

## ABSTRACT

Title of Thesis: AN ANALYSIS OF CODE SWITCHING  
EVENTS IN TYPICALLY DEVELOPING  
SPANISH-ENGLISH BILINGUAL  
CHILDREN

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Code-switching (CS) patterns were investigated in language samples of 14 typically-developing Spanish-English bilingual preschool-aged children. CS occurred primarily when the children spoke in Spanish. We investigated code-switched events, vocabulary measures, and disfluencies to better understand if children utilize code-switching to fill in lexical gaps in Spanish, as measured by disfluencies surrounding the code-switch. Results indicate that children's spoken vocabulary diversity is not related to code-switching frequency, although their receptive vocabulary skills are negatively correlated to proportions of code-switched events. We also found no significant relationship between code-switched events and disfluencies across participants. Findings suggest clinical implications related to best practice for speech-language pathologists when working with bilingual children, as they observe language attrition, and code-switching related to language proficiency and dominance.

AN ANALYSIS OF CODE SWITCHING EVENTS IN TYPICALLY  
DEVELOPING SPANISH-ENGLISH BILINGUAL CHILDREN

by

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## Chapter 1: Introduction

In the field of speech-language pathology, assessment and treatment of bilingual children is a fairly recent and underdeveloped area of research. Bilingualism refers to a person learning two languages either simultaneously or sequentially. Children who are considered to be simultaneous bilinguals are learning both of their languages concurrently prior to the age of 3 years, while those labeled as sequential bilinguals learn their first language (L1), then acquire their second language (L2) after age 3. Of the speakers of other languages in the United States (U.S.), approximately 35,000,000 of these are Spanish-speaking (U.S. Census Bureau, 2013-2017). Furthermore, there are approximately 4.4 million English Language Learners (ELLs) in the U.S. and about 13% of them receive special education services, which includes speech and language services (US DOE, 2015). However, bilingual providers make up only approximately 6% of all American-Speech Language Hearing Association (ASHA) certified service providers (ASHA, 2018).

This discrepancy between bilingual providers and potential Spanish-English clients in the U.S. may result in misdiagnosis of bilingual children, an increase in disproportionality rates, or poorer treatment outcomes. Thus, evidence-based research related to bilingualism best practices is critical to better serve the bilingual population.

We will begin with reviewing the literature on language skills in childhood bilingualism, then we will review the literature on code-switching (CS) among bilinguals, and finally will look at fluency in bilingual speakers. We will form a

hypothesis to better understand the relationships among language, CS, and fluency in bilingual populations.

*Language Skills and Childhood Bilingualism*

Many authors have supported the dual language system hypothesis as an explanation of bilingual language development (e.g., Genesee, 1989; Johnson & Lancaster, 1998; Paradis, 2001; Paradis & Navarro, 2003). According to the dual language system hypothesis, bilingual children have two separate language systems. That is, for each of their languages, they have a language-specific system for phonological, morphological, and syntactic skills. In contrast, when monolingual children retrieve a word, they need only search stored phonological features for each semantic representation in one language. Monolingual children then must be able to access these specific phonological representations with appropriate segmental and suprasegmental information, to finally produce a word.

For children who are bilingual, phonological representations are doubled, one for each language. For both simultaneous and sequential bilingual children, easily accessing the phonological, syntactic and morphological representations of either their L1 or L2 will be dependent on their language dominance and proficiency in either language. In the U.S., where the majority language is English, it is probable children will store and access English language structures more easily than in their minority language. However, depending on their language exposure and dominance, they may store and access specific vocabulary terms in their minority language, such as household vocabulary terms learned in the years prior to school entry. Apparent language proficiency may be dependent on a child's contextual support, or lack

thereof (Cummins, 1984). Basic interpersonal communication skills (BICS) refers to social language skills that children develop from day-to-day conversation with peers and adults (Cummins, 1984), typically in the years before school entry. In contrast, Cummins (1984) defines cognitive academic language proficiency (CALP) as the academic language skills that children develop from direct academic instruction. Bilingual children in the U.S. may be highly proficient in BICS in their L1, but lack proficiency in their L1 with academic-related terminology (CALP) due to a dominance of English-only and transitional bilingual education models in the U.S. This typical profile leads to the recommendation that bilingual children's language profiles are best captured when assessing both languages (e.g., Peña, Bedore, & Kester, 2016; Solorio, Sherman, Liu, Bedore, Peña, & Iglesias, 2010).

When children are restricted to using solely one of their languages (by social or academic context), what may result is a tendency for children to use other means to compensate for lexical gaps (Golberg, Paradis, & Crago, 2008), words that they know in one language, but not the other. They can use word substitutes, such as non-specific vocabulary (NSV), or code-switch. NSV refers to generic terms, such as pronouns, deictics (*this, that, these, them, those*), general all-purpose (GAP) verbs (such as *go, do, make*), or other "place holders", such as *thing, stuff*, etc. GAP verbs are non-specific in nature and may be used to compensate for retrieval deficits of more specific verbs (e.g., 'cook,' 'tiptoe,' etc.). It is possible that bilingual children may use NSV terms if they are in an English-speaking setting and have the specific word stored in Spanish, but not English. We note that a similar phenomenon may occur when monolingual speaking children have not been exposed to specific



vocabulary terms and thus, have no way to express a concept. Children with delayed language development have also been shown to rely on NSV (e.g., Golberg et al., 2008; Paradis, 2010; Sanz-Torrent, Aguilar, Serrat, & Serra, 2001; Sheng, 2014).

Use of GAP verbs among bilingual children is a frequently researched topic. Studies have demonstrated language similarities between monolingual and bilingual children with specific language impairment (SLI) and typically developing (TD) bilingual children (e.g., Grüter, 2005; Paradis, 2010; Paradis & Crago, 2000). For example, use of GAP verbs has been documented in language samples of children learning a second language who are TD, as well as in children with SLI (e.g., Golberg et al., 2008; Paradis, 2010; Sanz-Torrent et al., 2001; Sheng, 2014). It could be argued that TD bilingual children use GAP verbs and NSV for lexical gap purposes stemming from a lack of exposure to certain vocabulary terms (Golberg et al., 2008), while monolingual or bilingual children with SLI overuse GAP verbs to compensate for limited vocabulary stemming from poor uptake of language input (Gutiérrez-Clellen, Simon-Cereijido, & Wagner, 2008).

Regardless, such linguistic similarities between groups may put bilingual children at risk for being overidentified as having language impairment, thus supporting the claim that clinical markers for monolingual children with SLI should not be applied to diagnosis of bilingual children (e.g., Brundage & Rowe, 2018; Golberg et al., 2008; Leaders Project, 2013; Paradis, 2010).

#### *Code Switching: Its Definition and Causes*

Code-switching (CS) is a phenomenon seen in bilingual and multilingual speakers. In a country without an official language and containing approximately 64

million speakers of languages other than English, it is not surprising that speakers in the U.S. have developed a tendency to frequently switch from one language to another (U.S. Census Bureau, 2013-2017). It is probable that bilingual individuals speaking a minority language in the U.S. have more occasion to switch to the majority language, English, and research has indeed shown that this “direction” is more prevalent, even when bilingual individuals are immersed in the minority language culture and are continuously being exposed to their L1 (Sheng, 2014).

Theories about Code Switching (why do people code switch?)

Bilingual children and adults code-switch for a variety of reasons; theories have supported both social and lexical gap purposes for CS (Bhatt & Bolonyai, 2009). The cognitive load hypothesis suggests that CS in children arises from stress on the speaker’s cognitive or executive function systems. In the cognitive load hypothesis, researchers have argued that learning two languages may stimulate advanced cognitive processes that younger children may have not fully developed yet (e.g., Gross, Lopez, Buac, & Kaushanskaya, 2019; Wilson & Dumont, 2015). Thus, children may use CS to compensate for this cognitive load. Learning two languages simultaneously and being less proficient in one language also imposes a cognitive demand. For lexical retrieval, accessing phonological representations of a specific language and inhibiting the phonological representations of the other may be cognitively demanding, especially in young children. Language proficiency also impacts this discrepancy and less balanced bilinguals may have more difficulty accessing phonological representations in their less dominant language, which may lead to more CS (Taliancich-Klinger, Byrd, & Bedore, 2013). Since this proposal will

be investigating CS in young bilingual children who are still quite early in the process of learning their two languages, we will focus on explanations of CS as a means to fill lexical gaps, although we acknowledge the social and discourse function that CS constitutes in specific bilingual communities, in which CS occurs for specific pragmatic purposes.

#### Code-switch Types and Cognitive Load

In the literature, code-switch types are often described as either intra-sentential or inter-sentential. Intra-sentential CS refers to switching that occurs within a single utterance (e.g., “Look the dog is pequeño” “*Look the dog is small*”) (e.g., Boztepe, 2003; Gross et al., 2019). Inter-sentential CS refers to switching that occurs between utterances (e.g., Look the dog is small! Qué lindo” “*Look the dog is small! How cute*”) (e.g., Boztepe, 2003; Gross et al., 2019). Intra-sentential CS can be further described as an insertion, alternation, or dense type of code-switch. Insertions are switches of single words in the same utterance (e.g., “Look the dog is pequeño.”) (e.g., Boztepe, 2003; Dorleijn, 2017; Green & Wei, 2014). Alternations are instances in which utterances begin in one language and alternate into another; these types of code-switches tend to occur in longer utterances (e.g., “Look the dog is pequeño y tiene ojos tan grandes” “*Look the dog is small and has big eyes.*”) (e.g., Boztepe, 2003; Dorleijn, 2017; Green & Wei, 2014). Finally, dense CS refers to switching that integrates the two languages and combines their word and morphological structures (e.g., “Estamos jangueando” “*We are hanging out*”) (e.g., Dorleijn, 2017; Green & Wei, 2014).

Dense CS is often exhibited by more proficient bilingual speakers due to the higher level of cognitive control required to integrate the two languages in a complex and purposeful manner (e.g., Dorleijn, 2016; Green & Wei, 2014). It is arguable that because alternations typically occur in instances of longer utterances, children using alternations may also be more proficient users of their languages. Use of alternations as a code-switch type require the individual to have both lexical and syntactic aspects of the language stored and accessible (e.g., Dorleijn, 2016), while use of insertions as a code-switch type typically only requires the individual to have lexical aspects of the language stored and accessible. Researchers have attempted to understand cognitive processes underlying the use of specific code-switch types, such as insertions and alternations. It is proposed that children may utilize CS, in general, when specific phonological structures are not stored at all or are not as accessible in the moment of the code-switch. The latter tends to occur more often with imbalanced bilinguals, with structures being more easily and quickly accessible in children's more dominant language (e.g., Green & Wei, 2014; Potter, Fourakis, Morin-Lessard, Byers-Heinlein, & Lew-Williams, 2018). Green and Wei (2014) propose that alternations are used by individuals with a clear distinction between their languages, while insertions are used by individuals who are less balanced bilinguals. We suggest that insertion types of CS may be more often used by children for lexical gap purposes in comparison to alternation types of CS.

#### Code Switching to Cover Lexical Gaps

Typically, children who appear to code-switch for lexical and syntactic gap purposes “borrow” a vocabulary word or syntactic structure from their more

dominant language to maintain fluent conversation. In bilinguals who are becoming English-dominant, word order borrowing is quite common (Volterra & Taeschner, 1978). For example, children may adapt English word order when describing nouns in Spanish and say ‘black cat,’ or ‘*negro gato*’ although Spanish typically follows a noun + adjective word order (Volterra & Taeschner, 1978).

In studies with bilingual children, researchers have found that CS is used to compensate for limited lexical diversity in the less dominant language, as measured by incorrect responses on picture naming and picture identification tasks. For example, Sheng (2014) marked incorrect naming responses as either semantically-, phonologically-, or visually-related responses, or language switches, and found that many bilingual children used language switches to compensate for unknown vocabulary words in either their L1 or L2. Guitérrez-Clellen, Simon-Cerejido, & Leone (2009) also found a role of language proficiency on the frequency of CS, and found that bilingual children with and without SLI who were less dominant in one of their languages switched to their more dominant language to fill in lexical gaps. These findings are critical to better understand how to assess bilingual children. In assessment, code-switched responses in language samples or during administration of standardized assessments are often excluded, not included in mean length of utterance (MLU) and generally disregarded (see Brundage & Rowe, 2018; Farver, Lonigan, & Eppe, 2009). Such evaluation trends ignore the linguistic and pragmatic use of CS (Bhatt & Bolonyai, 2009). When bilingual children are assessed in only one of their languages or CS is excluded from measures to determine the child’s overall language skills, then the child may appear similar to a child with language delay or disorder.

These methods lead to increased assessment bias, which may lead to an overdiagnosis of language impairment in TD bilingual children.

For example, Spanish-English bilingual children in one study retold ‘Frog’ stories separately in their L1 and L2, and scored differently on measures of mean length of utterance in words (MLU-w), total number of utterances, and total number of words dependent on their language dominance profile (Solorio et al., 2010). This suggests that bilingual children’s language profile is best captured when assessing both languages and when considering factors such as language dominance and use of CS (e.g., Guitérrez-Clellen et al., 2009; Solorio et al., 2010).

### *Bilingualism and Fluency*

The relationship between bilingualism and fluency is recently gaining more attention in the literature. Various studies have described higher levels of disfluency in the speech of bilingual children and adults (e.g., Brundage & Rowe, 2018; Byrd, Bedore, & Ramos, 2015; Hlavac, 2011.; Taliancich-Klinger et al., 2013). When viewed within the Demands and Capacities Model (which seeks to describe stuttering, rather than typical disfluency), language proficiency, time pressure, and using more complex language structures may all tax fluency (Starkweather & Gottwald, 1990). In bilingual children, accessing words and syntax in their less dominant language may impose a language encoding demand, thus leading to more disfluencies. Tumanova and colleagues found that monolingual English-speaking typically-developing preschool-aged children exhibit an average of 4.28% of disfluent words in conversational speech (Tumanova, Conture, Lambert, & Walden, 2014). Typically-developing bilingual children have been documented to exhibit higher rates of

disfluencies. For example, one study found that bilingual early school-aged children produced an average of 14.28% and 7.9% disfluent words in Spanish and English, respectively (Byrd, Bedore, & Ramos, 2015). Since the language profiles of bilingual children are influenced by their language proficiency, dominance, age of acquisition, and cognitive skills, it is important to understand how fluency interacts with these factors in order to best assess and treat bilingual children. Studies have demonstrated that children's lexical and syntactic skills impact their fluency rate (e.g., Ardila, Ramos, & Barrocas, 2011; Brundage & Rowe, 2018; Taliancich-Klinger et al., 2013). Typically, children are more likely to be disfluent on longer words, and when producing lengthier or complex syntactic structures, and on function words that initiate clausal units (e.g., Ardila et al., 2011; Bernstein, 1981; Brundage & Rowe, 2018; Taliancich-Klinger et al., 2013).

Byrd and colleagues have investigated differences in disfluencies exhibited by TD bilingual children, and as well as monolingual and bilingual children who stutter. They argue that bilingualism, in general, imposes a cognitive demand that results in elevated typical disfluency rate in TD bilingual children (Byrd, 2018). Furthermore, children with mixed language dominance, across BICS and CALP language targets, may be even more disfluent. Byrd (2018) discusses the distinct differences in disfluencies exhibited between bilingual children and monolingual children, including more instances of whole word repetitions and part-word repetitions in language samples of TD bilingual children. Authors have also described language-specific effects of syntax and vocabulary on typical disfluencies in studies with simultaneous Spanish-English bilinguals (Brundage & Rowe, 2018). These findings support the

importance of understanding profiles of typical disfluency exhibited by TD bilingual children to prevent overidentification of fluency disorders.

### Fluency and Code Switching

Since the present study is investigating CS as a means to fill in lexical gaps and to compensate for a lack of proficiency or exposure to lexical terms, we will next discuss how CS may contribute to taxing fluency in bilingual children. Bilingual children may exhibit more disfluencies, but not necessarily because they have a fluency disorder. Authors have demonstrated a relationship between disfluencies and language in bilingual children (e.g., Bedore, Fiestas, Peña, & Nagy, 2006; Cabrera & Bernstein Ratner, 2000). For example, Bedore and colleagues (2006) found differences in maze use in Spanish in comparison to English in bilingual school-aged children. Researchers have attempted to use measures of disfluencies surrounding CS to better understand the relationship between disfluencies and CS. Wilson and Dumont (2015) investigated language samples of older Spanish-English bilingual speakers and hypothesized that, by measuring disfluencies occurring before an adult speaker's code switch, they could determine if individuals seemed to use CS to fill lexical and syntactic gaps. However, they found no significant difference between disfluencies containing a code-switched event with a compound verb (e.g., *hacer* draw 'to draw') that is frequently used by bilingual communities and non-code-switched utterances (Wilson & Dumont, 2015). They conclude that this specific code-switched event is not used to fill in lexical gaps, but instead is used to integrate the two languages in a sophisticated manner (Wilson & Dumont, 2015). Other researchers have found a relationship between disfluencies and code-switched events;



however, they suggest that their purpose may be to facilitate comprehension of code-switches by listeners as opposed to indicating speech production difficulties (Hlavac, 2011). In all, research investigating the relationship between CS and disfluencies has produced mixed results and opposing hypotheses, and to our knowledge, there are no studies investigating this relationship in young preschool-aged children.

### Current Study

This study aims to understand the relationships among fluency, language, and use of CS in young bilingual children. We will ask if TD bilingual children who code-switch exhibit more disfluencies prior to these events, and whether these behaviors relate to their language profiles, as measured by language sample analysis and language test scores.

Thus, the purpose of the present study is to better understand the relationships among CS, fluency and language proficiency. The findings of the present study can contribute to more informative TD bilingual children's language profiles and influence best practices for assessment and treatment of bilingual children.

### Study Questions and Hypotheses

This study examined the relationships among CS, language skills and fluency in TD Spanish-English bilingual children:

1. *Is there a relationship between CS frequency and vocabulary skills?*

If CS is used to fill lexical gaps and vocabulary is an indicator of lexical knowledge, then it is hypothesized that children who code-switch more often will show

- a.* less vocabulary diversity in their language samples, even when code-switches are counted in lexical diversity estimates, as measured by number of different words (NDW) in children's language samples.
- b.* less advanced vocabulary knowledge, as measured by vocabulary test scores on the *Peabody Picture Vocabulary Test- 4 (PPVT)* and its Spanish equivalent, the *Test de Vocabulario en Imagenes Peabody (TVIP)*.

2. *Is there a relationship between CS and fluency?*

If CS is used to fill lexical gaps and disfluencies are a marker of linguistic uncertainty, then it is hypothesized that there will more disfluencies immediately prior to CS events [e.g., pauses or fillers prior to the CS or word, or disfluency on the CS or word].

3. *Is language proficiency related to the frequency of CS events with disfluencies?*

If language proficiency is related to CS for lexical gap purposes and disfluencies are a marker of linguistic uncertainty, then more CS events with disfluencies will occur in the child's less dominant language [as determined by parental report on the *Developmental Vocabulary Assessment for Parents (DVAP)*].

## Chapter 2: Methods

### Experimental Designs

This study used a correlational design in which use of CS, fluency and vocabulary in bilingual children were analyzed for potential associations. The independent variable is the children's use of CS in language samples. The dependent variables are: the frequency and position of disfluencies within and between English and Spanish samples, vocabulary skills as measured by language sample analysis and test scores, and language proficiency as measured by parental report on the *Developmental Vocabulary Assessment for Parents (DVAP)* in both languages.

### Participants

The participants were a part of a larger study conducted at the Language Fluency Laboratory at the University of Maryland, in College Park, Maryland. Participants were recruited from the community via flyers, media outlets, word of mouth, etc. The participants consisted of 15 TD preschool age children (M= 7; F= 8; age range= 2;6-3;8). All participants were considered simultaneous Spanish-English bilinguals, per parental report. One participant was excluded from the study due to missing test data and parental reports. The remaining participants consisted of 14 preschool age children (M=6; F=8; age range= 2;6-3;8). Caregivers were asked to list all languages that their children were exposed to throughout the day and the average amount of time they were exposed to each; six participants received between 70-80% of exposure in Spanish, two participants received between 70-80% of exposure in English, and six participants received between 40-60% of exposure in Spanish and

English. It should be noted that one caregiver reported their child as being exposed to Hebrew in the household, as well.

### *Consent and Background Testing*

All caregivers signed and were given a copy of a consent form explaining the purpose of the study, requirements to participate, and confidentiality information. All caregivers were offered the option to agree or decline to sign the consent form, which was provided in both English and Spanish.

Caregivers were asked to fill out a questionnaire with information regarding maternal education, family history of speech and/or language disorders, the child's previous history of speech and/or language or medical concerns, and questions pertaining to the child's developmental history. All children were reported to be typically-developing per parental report, with no past or current history of speech, language, or fluency disorders. All participants were required to have at least 20% of exposure in the less-used language (Spanish or English), a full-term birth, and met typical developmental milestones per parental interview. Children were also administered the *MacArthur-Bates Communicative Development Inventories (MCDI)* and were required to have at least 50 words and some two word combinations in at least one of their languages when enrolled in the study. Children were also administered vocabulary tests in both Spanish and English (*Peabody Picture Vocabulary Test- 4* and its Spanish equivalent, *Test de Vocabulario en Imagenes Peabody*). All participants scored within the average or above average range in either Spanish, English, or both. Maternal education ranged from the associate and bachelor's levels to the doctorate level.

## Tasks

### Stimuli

Analysis of the following factors was utilized to answer the research questions. These included CS and fluency of language samples in both English and Spanish, and scores on the *DVAP* Spanish and English versions or the *TVIP* and *PPVT* to determine language dominance. We also examined CS profiles across languages and explored relationships between these behaviors and expressive lexical diversity and standardized vocabulary test scores.

*Language sample:* For the language sample, participants were recorded during a spontaneous and naturalistic play session with either their caregiver or a clinician participating at the Language Fluency Laboratory. When possible, play sessions with caregivers were utilized for analysis in order to capture the best representation of the child's language abilities. In some cases, play sessions with a clinician were utilized based on the parent's comfort speaking both languages. In Spanish samples, a parent was the interlocuter in 13 out of 14 samples. In English samples, a parent was the interlocuter in 7 out of 14 samples. Language samples were conducted at the University of Maryland or in the child's home. Each child provided an English and a Spanish sample, with an adult speaking the target language to the child. Parents or clinicians were given explicit instruction to speak only in one language dependent on the language 'mode' for each given session. Sessions were held on separate days.

*DVAP in Spanish and English:* The *DVAP* is a list of 212 vocabulary words from the *PPVT-4* and has been found to be both a reliable and valid measure of expressive vocabulary in samples of children between 2 to 7 years-old (Libertus, Odic,

Feigenson, & Halberda, 2013). The *DVAP* asks parents to check off all items which their child says. Research confirms that measuring the number of words that a child is reported to say in either language is a reliable and valid determiner of language dominance (Bedore et al., 2012; Peña, Gillam, Bedore, & Bohman, 2010).

Furthermore, the *DVAP* is well correlated with other measures of vocabulary, including the *PPVT* and the *MCDI* (Libertus et al., 2013).

*PPVT and TVIP:* The *PPVT* and its Spanish equivalent, the *TVIP*, were used to assess receptive vocabulary skills. The *TVIP* has been normed on both English and Spanish speaking groups ranging from ages 2;6 to 90 years and older.

*Caregiver Questionnaire:* An informal caregiver questionnaire was completed by parents to determine information about their child's development and language abilities (see Appendix A). Parent questionnaires have been previously noted in the literature as a reliable measure for gathering information about language input and have been correlated to bilingual children's language skills (e.g., Hoff et al., 2012; Place & Hoff, 2011).

### Procedure

*Defining dominance:* Language dominance was first defined as parental report on the *DVAP*. Parents filled out a *DVAP* for their child in both of their languages, English and Spanish. A ratio was calculated to determine language dominance. The Spanish *DVAP* score was divided by the English *DVAP* score to find a ratio. The following groups were created:

1. Spanish dominant: *DVAP* ratio above 1.25
2. English dominant: *DVAP* ratio below 0.75

### 3. Balanced: *DVAP* ratio between 0.75 and 1.25

One participant did not have a *DVAP* score available in English, thus language dominance was defined by *TVIP* and *PPVT* scores. *TVIP* scores were divided by *PPVT* scores to find a ratio. The participant was placed in the balanced group based on a ratio of 1. Based on these definitions, five children were placed in the Spanish dominant group, three in the English dominant group, and six in the balanced group. *Language sample*: Participants were given various play items and were instructed to interact as they typically would with toys. Recordings were stopped after roughly 100 utterances were counted, excluding repetitions of adult utterances, one-word utterances, or unintelligible utterances. Caregivers were provided a list of suggestions for encouraging expressive language during the sample, including use of open-ended questions and pretend play to stimulate language use. Caregivers and clinicians were instructed to speak the language of assessment (Spanish or English); however, children were not explicitly directed to speak in any specific language. During Spanish mode samples, adult interlocutors code-switched an average of 2.39% of words. In English mode samples, interlocutors did not code-switch at all.

#### *Scoring of Transcripts*

##### Coding

All utterances were transcribed using CHAT in the Child Language Analysis (CLAN) program. All English mode samples were originally coded by an individual blind to the purpose of the study and all were double coded for accuracy. All Spanish mode language samples were double coded by an individual blind to the purpose of the study.

## Defining Code Switching

Each word produced by the child participant was coded as English or Spanish. The “default” language for the session was defined by instruction to the adult to initiate conversation in either English or Spanish. A code-switch was defined as any word or utterance containing a word in a language different than the language produced by the caregiver or clinician.

Proportion of code-switched events in each sample were calculated by determining the total number of different events in each sample over the number of utterances in the sample. Code-switch events were defined as any instance of intra-sentential or inter-sentential CS. We exclusively analyzed intra-sentential code-switches as insertion or alternation types to further investigate possible differences in cognitive and linguistic functions when using either insertions or alternations, as found in previous literature (e.g., Green & Wei, 2014). Intra-sentential code-switched events were counted as either insertions (e.g., “The dog is blanco and so small”) or alternations (e.g., “The dog is blanco y es tan pequeño”). Insertions were defined as single words that were code-switched in any given utterance. Alternations were defined as utterances that began in one language and alternated into another, which typically occurs in longer utterances. When code-switches occurred more than one time per utterance, these were counted as more than one code-switch event. For example, if a child said, “The dog is blanco and so small and le gusta comer mucho,” two code-switched events would be counted, since the child had an instance of an insertion and an alternation type of code-switch.



For samples in the English mode, child CS into Spanish occurred in only 2 out of 14 language samples. In contrast, in samples in the Spanish mode, CS into English by the child occurred in 13 out of 14 language samples. Proportion of code-switched words were calculated by determining the total number of different code-switched items (tokens) over total words in each sample. The following tokens were excluded from counting as code-switched words: proper nouns, filler words, non-sense/child made-up words, interjections (e.g., *ah*, *hm*, *mhm*), and onomatopoeia.

#### Investigating Code Switch Types

For the Spanish mode, children's samples were investigated for analysis of code-switch types if their sample contained more than 50% of utterances in Spanish. A total of 9 out of 14 samples met this criterion. Inter-sentential code-switches were excluded from this analysis due to the limited number of inter-sentential code-switches produced by participants.

Using CLAN software analysis, a search for code-switched words were conducted for each participant to investigate if the equivalent word in the target language occurred anywhere in the sample. For example, if a child code-switched the word "scissors" and used the word "tijeras" during an English mode sample, then a search for the English equivalent 'scissors' was conducted. This investigation may help understand if children were using code-switched events for lexical gap purposes, lexical retrieval purposes (in the case in which children do in fact have words in their expressive vocabulary), and if code-switched events have any similarities between them. To conduct this analysis, proportions of these events were calculated across all children. For example, for all words in which translational equivalents were found in

the sample, this number was divided by the total number of different code-switched words in each sample.

### Defining Disfluencies

Disfluencies were defined as revisions, pauses, hesitations, and/or fillers, as well as sound, part-, whole- word, or phrase repetitions (Bedore et al., 2006).

Disfluencies were coded in both English and Spanish samples, and marked with disfluency codes per the CLAN protocol (Bernstein Ratner & Brundage, 2019).

Analysis of the position of disfluencies in each sample was determined by locating code-switched events in each sample and determining if a disfluency occurred prior to it. Intra-sentential code-switched events were also categorized into types (i.e., insertions or alternations) during this analysis in order to determine if specific code-switched events appeared to cause more disfluency than others. Inter-sentential code-switches were excluded from this sample due to the limited number available.

### Measuring Vocabulary Diversity

Vocabulary diversity was measured with number of different words per 100 words (NDW). NDW is a valid and reliable measure of vocabulary diversity, and has been previously used as a measure of language productivity, and correlated with measures of linguistic uncertainty and language ability (e.g., Bedore et al., 2006; Bedore, Peña, Gillam, & Ho, 2010; Solorio et al., 2010). *PPVT* and *TVIP* scores were also utilized as measures of receptive vocabulary skills.

Post Hoc Analyses Study Questions:

The following questions were asked as part of post hoc analyses:

Regarding CS behaviors:

- a. Are there differences in what types of CS children use?
- b. For instances of code-switched words (i.e., insertions), is there evidence anywhere else in the sample of the child using that word in the target language?

Regarding CS and disfluency:

- a. Are there differences in disfluency when bilingual children use their two languages based on their language dominance category?
- b. What types of disfluencies occur prior to code-switched events?
- c. What types of code-switched events have disfluencies prior to them?

## Chapter 3: Results

### General Profiles of the Data

A two-sample t-test was utilized to investigate the relationship between the proportion of code-switched events and language direction (i.e., English or Spanish). There was a significant difference in proportions of code switched events in the Spanish samples ( $M = 0.33$ ;  $SD = 0.29$ ) and English samples ( $M = 0.01$ ;  $SD = 0.01$ );  $t(13) = 4.18, p = .001$ ). In English mode samples, only 2 out of 14 children code-switched. Approximately 88% of code-switched events (8 out of 9) were intra-sentential code-switch types, with all eight of them being classified as insertions. Statistical analyses were therefore conducted for Spanish mode samples only unless otherwise stated, due to the limited number of code-switched events that occurred in English mode samples.

### Language Dominance Measures

Parental report measures (i.e., percent of exposure of languages in the home and *DVAP* scores) were correlated with one another and with standardized test measures (i.e., *PPVT* and *TVIP*) to investigate correlations within measures. Percent of exposure in Spanish reported by parents was significantly correlated with the *TVIP* ( $r(12) = 0.71, p = .001$ ), but not significantly correlated with *DVAP*- Spanish scores ( $r(12) = 0.41, p = 0.15$ ). Percent of exposure in English reported by parents correlated positively with the *PPVT*, ( $r(12) = 0.18, p = 0.54$ ) and with *DVAP*- English scores, ( $r(12) = 0.41, p = 0.15$ ); however, correlations were not significant. *DVAP*- Spanish scores were positively correlated with the *TVIP* ( $r(12) = 0.77, p = .001$ ) and *DVAP*-

English scores were positively correlated with the *PPVT* ( $r(12) = 0.71, p = .001$ ); both of these correlations were significant.

### Results of Study Questions

#### *Is there a relationship between CS frequency and vocabulary skills?*

We hypothesized that if CS is used to fill lexical gaps and vocabulary is an indicator of lexical knowledge, then children who code-switch more often will show less vocabulary diversity in their language samples as measured by NDW. To test this hypothesis, children were divided into two groups (i.e., high or low CS). The low CS group code-switched less than 16% of the time across the entire sample. A two-sample t-test was utilized to investigate the relationship between code-switch group and expressive vocabulary diversity. There was not a significant difference in NDW in the high CS group ( $M = 52.29; SD = 10.36$ ) and low CS group ( $M = 49.43; SD = 9.07$ );  $t(12) = 0.55, p = 0.59$ ).

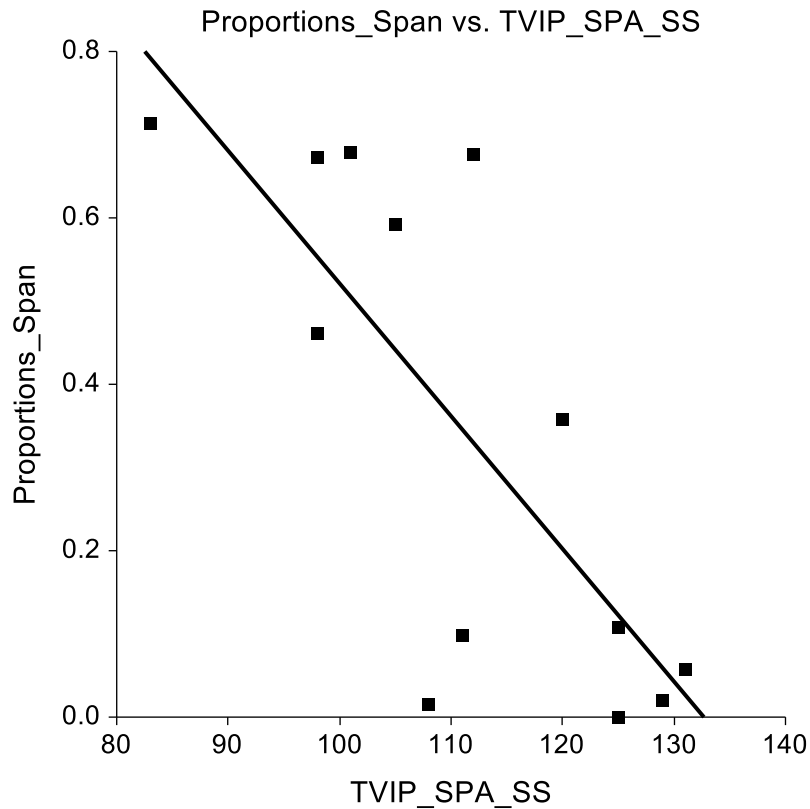
We also hypothesized that if CS is used to fill lexical gaps and vocabulary is an indicator of lexical knowledge, then children who code-switch more often will show less advanced vocabulary knowledge, as measured by vocabulary test scores on the *PPVT* and its Spanish equivalent, the *TVIP*. To test this hypothesis, a linear regression was utilized to examine if the proportion of CS in Spanish mode language samples were correlated with children's receptive vocabulary scores per the *TVIP* and *PPVT*. A significant negative correlation was found ( $r = -0.76, p < .001$ ) for the proportion of CS and receptive vocabulary scores per the *TVIP*, and a negative but non-significant correlation was found ( $r = -0.49, p < 0.07$ ) for the proportion of CS

and receptive vocabulary scores per the *PPVT*. Figure 1 demonstrates that, as vocabulary scores fell on the *TVIP*, code switching by participants was more frequent.

Figure 1.

*Correlation between Code-Switching Proportions in Spanish Samples and TVIP*

*Standard Scores*



*Note.* TVIP\_SPA\_SS = standard score on the *TVIP*, Proportions\_Span = proportion of code-switched events produced by participants in Spanish mode language samples

*Is there a relationship between CS and fluency?*

We hypothesized that if CS is used to fill lexical gaps and disfluencies are a marker of linguistic uncertainty, then there will more disfluencies immediately prior to CS events. To test this hypothesis, a chi-square goodness of fit test was performed to investigate the relationship between the position of disfluencies and the number of code-switched events. These data were pooled raw counts of disfluencies, code-switched events with disfluencies preceding them, and total code-switched events across subjects. The relation between these two variables approached, but did not reach significance ( $X^2(3, N=14) = 3.57, p = 0.06$ ). An illustration of the chi-square test demonstrating the non-significant relationship between position of disfluencies and number of code-switched events is presented in Table 1. A simple linear regression was calculated to determine if the proportion of CS related to the proportion of disfluent speech across children's samples. A non-significant negative correlation was found ( $r = -0.19, p < 0.51$ ). This finding suggests no significant relationship between proportions of CS and disfluencies that occur across children's samples.

Table 1.

*Chi-Square Test Investigating Disfluencies with Code-switched Events*

	CS	Not CS	<i>Marginal Row Totals</i>
Disfluent	60	107	167
Fluent	458	1126	1584
<i>Marginal Column Totals</i>	518	1233	1751

*Note.* CS = number of code-switched events in Spanish mode language samples either with (Disfluent) or without (Fluent) disfluencies, Not CS = number of non-code-switched events in Spanish mode language samples either with (Disfluent) or without (Fluent) disfluencies

*Is language proficiency related to the frequency of CS events with disfluencies?*

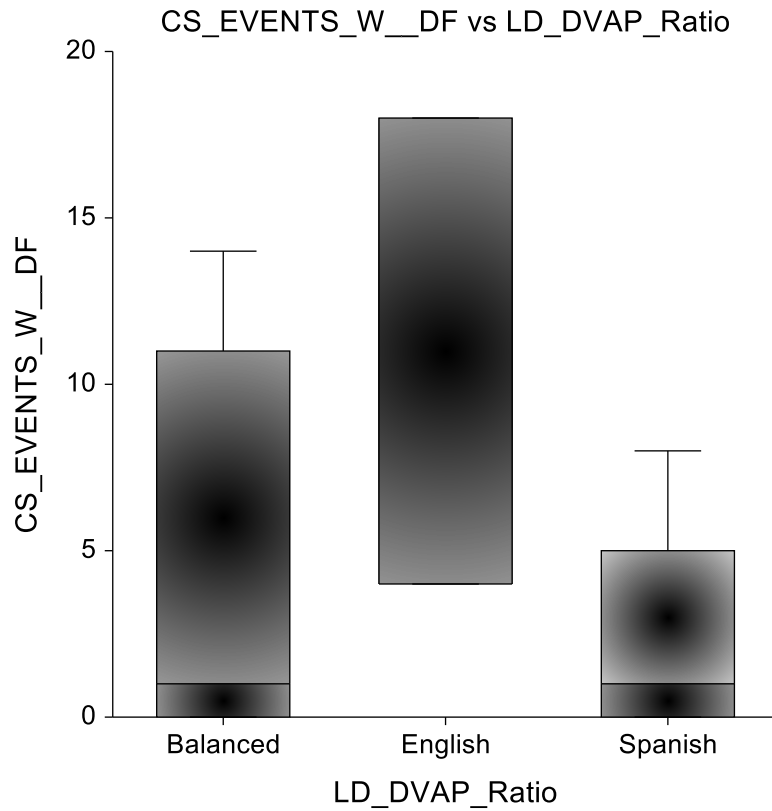
We hypothesized that, if language proficiency is related to CS for lexical gap purposes and disfluencies are a marker of linguistic uncertainty, then more CS events with disfluencies would occur in the child's less dominant language. To test this hypothesis, a Kruskal-Wallis test was conducted to compare the effect of the number of code-switched events with disfluencies preceding them on language dominance groups per parental report. There were no statistically significant differences between the proportion of code switched events with disfluencies and language dominance groups (Kruskal-Wallis  $H = 2.57, p = 0.28$ ). A representation of the non-significant



relationship between code switched events with disfluencies and language dominance groups is demonstrated in Figure 2.

Figure 2.

*Relationship between Code-switched Events with Disfluencies and Language Dominance Groups*



*Note.* CS\_EVENTS\_W\_DF = proportion of code-switched events with disfluencies in Spanish mode language samples, LD\_DVAP\_Ratio = language dominance groups based on DVAP ratios

### Post Hoc Analyses

*Are there differences in what types of CS children use?*

We divided intra-sentential code-switch types into either insertions (e.g., “The dog is blanco and so small”) or alternations (e.g., “The dog is blanco y es tan pequeño”) to investigate possible differences in cognitive and linguistic functions when using either type of code-switch, as found in previous literature (e.g., Green & Wei, 2014). Analysis of code-switched types were conducted for a total of 9 out of 14 children. A paired t-test demonstrated a significant difference in greater use of insertions ( $M = 0.95$ ;  $SD = 0.09$ ) than alternations ( $M = 0.05$ ;  $SD = 0.09$ );  $t(8) = 14.49, p = .001$ ).

*For instances of code-switched words (i.e., insertions), is there evidence anywhere else in the sample of the child using that word in the target language?*

Descriptive analysis of code-switched words (i.e., insertions) was conducted in order to investigate further possible precipitations of code-switched events. Recall that proportions of code-switched words were calculated across all children. To find a proportion for translational equivalents, all words that were found were divided by the total number of different code-switched words in each sample. Translational equivalents in the opposite language were found in 26% of two English and 13 Spanish samples across all children. Words that were always code-switched in samples were also investigated. To find the proportion of words that were always code-switched, all words that were found were divided by the total number of different code-switched words in each sample. Approximately 23% of words were

always code-switched across all children. Finally, approximately 51% of words were not found in other places in the samples; however, they were also not found to be code-switched in other instances. These code-switches were analyzed separately due to the fact that we were unable to determine if children were given other opportunities to produce the word in the target language. Appendix B lists tables of each child's different code-switched words and their translational equivalent. The tables also show whether the translational equivalent of the word was found, if the code-switched word was always code-switched, and if it is unknown whether the code-switched word was known to the child, since there are no other instances of the child producing the word.

*Are there differences in disfluency when bilingual children use their two languages based on their language dominance category?*

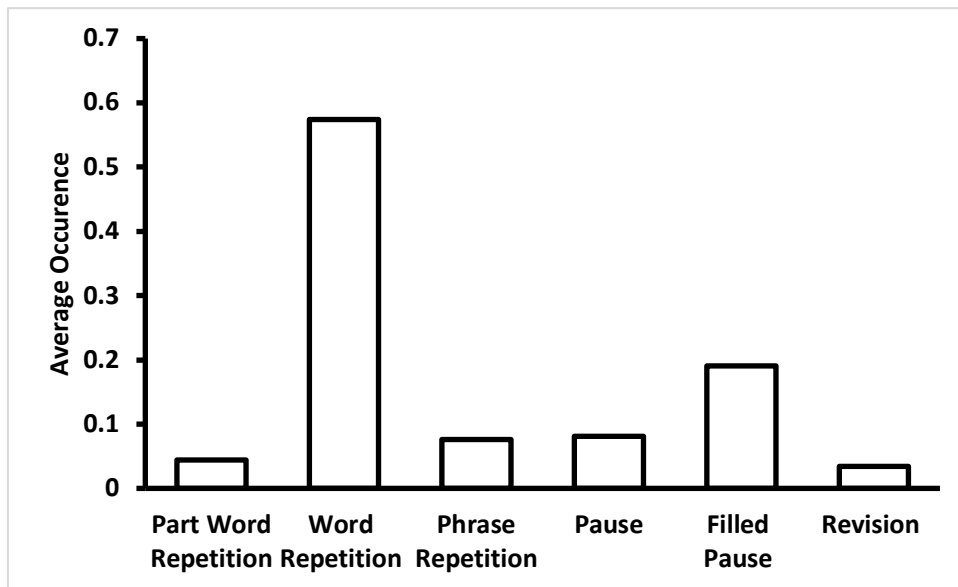
A one-way ANOVA was conducted to compare the effect of the proportion of total disfluencies in Spanish mode language samples on language dominance groups per parental report. There were no statistically significant differences between the proportion of total disfluencies in Spanish language samples and language dominance groups as determined by a one-way ANOVA ( $F(2, 11) = 1.16, p = 0.35$ ).

*What types of disfluencies occur prior to code-switched events?*

For children with disfluencies occurring prior to a code-switched event, an analysis of disfluency types was conducted. The average total proportion of disfluency types occurring in the Spanish mode across all children are indicated in Figure 3. In English mode samples, only one disfluency prior to a CS event was noted. This child used a phrase repetition prior to an insertion code-switch type.

Figure 3.

*Average Disfluency Types Occurring Prior to a Code-switched Event*



*Note.* Average Occurrence = total number of disfluency type divided by total number of disfluencies across all participants

*What types of code-switched events have disfluencies prior to them?*

A paired sample t-test was utilized to investigate the proportion of intra-sentential code-switch types occurring after a disfluency. There was a significantly greater use of insertions ( $M = 0.85$ ;  $SD = 0.34$ ) than alternations ( $M = 0.15$ ;  $SD = 0.34$ );  $t(8) = 3.12, p = 0.01$ ).

## Chapter 4: Discussion

### Findings from Research Questions

The present study found a significant negative correlation between proportions of CS and measures of receptive vocabulary (i.e., *TVIP*). That is, children who had lower proportions of CS in Spanish mode language samples had better receptive vocabulary scores in Spanish than children with higher proportions of CS. This finding demonstrates that in our samples, CS may be an indicator of low lexical knowledge in the language mode the child is speaking in. Since our findings with diversity of expressive vocabulary are mixed, CS may be more related to general word access than word knowledge. It has been hypothesized that children decide to code-switch because the word in their more proficient language is more readily and easily available at the time that they need to use it (e.g., Green & Wei, 2014). In addition, given our finding that high and low CS groups and other measures of vocabulary diversity (i.e., *NDW*) were not significantly different, CS does not appear to be *only* related to vocabulary abilities, at least in this group of children and in this group of language samples. This conclusion is similar to what others have found. For example, Yow and Patricia (2015) found a significant and positive correlation between proportions of code-switched utterances and language measures, such as mean length of utterance (*MLU*) and number of different word roots (*NWDR*) in bilingual early school-aged children.

Based on our findings on the relationship between CS and vocabulary, we next discuss clinical implications for speech-language pathologists (*SLPs*). Often, during assessment with bilingual children, *SLPs* are advised to collect language

samples in both of the languages that the child speaks. We propose that eliciting a code-switched language sample may be the best way to capture these children's language abilities since we found that CS indeed may be an indicator of lexical gaps. To elicit a code-switch sample, the adult interlocuter can code-switch while interacting with the child to prompt CS. Alternatively, SLPs might try to elicit samples in both languages that sample from both BICS and CALP vocabulary sets (e.g., home vs. academic scenarios). Our findings with CS and vocabulary indicate that overall language abilities may be captured best when children are free to use either one of their languages to fill in gaps, if needed. This recommendation is related to what Cummins (1984) explains as the BICS and CALP gap that bilingual children undergo in the early school-age years.

This study did not find a significant relationship between disfluencies and CS events. Further, we did not find a significant relationship between disfluencies with code-switched events and language dominance categories. The Demands and Capacities Model explains that bilingualism, in general may impose a cognitive demand on children learning two languages, which may be exacerbated by imbalanced language proficiency (Starkweather & Gottwald, 1990). If indeed an indication of linguistic uncertainty, this demand may lead to more instances of CS and disfluencies in a child's less proficient language. However, the findings of the present study do not demonstrate that bilingualism imposes a cognitive demand on preschool aged children, as measured by disfluencies with CS events. These findings are similar to results found in the literature for bilingual adults (e.g., Hlavac, 2011; Wilson & Dumont, 2015). As other researchers have noted, it is difficult to

investigate this relationship due to the fact that CS often appears without disfluencies as well (Hlavac, 2011).

Although this study did not find a clear relationship, other studies have found patterns between occurrences of CS and disfluencies, such as disfluencies occurring more often with specific morphological and phonological characteristics (Hlavac, 2011). However, Hlavac (2011) along with other researchers (e.g., Bedore et al., 2006) have proposed that maze use and CS may be more of an indication of higher level language ability than of linguistic uncertainty in school-aged bilingual children and older bilingual adults. In fact, researchers find that CS patterns used by bilingual adults are produced with specific cognitive and linguistic strategies to facilitate comprehension to listeners (see Dussias, Guzzardo Tamargo, Kroff, & Gerfen, 2014). We conclude that disfluencies were not an indicator of linguistic uncertainty, and that CS and language proficiency were not indicators of increased cognitive demand in our sample of TD bilingual children.

#### *Findings from General Results and Post Hoc Analyses*

In general, this study found a significant difference in CS and language direction; code-switched events occurred more frequently in the Spanish mode. Researchers have found similar results and discuss what these findings mean regarding maintaining bilingualism in the United States (e.g., Fillmore, 1991; Portes & Schauffler, 1994; Restrepo, 2003; Restrepo & Kruth, 2000). Given that the U.S. is an English dominant society, language attrition is occurring more frequently and rapidly, and may be more likely to occur with children who are second and third generation children of immigrant families (e.g., Fillmore, 1991; Portes & Schauffler,

1994). Certainly, the children in this sample were challenged more to respond to their caregivers in Spanish than English.

This finding has important implications for SLPs working with bilingual children and families. Bilingual families may believe myths that bilingualism causes disruptions in language abilities, especially in children who are not typically-developing; however, it is imperative for the SLP to educate families that research has shown the opposite (e.g., Dai, Burke, Naigles, Eigsti, & Fein, 2018; Gutierrez-Clellen, 1999) and families should continue to maintain bilingualism in the household as it will provide best treatment outcomes (e.g., Gutierrez-Clellen, 1999; Thordardottir, 2010). Although maintaining bilingualism when the heritage language is not the language of the wider community appears difficult, researchers have provided recommendations to maintain the L1 in the home. These recommendations include enrolling children in schools that encourage bilingual instruction, such as immersion programs, providing as much L1 input possible in the home, encouraging the child's use of their L1, and showing television shows in the L1 (e.g., Ebert, Kohnert, Pham, Disher, & Payesteh, 2014; Farver et al., 2009; Lugo-Neris, Jackson, & Goldstein, 2010; Restrepo, Morgan, & Thompson, 2013; Ribot et al., 2018; Uccelli & Pérez, 2007).

Code-switch types were also analyzed in the present study. We found that of intra-sentential code-switch types, children used more insertions in comparison to alternations. This result is similar to what was found in a study with older Welsh-English bilinguals, who exhibited more insertion code-switch types in comparison to alternations (Deuchar, 2005). However, this result is in contrast with what was found



in a study with low and high fluency Spanish-English older bilinguals, who exhibited more alternations and dense code-switch types, respectively (Lipski, 2014).

Researchers have found differences in cognitive load and language proficiency with using insertion and alternation types of CS (Green & Wei, 2014; Gross et al., 2019). We propose that insertions may be used more often as lexical gaps than alternation code-switched types, given their nature. That is, to use alternation code-switched types, children must have both lexical and syntactic expressive abilities of the language, whereas children only need lexical expressive abilities of the language to use insertion code-switched types. Previous research supports that higher level cognitive skills may impact how children compensate for lexical gaps. In a study with Mandarin-English bilingual children, Sheng (2014) discovered that, in a lexical-semantic task, older bilingual children were more likely to make advanced linguistic errors, such as use of words that were similar in meaning, rather than code-switches or “don’t know” responses. Sheng (2014) attributes this finding to the older children’s more advanced cognitive and language skills. We propose that analyzing code-switch types in language samples may provide the SLP with further information related to the child’s language abilities and profile. That is, if the child is mostly using insertion CS types, they may consider if the child has lexical gaps in their L1 or L2, although our findings do not firmly establish that lexical gaps provoke code switches. For example, the SLP may utilize conceptual vocabulary scoring techniques to investigate if a child uses a word in either language, and further probe to analyze if the child is able to use or identify a word in the target language. This information may help the SLP with differential diagnosis and may help to identify strategies to

collaborate with teachers or other members of the classroom to support the L1 if gaps are observed, for example.

Finally, we analyzed what types of intra-sentential CS events occurred more often before disfluencies. We found that more insertions occurred after disfluencies in comparison to alternation CS types. This result further supports that insertions may be a better indicator of CS types that are used as lexical gap fillers in comparison to alternations. However, we acknowledge that conclusions as these require further research as the present study did not find a clear and significant relationship between disfluencies and CS.

### Limitations

Our first limitation is the small sample size of children observed in this study. It is difficult to generalize findings from this study given the diversity in bilingual populations, and the diversity in the participants themselves. It is likely that CS patterns, in general are a child-specific phenomena, making individual findings difficult to generalize to groups of bilingual children. Furthermore, many findings did not reach statistical significance, although a few approached this threshold. It is probable that observing more participants may have changed the statistical significance of some findings; however, this is also difficult to predict given the heterogeneity of the participants observed.

Another limitation of this study is the age of the participants observed and their profiles of bilingualism. Given that most children did not code-switch in English-mode samples, analyzing their CS patterns in both of their languages was not possible. This is difficult to control given that language attrition is becoming more

common in younger generations (e.g., Fillmore, 1991; Portes & Schauffler, 1994); however, it is probable that observing younger participants may have allowed us to conduct more analyses in the English language mode samples. We also acknowledge that the nature of how language samples were collected may have impacted CS patterns; children were free to play with whatever toys they deemed interesting and free to speak which language they wanted to.

Finally, limitations existed in the methodology of the present study. Some language samples occurred with parents as the interlocutors; however we did not ask nor have any way of measuring how often CS was common in the household. We also utilized parental report measures to identify if children were typically developing, however, there was no way of determining if this report was reliable and valid. These limitations also make it difficult to generalize results to all bilingual populations, and research is further needed to understand CS patterns in bilingual preschool-aged children.

### *Future Directions*

We found in the present study that CS patterns may be a child-specific phenomenon. Translational equivalents of code-switched words were found in about one-third of language samples across all children, and about half of the code-switched words were not found code-switched or as translational equivalents in other parts of the language sample. We are unable to conclude if half of the words analyzed were either stored or able to be retrieved from the child's lexicon in the moment of CS. From this descriptive analysis, the question remains of what prompts CS when the word appears to be within your lexical and phonological lexicon? We recommend

future research to investigate patterns in each child separately and to further investigate if code-switched words that were classified as ‘unknown’ can be found in children’s vocabulary test and *DVAP* results. That is, is there evidence of the child using or knowing the code-switched word during administration of the *PPVT* or *TVIP*, or does the parent report the child using the word per the *DVAP*? If so, more sensitive, timed tasks may be required to judge whether CS results from access constraints rather than knowledge gaps.

Future research may also want to investigate CS patterns prompted by a code-switched language sample. The present study investigated CS in specific language modes; however, more information regarding possible precipitations of code-switched events in preschool aged children may arise with a code-switched language sample. Furthermore, researchers may want to investigate these events in a more structured method, such as during a story retell of the same book across all participants to better generalize results.

Finally, although this study did not find a clear relationship between disfluencies and CS events, we did find that there was a weak correlation between these variables. Future research may want to investigate other variables that may be indicative of linguistic uncertainty to better understand why children code-switch, such as investigating speech rate prior to CS events.

# Appendices

## Appendix A

Caregiver questionnaire.

**Subject ID#:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **VISIT: 1 2 3 4 5**

Person completing form (please circle one):

**Mother**      **Legal Guardian**      **Other:** \_\_\_\_\_

The following questionnaire requests case history information that may be relevant to the research questions being examined in the study. This information will remain completely confidential and will only be available to the researchers conducting the study. If any of this information is used in the final research report, all identifying information will be removed.

Please fill out the following information as completely as possible.

**1.1 Child's gender: M / F**      **1.2 Date of Birth: \_\_\_/\_\_\_/\_\_\_\_\_**

Please indicate the race/ethnicity of each parent or legal guardian and the participant. Check all that apply. These data are for reporting purposes only.

**2.1 Parent / Legal guardian 1:**

\_\_\_ African American      \_\_\_ Hispanic      \_\_\_ Caucasian (white)  
\_\_\_ Asian      \_\_\_ Native American      \_\_\_ Pacific Islander  
\_\_\_ Other: \_\_\_\_\_

2.1.1 My Native Language: \_\_\_\_\_

**2.2 Parent / Legal Guardian 2:**

\_\_\_ African American      \_\_\_ Hispanic      \_\_\_ Caucasian (white)  
\_\_\_ Asian      \_\_\_ Native American      \_\_\_ Pacific Islander  
\_\_\_ Other: \_\_\_\_\_

2.2.1 Native Language of Parent / Legal Guardian 2: \_\_\_\_\_

**2.3 Child:**

\_\_\_ African American      \_\_\_ Hispanic      \_\_\_ Caucasian (white)  
\_\_\_ Asian      \_\_\_ Native American      \_\_\_ Pacific Islander  
\_\_\_ Other: \_\_\_\_\_

2.4 Mother: What is your highest completed educational level? (Circle one)

- A. No formal schooling
- B. Grade school:      ( Some / Completed )
- C. High school:      ( Some / Completed )
- D. College or associate degree: ( Some / Completed )
- E. Graduate degree(s):      ( Masters / Doctorate )      Other: \_\_\_\_\_

2.5 Number of caregivers (e.g., mother, father, grandparent, nanny, others) currently in household: \_\_\_\_

2.6 Number of siblings: \_\_\_\_

2.6.1 Ages: \_\_\_\_\_

3. Primary language spoken in the home: \_\_\_\_\_

3.1 Is your child exposed to any other languages during the day? Y / N

3.1.1 If so, which one(s)? \_\_\_\_\_

3.1.2 For approximately how many hours a day? \_\_\_\_

3.2 Has your child spent one month or longer outside of the U.S. during the past year? Y / N

3.2.1 Where? \_\_\_\_\_

3.2.2 For how long? \_\_\_\_\_

4. Where does your child spend most of the day Monday through Friday?

4.1 At home with me and/or another primary caregiver (please name: \_\_\_\_\_ )

If there is an additional primary caregiver, is this person:

4.1.1 \_\_ a relative      \_\_ a "nanny" or unrelated child care provider

4.1.2 Is this person a native speaker of English? Y / N

4.1.3 If not, what is this person's native language? \_\_\_\_\_

4.2 In a day care with \_\_\_\_ other children ages \_\_\_\_ to \_\_\_\_ (if your child is in a classroom inside a larger facility, estimate the number of other children in your child's "classroom")

5. How many TVs are in the household? \_\_\_\_

5.1 Please estimate how many hours per day the TV is on \_\_\_\_

5.2 Please estimate how many hours of screen time (TV/movies/tablet animations) your child watches per day \_\_\_\_

5.3 What is your child's favorite TV show(s)? \_\_\_\_\_

5.4 What is your child's favorite DVD or video? \_\_\_\_\_

6. Does your child play computer/tablet games? Y / N

6.1 If so, how many hours per day? \_\_\_\_

6.2 What is your child's favorite computer/tablet game? \_\_\_\_\_

7. Does your family own any pets? Y / N

7.1 If so, how many? \_\_\_\_

7.2 What kind(s)? \_\_\_\_\_

8. Do you and your child ever read books together? Y / N

8.1 If so, on average, *how many books per week* does your child have read to him/her? \_\_\_\_

8.2 Please estimate: How many books do you own? \_\_\_\_

8.3 How many children's books does your child have? \_\_\_\_  
(do not count books that are primarily used by your child's siblings)

8.4 Does your child ever pretend to read books? Y / N

8.5 Does your child have a favorite book? Y / N

8.5.1 If so, what is it? \_\_\_\_\_

9. On average, how much time per day do you (and other adults in your household) spend in one-to-one **conversation** with your child? \_\_\_\_

10. On average, how many hours per day do you (and other adults in your household) spend in one-to-one **play** with your child? \_\_\_\_

11. On average, how many hours per day does your child spend playing alone? \_\_\_\_

12. On average, how many hours per day does your child spend playing with other children? \_\_\_\_

13. Does your child have a history of ear infections? Y / N

13.1 How many? \_\_\_\_

13.2 How many in the past year? \_\_\_\_

14 Do you have any concerns about your child's development? Y / N

14.1 If so, please describe: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

15 Has your child had any major medical events? Y / N

15.1 If so, please describe: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

15.2 At what age(s)? \_\_\_\_\_  
 15.3 Number of hospitalizations: \_\_\_\_\_  
 15.4 Length of hospital stay(s): \_\_\_\_\_

16 Has your child ever been diagnosed with a condition that might impact his/her language development or school performance? Y / N

16.1 If so, please describe: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

17 Is there any history of language and/or learning disabilities in your immediate family (you or your child's other biological parent, grandparents, aunts/uncles/cousins, siblings) such as problems paying attention, reading, speaking (stuttering or articulation problems), learning, or other school problems?

Y / N

17.1 If so, please describe: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

18 Have any of your child's siblings had delays in meeting developmental milestones? Y / N

18.1 If so, please describe: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

SLAS1. Please rate your child's language skills in English relative to those of other native-English-speaking children his or her own age:

1	2	3	4	5	6	7
very			normal			very
low			for age			high

SLAS2. If your child is learning Spanish  
 Please rate your child's language skills in Spanish relative to those of other Spanish-speaking children his or her own age:

1	2	3	4	5	6	7
very			normal			very
low			for age			high

SLAS3. Please rate your child's social skills relative to those of other children his or her own age:

1	2	3	4	5	6	7
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very                      normal                      very  
low                      for age                      high

SLAS4. Please rate your child's ability to say sentences clearly enough to be understood by strangers:

1    2    3    4    5    6    7  
very                      normal                      very  
low                      for age                      high

SLAS5. Please rate the number of words your child knows, compared to other children his or her age:

1    2    3    4    5    6    7  
very                      normal                      very  
low                      for age                      high

SLAS6. Compared to other children, please rate how well your child responds when you call his or her name:

1    2    3    4    5    6    7  
very                      normal                      very  
low                      for age                      high

SLASF. Compared to other children his/her age, how fluent is your child's speech (free of repetitions, hesitations, and use of fillers such as "um" or "uh")

1    2    3    4    5    6    7  
very                      normal                      very  
low                      for age                      high

**19. Is there anything else you'd like us to know about your child, so that we can appreciate his/her development throughout this study better?**

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Appendix B

Descriptive analysis of code-switched words.

*English Samples*

*Child 1*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Tijeras	Scissors	Unknown

*Child 2*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Pequeño	Small	Found
Grande	Big	Found
Niños	Kids/children	Unknown
Agua	Water	Found

*Spanish Samples*

*Child 1*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Hey	Hola	Unknown
Whoa	Vaya/guau	Unknown

*Child 2*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Poop	Caca/popó	Always CS
Cake	Pastel	Unknown
Okay	Bien	Unknown
Ice cream	Helado	Always CS
Favorite	Favorito	Unknown
Waffle	Wafle	Unknown
Candies	Dulces	Unknown
Wow	Guau/vaya	Always CS
Yellow	Amarillo	Unknown
Blue	Azul	Unknown
Green	Verde	Found
Red	Rojo	Found
Movie	Película	Found

Popcorn	Palomitas	Always CS
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*Child 3*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Yeah/yep	Sí	Found
Purple	Morado	Unknown
Acabar	Finish	Unknown
Baby	Bebé	Found
What	Qué	Always CS
Waffle/Waffles	Wafle/Wafles	Always CS
Wow/woah	Guau/vaya	Unknown
Mami	Mommy	Found

*Child 4*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Stickers/sticker	Pegatina	Always CS
Pie	Pay/tarta	Unknown
Okay	Bien	Unknown
Cookie	Galleta	Always CS

*Child 5*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Here	Aquí	Always CS
Yes	Sí	Found
Papi	Daddy/dad	Found
Mami	Mommy/mom	Found
Piggy	Cerdo	Unknown
Telephone	Teléfono	Found
Spoon	Cuchara	Always CS
Okay	Bien	Always CS
First	Primero	Always CS
Aguacate	Avocado	Unknown
Anywhere	Cualquier	Always CS
Knife	Cuchillo	Found
Teléfono	Telephone	Found
Llave	Key	Always CS
Queso	Cheese	Found

Please	Por favor	Always CS
Doctora	Doctor	Found

*Child 6*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
More	Más	Unknown
This	Este	Always CS
Bye	Adios	Unknown
Hey	Hola	Unknown
Eyes	Ojos	Always CS
Orange	Anaranjado	Unknown

*Child 7*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Okay	Bien	Always CS
Ice cream	Helado	Found
Yeah	Sí	Found

*Child 8*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Wow	Guau/vaya	Unknown
Mine	Mío	Always CS
Cupcake	Magdalena	Unknown
Milkshake	Batido	Unknown
Yes/yeah	Sí	Always CS
Where's	Dónde	Unknown
Mami	Mom/mommy	Found
Ice cream	Helado	Unknown
What	Qué	Always CS
Here	Aquí	Found
Apple	Manzana	Unknown
White	Blanco	Unknown
Cuchillo	Knife	Always CS
Cookie	Galleta	Unknown
Green	Verde	Unknown
Black	Negro	Unknown
Brown	Café	Unknown

Red	Rojo	Unknown
Yellow	Amarillo	Unknown
Potato	Papa	Unknown
Waffle	Wafle	Always CS
Zanahorias	Carrots	Unknown
Don't	No	Found
Help	Ayuda	Unknown

*Child 9*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
We	Nosotros	Unknown
Car	Carro	Always CS
Mom	Mami	Always CS
Toys	Juguetes	Unknown
Phone/Telephone	Teléfono	Unknown
Yeah/yes	Sí	Always CS
Bloques	Blocks	Found
Yellow	Amarillo	Unknown
Okay	Bien	Always CS
Hello	Hola	Always CS
Home	Casa	Unknown
Here	Aquí	Found
There	Ahí	Always CS
Truck	Camión	Unknown
Back	Espalda	Unknown
Front	Frente	Unknown
Blue	Azul	Unknown
Horse	Caballo	Found
Bye	Adios	Unknown
Boat	Barco	Unknown
Canasta	Basket	Unknown

*Child 10*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Yeah/yes	Sí	Found
Okay	Bien	Always CS
Mami	Mommy/mom	Unknown
Gone	Ausente	Always CS
Bicycle	Bicicleta	Found
Why	Por qué	Unknown
Blue	Azul	Always CS
Nothing	Nada	Always CS
Red	Rojo	Found
Pink	Rosado	Always CS
Train	Tren	Always CS
Hello	Hola	Always CS
Curita	Band-aid	Unknown
I'm	Soy/estoy	Unknown
Another	Otro	Always CS
Bomberos/bombero	Firefighter	Always CS
But	Pero	Unknown
Astronaut	Astronauta	Always CS

*Child 11*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Happy birthday	Feliz cumpleaños	Unknown

*Child 12*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Purple	Morado	Unknown
Yeah	Sí	Found
Tren	Train	Found
More	Más	Found
Train	Tren	Found
Mami	Mom/mommy	Always CS
Not	No	Found
Parking	Estacionamiento	Unknown
Please	Por favor	Found
Okay	Bien	Unknown
Yellow	Amarillo	Found
Black	Negro	Unknown

*Child 13*

<b>CS Words</b>	<b>Translational Equivalent</b>	<b>Found, Always CS, Unknown</b>
Okay	Bien	Always CS
Mine	Mío	Unknown
Yeah/yup	Sí	Found
Nope	No	Found
Wow	Guau/vaya	Unknown
Mom	Mami/mama	Found
Miss	Señorita	Unknown

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