story retell and story generation in the 2nd language using the same protocol listed above. Story retells and story generations were included on the same SALT transcript in the corresponding language.

SALT Coding

SALT transcripts were first analyzed in both languages based on total number of utterances, MLU in words, number of total words, and total number of different words. For Spanish samples, results of the independent sample t-tests indicated significant differences for MLU in words ($t(96) = 5.75, p = .001$), number of total words ($t(96) = 3.92, p = .001$), and number of different words ($t(96) = 3.96, p = .001$). Similarly, to Spanish, results of the independent sample t-tests for English samples indicated significant differences for MLU in words ($t(96) = 6.77, p = .001$), number of total words ($t(96) = 6.16, p = .001$), and number of different words ($t(96) = 5.34, p = .001$). Table 2 lists descriptive statistics for SALT data. This indicates differences between DLD and TD for MLU in words, number of total words, and number of different words across both languages with the TD group outperforming the DLD group.

All instances of code-switching from both groups were audiotaped, transcribed, and coded using SALT software. Initially research assistants only coded for utterances containing code-switching by finding utterances that contained words/phrases other than the language of elicitation. Code-switches were coded based on whether they were intersentential (whole utterance) or intrasentential (part of an utterance). Utterances were then coded as single word switches (insertional switches) or switches at phrase/clause boundaries (alternational switches) which are characteristic of natural language boundaries. These natural language boundaries include various types of phrases and clauses such as prepositional phrases and independent clauses. After determining if a code-switch was insertional or alternational, code-switches were further coded based on the part of speech of where the code-switch began, whether that be a noun, a verb, an adjective, etc.

Code-switches that did not fall into any of these categories were marked as “other.” In the samples, there were code-switches that contained more than one word and/or did not occur at a natural language boundary. These code-switches were also marked as “other.” If a child code-switched more than four times in one utterance, or a child code-switched within a code-switch (insertional within alternational) the utterance was also marked as “other.” Finally, if a child expressed confusion within an utterance with a code-switch or produced an utterance with a code-switch so agrammatical or unintelligible that its meaning was too difficult to decipher, these were also marked as other. Appendix A provides detailed explanations of each type of code-switch in addition to examples found in the samples.

Reliability

To ensure that the language samples were transcribed accurately based on the child’s utterances (transcription reliability), bilingual research assistants transcribed audio recordings

on SALT. Three separate research assistants transcribed the samples: two research assistants transcribed the samples independently of each other, and the third decided any discrepancies between the two. Then for coding reliability, a separate bilingual research assistant independently coded 20% of the language transcripts in each language on SALT to obtain transcription reliability. The research assistant was first trained on the coding procedures described above and coded 20% of the samples in each language. Transcription reliability was calculated by averaging the percentage accuracies for each transcript. Reliability for English was 99% and for Spanish was 99%.

Analytical Approach

A 2x2 ANOVA factorial design was used to estimate differences between groups (TD vs DLD) and within-differences between type of code switch in each language. For all factorial designs, chronological age in months was included as a covariate since there was a statistically significant difference in age between the children with DLD and TD. Bivariate correlations were also calculated to estimate the relationship between the proportion of codeswitch by type and measures of language ability and receptive vocabulary in each language. All analyses were conducted in SPSS 27.

Results

Of the 98 participants in this study, 76 children code-switched at least one time in either Spanish or English. Combined, 10.12% of the total utterances in both languages were code-switched. During Spanish elicitation samples, 63 children code-switched from Spanish to English at least one time while only 36 children code-switched from English to Spanish during English elicitation. The proportion of code switches over total number of utterances was calculated for each language. However, the overall proportion of codeswitching from

English to Spanish (11.57%) was relatively the same as the proportion of code-switching from Spanish to English (8.83%). Overall, more children code-switched from Spanish to English, but both groups of children code-switched at a similar frequency. When comparing patterns between the TD group and DLD group, the data showed that the children with TD were less likely to code-switch at all while the DLD group was more likely to code-switch in both languages.

The first research question aimed to determine which type of code-switch (intrasentential or intersentential) was produced more often by children with DLD or TD. Table 4 shows descriptive statistics for intrasentential and intersentential code-switches by language and by group. The results of the 2x2 ANOVA indicated that there was a non-significant difference between the proportion of intrasentential and intersentential code-switch, ($F(1,95) = .485, p = 0.488$), a non-significant difference between Spanish and English, ($F(1,95) = .235, p = 0.629$), and a non-significant interaction between language and type of code switch, ($F(1,95) = 1.315, p = 0.254$). In addition, there was a non-significant difference between children with TD and DLD, ($F(1,95) = 3.271, p = 0.074$). Therefore, children with and without DLD tended to use both intrasentential and intersentential code-switches at about the same rate in both languages.

The next question aimed to determine the difference in insertional code-switching between children with TD and children with DLD. The results of the 2x2 ANOVA showed a non-significant main effect of language, ($F(1,95) = .136, p = 0.713$), suggesting that insertional codeswitches occur at similar rates between the languages (Spanish = 4.9%, English = 5.12%), a non-significant

between group effect ($F(1,95) = 1.287, p = 0.259$), suggesting that children with TD and DLD produced similar code-switches when both languages are taken together, but a significant interaction between language and group, ($F(1,95) = 6.641, p = 0.012$), suggesting that the DLD group produced significantly more insertional code-switches in English than the TD group.

The relationship between insertional code-switches and vocabulary was further explored using correlations. Correlation tests compared the total proportion of insertional code-switches in Spanish and English to standard scores from TVIP (Spanish) and PPVT-4 (English) vocabulary standard scores. For Spanish language samples, there was a positive correlation between PPVT-4 (English) scores and insertional code-switches ($r = .215, p < .05$). This means that as PPVT-4 (English) scores increased, the number of insertional code-switches from Spanish to English also tended to increase. However, there was no significant correlations between TVIP (Spanish) scores and insertional code-switches.

It is important to consider that there are statistically significant differences between TD and DLD for receptive language skills as indicated by the TVIP (Spanish) and the PPVT (English) with TD scoring higher than DLD. Interestingly, the correlation between the proportion of insertional code-switches by the number of utterances in Spanish and English were significantly correlated ($r = .396, p < .001$), suggesting that children who used insertional codeswitching in one language tended to also use it in the other language. Table 9 lists all the different types of insertional code-switches. Insertional nouns were the most common type of code-switch from Spanish to English, while insertional determiners were the most common type from English to Spanish. The most frequent type produced in both languages were insertional conjunctions

The third question aimed to determine if there is a difference in the frequency of productions of alternational code-switches produced by children with language disorders and children with typical development. The results of the 2x2 ANOVA showed non-significant effects for language, $F(1,95) = .020, p = 0.888$, group, $F(1,95) = 1.352, p = 0.248$, or the interaction between language and group, $F(1,95) = .425, p = 0.51$, for the proportion of alternational codeswitching. This suggests that both groups use alternational code-switches at about the same rate, regardless of language.

The frequency of alternational code-switches were compared across groups in both languages. For language samples elicited in Spanish, 12.6% of the TD group produced at least one alternational code-switch, while 23.4% of the DLD group produced at least one alternational code-switch to English. For English language samples, 3.2% of the TD group produced an alternational code-switch while 35.2% of the DLD group produced an alternational code-switch to Spanish. Overall, children with DLD were more likely produce alternational code-switches compared to their typically developing peers regardless of language, but this was not statistically significant. The most frequent alternational code-switch was the same in both languages: alternational verb phrases. The next most common was alternational dialogue from Spanish to English.

The last question aimed to determine if there is a difference in the frequency of productions of “other” code-switches produced by children with language disorders and children with typical development. The results of the 2x2 ANOVA showed a non-significant effect of language, $F(1,95) = 1.636, p = 0.204$, suggesting that the proportion of other code-switching is about the same in Spanish and English, a significant effect of group, $F(1,95) = 5.643, p = 0.020$, suggesting that the DLD group made more other code-switches than the

TD group when both languages are taken together, and a significant interaction between group and language $F(1,95) = 4.983, p = 0.028$, suggesting that children with DLD made significantly more other code-switches in English samples.

For language samples elicited in Spanish, 20.5% of the TD group produced an “other” code-switch, while 29.3% of the DLD group produced an “other” code-switch to English. However, for the English samples, 14.2% of the TD group produced “other” code-switches, while 38.1% of the DLD group produced “other” code-switches. In both languages, children with DLD were more likely to produce “other” code-switches than their typically developing peers.

Discussion

This study aimed to identify code-switching patterns and differences between typically developing children and children with language disorders who are bilingual in Spanish and English. Data from this current study suggested that code-switching continues to be present in the language of bilingual children. More children were code-switching from Spanish to English but the average proportion of code-switching was relatively the same between Spanish and English. Data from this study also showed more code-switching from English to Spanish, as Gutierrez-Clellen et al. (2009) reported a total proportion to English as .002 for English dominant children and .022 for Spanish dominant children. In this study, the average proportion of code-switching from Spanish to English was 29% for the TD group and 26% for the DLD group. This shows that it may be more common for bilingual children to code-switch from English to Spanish. As most participants were in preschool or elementary school, it is likely that their exposure to English increased. Smolak et al. (2020) recognized that language exposure can have an impact on code-switching behaviors.

Although more children code-switched from Spanish to English, the proportion of code-switching was the same, with about 10% of the total utterances code-switched.

Question 1: Is there a difference between intrasentential and intersentential code-switching across groups?

Children in this study were using both intersentential and intrasentential code-switches at the same rates regardless of group and language. After coding 196 language samples, it was evident that no two children code-switch in the same pattern. This data suggests that both typically developing children and children with language disorders continue to produce various types of code-switching while speaking. Smolak et al. (2020) suggests that young children produce more intersentential code-switching, and as they age, produce more intrasentential code-switches from Spanish to English. While the participants of this study are above the age range from Smolak et al.'s (2020) study, the findings are generally consistent. Although this study did not account for changes in development as children age, the data showed that school-age children are using both types of code-switching, intersentential and intrasentential.

Question 2: Is there a difference between groups for insertional code-switches?

In this study, children with DLD typically scored lower on the PPVT-4 (English) and the TVIP (Spanish), indicating deficits in vocabulary. We found an interaction between language and group suggesting that children with DLD produce more insertional code-switches from English to Spanish, potentially due to vocabulary deficits. However, we also found that insertional code-switching from Spanish to English had a positive correlation with PPVT-4 (English) scores, but there was no significant correlations for TVIP (Spanish) scores. As both the TD group and DLD group are using insertional code-switches in different

contexts, there are likely other variables at play that were not controlled for during the analysis. Insertional code-switches may be a red flag for DLD, but further investigation is necessary to account for other factors not considered in this study.

Overall, children who used insertional code-switches in one language also used them in the other language. Insertional nouns were the most common switches from Spanish to English, while insertional determiners were the most common switches from English to Spanish. Insertional conjunctions were frequently seen in both languages. Table 3 highlights comparisons between TD and DLD for proportions of code-switching. The data suggested that children with DLD are more likely to use insertional switches in both languages. This could indicate that children with DLD have more mental overlap of languages when speaking and less awareness of language differences. In addition, children with TD were much more likely to switch only to English rather than to Spanish. This was a further indication of increased exposure and proficiency compared to the DLD group.

Previous studies (Gutierrez et al., 2009) (Poplack, 1980) suggest that insertional code-switches, specifically noun-switches, are the most frequent type of code-switches that children and adults produce. This was the case for Spanish to English code-switching, but determiners were the most common from English to Spanish. These include indefinite articles, definite articles, and demonstratives. In addition, conjunctions were the next most frequent switch in both Spanish and English. When coding language samples in both languages, it was noted that some children would only code-switch articles, only switch conjunctions, or only switch nouns. This was not the case for the majority of children, but there were some patterns of only switching specific parts of

speech. As mentioned above, children continue to diversify their code-switching patterns due to several potential linguistic factors.

Question 3: Is there a difference between groups for alternational code-switches?

In this study, there were no significant differences between children with language disorders and typically developing children as it relates to alternational code-switches. Overall, the proportion of alternational code-switches was low compared to other types. To code a phrase or clause as an alternational code-switch, we specified that the child must code-switch the entire phrase or clause. We expected that children with typical development would produce more alternational code-switches as they occur at complex language boundaries. Perhaps the requirements of this type of code-switch were too limiting to find significant results.

Although there were not significant results between DLD and TD for alternational code-switches, we noticed a pattern of code-switching that was both unexpected and occurred frequently in samples from Spanish to English. We noticed that several children were code-switching dialogue of characters in their story retells and generations. Below is an example of an alternational dialogue code-switch found in the language samples. It is likely that children are accustomed to hearing more dialogue in English when listening to stories at school. Therefore, children may be imitating story-telling behaviors of their teachers.

Example of alternational dialogue code-switching: El niño dijo (The boy said)// “Don’t come back again.”

Question 4: Is there a difference across groups for “other” code-switches?

A code-switch was marked as “other” if there were 4 or more code-switches within an utterance, there was a code-switch within a code-switch, the child expressed confusion within an utterance, or the utterance was severely agrammatical and hard to decipher. In other words, these types of code-switches did not follow a typical grammatical pattern and were more random than the others listed above. Our hypothesis was supported by our findings, as children with DLD produced more “other” code-switches than the TD group, especially in the English samples. This suggested that children with DLD may have grammar/syntax weaknesses, as they are code-switching at random places within the utterance rather than in a patterned way. As with insertional code-switches, frequent code-switches within an utterance or frequent grammatical errors in a code-switched utterance may be indicative of DLD.

Clinical Implications

Although many SLPs are seeing bilingual children on their caseloads across the country, they still may be unsure of how to analyze language samples that contain code-switching. Rather than removing utterances that contain code-switches from the language sample, SLPs can and should look at these utterances from an objective angle. Above all, these utterances should be reported in a language sample. Code-switching can contain lexical, syntactic, and sociolinguistic information that is important to document. Code-switching alone is not indicative of DLD or TD, and overall code-switching continues to be present in both elicited and spontaneous language samples of bilingual children.

When screening a child, you may notice that they are using many single-word code-switches or several code-switches within an utterance. As our data suggested that there are

differences between groups, it would be appropriate to complete a full speech and language evaluation, as these may be signs of DLD. SLPs could also continue to document the number of occurrences of both insertional and “other” code-switches for reassessment purposes. Overall, it is important for SLPs to not overlook code-switching when collecting a language sample, as it contains useful information about the child’s language skills.

Limitations

When evaluating the significance of the reported findings, it is important to note some limitations of this study. First, story retells and story generations do not capture the full language capacity of bilingual children. However, at least one instance of code-switching was produced by 77.55% of children in this study. As code-switching continues to be prevalent, we hypothesize that a child’s code-switching behaviors would generalize to other communicative settings. As story retells and story generations are two different types of elicitation, it is also possible that children code-switch differently when given a model or prompted to tell a story on their own.

Another limitation is that language proficiency, exposure, and preference were not considered when analyzing several of the variables related to code-switching. Other studies have considered these factors when analyzing code-switching behaviors and there is evidence to support that proficiency, exposure, and preference do influence code-switching. Because language proficiency was not considered, it is possible that the children with DLD were more Spanish dominant and children with TD were more English dominant, which changes the implications of the data for insertional code-switching. If this was the case, proficiency would be a potential implication of why children produced more insertional code-switches. Further investigation of these types of code-switching, as they relate to children with DLD

and typically developing children, should analyze the effect of these factors on code-switching patterns.

Finally, code-switches classified as “other” had a broad definition with multiple specifications on how it should be coded. Future analyses could individually code each of the outlined specifications to narrow down which factor is the most significant as it relates to children with DLD. This specificity may be a better indicator of DLD code-switching patterns.

Conclusion

In summary, this study analyzes the differences between children with DLD and typically developing children and their use of several categories of code-switching. This research presents significant evidence of potential indicators for DLD and provides clinical implications for speech-language pathologists. These findings do suggest that there are significant differences between code-switching patterns of typically developing children and DLD.

Table 1. Descriptive Statistics and results of Independent samples T-tests for language measures.

	TD (N=64)		DLD (N=34)		<i>t</i> (96)	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
KBIT-2 Standard Scores	103.19	13.42	104.21	15.06	-0.34	.73
TVIP Standard Scores	92.36	17.39	78.32	16.21	3.89	.001
PPVT-4 Standard Scores	90.75	18.98	73.64	14.41	4.54	.001

Table 2. Descriptive statistics and results of Independent sample T-tests for SALT data.

	TD (N=64)		DLD (N=34)		<i>t</i> (96)	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Total # of utterances (S)	75.86	19.27	78.97	23.82	-0.70	0.49
Total # of utterances (E)	69.67	19.24	67.09	27.65	0.54	0.59
MLU in words (S)	6.04	1.47	4.37	1.18	5.74	.001
MLU in words (E)	6.77	1.32	4.13	1.31	9.40	.001
Number of total words (S)	417.02	182.70	273.44	150.81	3.92	.001
Number of total words (E)	445.19	161.74	237.15	154.29	6.16	.001
Number of diff. words (S)	111.03	37.67	81.62	29.23	3.96	.001
Number of diff. words (E)	108.34	32.71	70.15	35.58	5.34	.001

Table 3. Proportion of code-switching for TD vs DLD.

	TD (N=64)	DLD (N=34)
No code-switching	30%	9%
Code-switching in both	16%	44%
Code-switching – Spanish only	50%	29%
Code-switching – English only	29%	26%

Table 4. Descriptive statistics for proportion of intrasentential vs intersentential code-switches.

	TD (N=64)		DLD (N=34)		Total (N=98)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Intrasentential Spanish to English	1.29	3.69	2.01	5.00	1.54	4.18
Intersentential Spanish to English	2.27	9.21	2.16	5.69	2.23	8.13
Intrasentential English to Spanish	0.96	3.40	4.92	11.8	2.33	7.70
Intersentential English to Spanish	0.02	0.12	0.09	0.18	0.05	0.14

Table 5. Descriptive statistics of insertional code-switches.

	TD (N=64)		DLD (N=34)		Total (N=98)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Total proportion insertional (S)	4.81	9.60	5.06	11.26	4.90	10.15
Total proportion insertional (E)	2.16	6.30	10.69	25.23	5.12	16.09

Table 6. Correlation Table for TVIP/PPVT-4 standard scores and proportion of types of codeswitches for Spanish (N=98)

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. TVIP	87.49	18.19						
2. PPVT-4	84.93	19.29	.288**					
3. insertional	4.90	10.15	-0.04	0.22*				
4. alternational	0.54	1.84	-0.16	0.14	0.11			
5. intrasentential	1.54	4.18	-0.02	-0.03	-0.10	-0.05		
6. other	1.00	2.76	-0.20*	0.12	0.30**	0.64**	-0.06	
7. intersentential	2.23	8.13	.097	0.01	0.01	-0.03	0.40**	0.06

*indicates $p < .05$ **indicates $p < .01$ **Table 7.** Correlation Table for TVIP/PPVT-4 standard scores and proportion of types of codeswitches for English (N=98)

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. TVIP	87.49	18.19						
2. PPVT-4	84.93	19.29	.288*					
3. insertional	5.12	16.09	0.09	-0.07				
4. alternational	0.57	2.21	-0.03	-0.25*	0.22*			
5. intrasentential	2.33	7.67	-0.01	-0.06	-0.06	0.08		
6. other	1.77	6.97	-0.10	-0.19	0.18	0.17	-0.07	
7. intersentential	1.77	6.97	0.01	-0.09	-0.05	0.10	0.96**	-0.05

*indicates $p < .05$ **indicates $p < .01$ **Table 8.** Descriptive statistics for alternational code-switches.

	TD (N=64)		DLD (N=34)		Total (N=98)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Alternational English to Spanish	0.29	1.88	1.10	2.68	0.57	2.21
Alternational Spanish to English	0.42	1.65	0.76	2.15	0.54	1.84

Table 9. Instances of insertional and alternational code-switches.

	Spanish to English	English to Spanish
Insertional nouns	163	42
Insertional conjunctions	129	98
Insertional verbs	23	32
Insertional progressive verbs	5	2
Insertional adjectives	12	5
Insertional adverbs	7	5
Insertional determiners	15	112
Insertional pronouns	4	11
Insertional prepositions	4	3
Insertional other	18	4
Alternational noun phrase	2	6
Alternational verb phrase	15	23
Alternational adjective phrase	1	1
Alternational adverb phrase	5	3
Alternational prepositional phrase	1	2
Alternational dialogue	11	1
Alternational independent clause	4	2
Alternational dependent clause	0	0

Table 10. Descriptive statistics for “other” code-switches.

	TD (N=64)		DLD (N=34)		Total (N=98)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Other English to Spanish	0.68	2.40	3.82	11.18	1.77	6.97
Other Spanish to English	0.87	2.67	1.25	2.95	1.00	2.76

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Appendix A. SALT codes, descriptions, and examples of each code-switch. For the following examples, the language of elicitation is in Spanish.

SALT Codes	Descriptions	Examples
CS:inter	Intersentential code switch	<u>The frog jumped in the basket.</u>
CS:insN	Insertional noun	La rana se fue en la <u>basket</u> .
CS:insConj	Insertional conjunction	La gato estaba asustada <u>so</u> le fue.
CS:insV	Insertional verb	Y el rana <u>jumped</u> allí.
CS:insVProg	Insertional progressive verb	La rana está <u>jumping</u> en el agua.
CS:insAdj	Insertional adjective	El familia del niño están muy <u>mad</u> .
CS:insAdv	Insertional adverb	La niño está <u>back</u> .
CS:insDet	Insertional articles	Rana saltó a <u>the</u> pato.
CS:insPro	Insertional pronoun	La rana está comiendo <u>my</u> manzana.
CS:insPrep	Insertional prepositions	La rana subió on la brazo.
CS:insOther	Insertional other (functional words)	La rana hizo <u>goodbye</u> .
CS:altN	Alternational noun phrase	<u>The insect</u> camina en la hoja.
CS:altInd	Alternational independent clause	Y después, <u>they lived happily ever after</u> .
CS:altDep	Alternational dependent clause	Me encanta la chaqueta <u>that she is wearing</u> .
CS:altV	Alternational verb phrase	El gato <u>chased after the frog</u> .
CS:altAdj	Alternational adjective phrase	Eso es <u>really bad</u>
CS:altAdv	Alternational adverbial phrase	A bote <u>right here</u> .
CS:altPrep	Alternational prepositional phrase	Rana salta <u>into the basket</u> .
CS:altDia	Alternational dialogue	El niño dijo <u>don't come back again</u> .
CS:other	Other (see description below)	Y then la rana was going to go in la basket.

“Other” specifications:

- If child switches more than 4 times in an utterance
- If a child code-switches within a code-switch (insertional within alternational)
- If a child expresses confusion within an utterance
- If a child’s utterance is too agrammatical to ascertain meaning