PHONOLOGICAL PRODUCTIONS OF SPANISH-SPEAKING CHILEAN AND MEXICAN-AMERICAN PRESCHOOLERS

by

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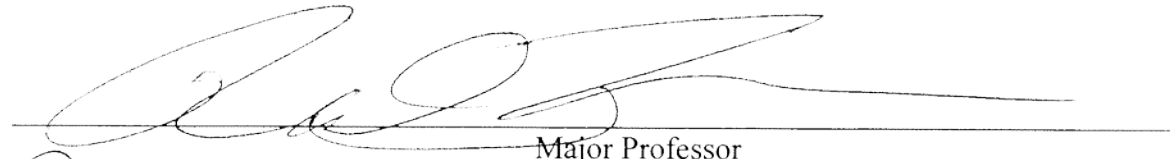

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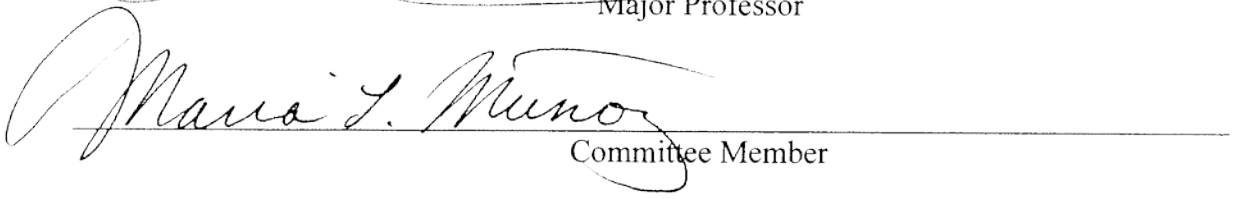

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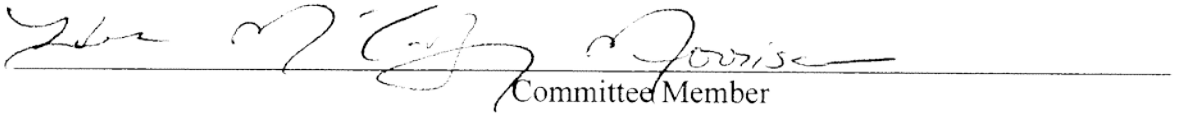

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LITERATURE REVIEW

A child's ability to communicate and be understood by others is critical for his/her early academic success. Children with reduced intelligibility (i.e., unintelligible speech; speech-sound disorders) often have concomitant difficulties with skills related to literacy (Rvachew & Grawberg, 2006) and comprise the largest number of individuals on clinician caseloads in the school setting (ASHA, 2004). For the monolingual English speakers, speech-language pathologists (SLPs) have developmental milestones and assessments on which to base diagnoses (Prezas & Hodson, 2007). However, data regarding children who speak other languages are sparse. Practitioners, for example, often rely on English-speaking norms when assessing the intelligibility of predominantly Spanish-speaking children (Skahan, Watson, & Lof, 2007). As a result, many monolingual Spanish and bilingual (Spanish-English) children are over or under identified for special education services (Goldstein, 2004).

Although valid normative data are needed for all children, there is a dire need for additional data on children who speak Spanish as their first language. In the United States, a dramatic increase of the Hispanic population is causing a need for normative data in Spanish in order to assess and treat children with speech and language disorders in their native language (e.g., Goldstein, 1995; Goldstein, 2002; Iglesias, 2001; Kaiser, 1998). Specifically, additional information is needed regarding phonological patterns (i.e., sound classes) as well as phonological dialectal differences that exist among Spanish-speaking children. The United States Census Bureau (USCB, 2008) reports that the influx of Hispanics from 2008-2050 will increase from 46.7 million to 132.8 million. Projections reveal that by the year 2050, one third of the U.S. population will be Hispanic and that Spanish-speaking children will comprise 39% of the total

population. The USCB estimates show a 17% increase from the current Hispanic population. This is critical, because Spanish-speaking children comprise the majority of English Language Learners in the schools, a group that has grown exponentially within the last ten years (USCB, 2008).

In addition to the increase of the Hispanic population in the United States, bilingual (Spanish-English) diagnosis and treatment can be challenging for SLPs because of inadequate normative data on the phonological development and disorders of the Spanish-speaking population (Goldstein, 1998). Assessment instruments and procedures that effectively diagnose Spanish-speaking children are lacking (e.g., Goldstein, 2002). Currently, children who speak Spanish are, in some cases, primarily assessed and diagnosed using normative data in English (Skahan, Watson, & Lof, 2007). However, Jimenez (1987, p. 357) points out that "Normative data regarding the development of English consonants cannot be applied to Spanish."

Children are diagnosed as having a speech disorder if they do not develop certain speech sounds at which typically developing children do according to developmental norms (ASHA, 2009). Researchers have studied the acquisition of speech sounds/phoneme inventories (e.g., Jimenez, 1987; Linarez, 1981; Stoel, 1973) and phonological patterns (e.g.,Goldstein & Iglesias, 1998; Goldstein & Iglesias, 1991; Goldstein & Iglesias 2001; Prezas, 2008). The data provide important milestones of Spanish speech acquisition, which will be discussed more in depth in order to understand speech sound and phonological development.

Speech Sounds and Phoneme Acquisition

Speech sounds are the phonemes or sound classes of a language. In the English language, for example, there are 26 consonants, nine vowels (Mendez, 1982), and a total of 17 vowels when diphthongs are included (Goldstein, 2001). Spanish, on the other hand, has five vowels /i, e, a, o, u/ (Mendez, 1982) and 18 consonants (Goldstein, 2004). According to Goldstein (1995),

the Spanish front vowels are /i/ and /e/, and the back vowels are /u/, /o/, and /a/. There are many allophones of Spanish (e.g., /b/→/ß/, /d/→/ð/, /g/→/ɤ/, /x/→/h/, /r/ (tap)→/R/ (trill), /l/, and /r/→/R/) that generally occur intervocalically. Spanish contains the voiceless unaspirated stops /p, t, k/, the voiced stop /b, d, g/, the voiceless fricative /f, s, x/, the affricate /ʧ/, the glides /w, j/; the lateral /l/; the tap /r/ and trill /R/; and the nasals /m, n, ɲ/ (Goldstein, 1995). Spanish dialects vary by changes in consonants (see Table 1).

Table 1: Phonemes of the Spanish Language

	Labial	Labio-Dental	Dental	Alveo-Palatal	Velar	Glottal
Stops	[p] [b]		[t] [d]		[k] [g]	
Affricates				[č]		
Fricatives		[f] [v] [b̆]	[đ] [s] [z]	[š]	[x] [g]	[h]
Nasals	[m]	[ɱ]	[n]	[ñ]	[ŋ]	
Laterals			[l]			
Semi-Consonants	[w]		[y]			
Vibrants		Tap Trilled	[r] [r̃]			

Spanish Vowels

	Front	Central	Back
High	[i]		[u]
Mid	[e]		[o]
Low		[a]	

Note: From Maez (1985).

According the studies that have been conducted on Spanish-speaking children, it has been found that by the age of four, Spanish-speaking children have acquired the majority of consonants with greater than 90% accuracy, with the exception of the phonemes /g/, /f/, /s/, /R/

(trill), and /ɾ/ (flap) (Eblen, 1982; Goldstein, 1995; Jimenez, 1987). By the time the children are seven, all the sounds except the following are mastered, /x/, /s/, /ʃ/, /l/, /ɾ/ (flap), and /r/ (trill) (Acevedo, 1993; De la Fuente, 1985).

According to Stoel's (1973) examination of speech sound classes, it was found that /r/, /ɾ/, and /l/ are the latest acquired sounds in Spanish, /ɲ/ is often substituted for /n/, and the nasals are acquired in a specific order (/m/, /n/, /ɲ/ and /ŋ/). According to the Macken (1975) study, the following results were found according to speech sound acquisition: stops occur before nasals, nasals occur before fricatives, fricatives and affricates occur before liquids, and the frontal consonants occur before back consonants. In another examination of Spanish speech sound acquisition, Mason, Smith, and Hinshaw (1976), suggested that the consonants /p, b, t, k, g, m, x, y/ and their allophonic counterparts are acquired by the age of 4 with a mastery of 90%. This holds true as well for all vowels (except /e/). By the age of 5, /l/ and /t/ were acquired, by the age of 6 /n, ɲ, f, s, ɾ/ were acquired, by the age of 7, /r/ (trill) was acquired, and finally by the age of 9, /d/ was acquired.

Linares's (1981) findings indicated that by the age of 3, Spanish-speaking children had developed more than half of the Spanish consonants they had been presented with at least 90% accuracy. The sounds /b/, /s/, and /r/ were not developed until the age of 5 years old. Similar results were found in another study by Linares of older children (5-8 years old). Except for /b/, /s/, /r/, /ɾ/ and /ß/ the majority of the consonants were mastered with at least 90% criterion. By the age of 7, these children have mastered all speech sounds with at least 90% accuracy with the exception of /x/, /s/, /tʃ/, /l/, /ɾ/ (tap), /R/ (trill), and consonant clusters (Acevedo, 1993; De la Fuente, 1985).

Jimenez (1987) studied the speech acquisition 120 monolingual Spanish-speaking children of the Mexican descent, aged 3;0 to 5;7. The children were divided into eight equal groups according to age, examining the 18 consonants in Spanish in initial, medial, and final position where appropriate. The children were prompted to respond spontaneously or from a delayed model using 38 line drawings. The children's dialect was taken into account when scoring their responses. The results showed that variability between the children was low on the early developing consonants and high on the later developing consonants, with /s/ showing the greatest variability. The tap /ɾ/ developed a whole year sooner than the trill /r/ and by the age of 5 /s/ and trill /r/ were still not mastered. The sound /x/ showed a reversal effect, as other previous studies have shown as well (Prather et al., 1975), meaning that they produced the sound correctly 75% of the time, until the following age was reached and production fell below the 75% criterion. According to this study, all of the 4 year old children were able to produce half of the consonants with 90% accuracy and by the age of 5 /s/ and trill /r/ were the only two consonants not reached with 90% accuracy.

Additional researchers (Fantini 1984, Anderson & Smith, 1987, De la Fuente, 1985) all found similar results with one major exception on the tap and trill /r/. Fantini found that children do not develop tap /r/ until 4.5 years old and develop the trill /r/ at 5 years old. De la Fuente reported the children saying tap /r/ at 3.0 years old and trill /r/ at 3.5 years old. Anderson and Smith do not show data on the acquisition of tap or trill /r/ (see Table 2).

Table 2: Spanish Phoneme Acquisition Studies and Results

Study:	Acevedo (1993)	Fantini (1984)	Jimenez (1987)	Linares (1981)	Melgar (1976)	Anderson and Smith (1987)	de la Fuente (1985)
Origin of Participants:	Texas	Texas	California	Chihuahua, Mexico	Mexico City	Puerto Rico	Dominican Republic
Criterion:	90%	Produced	50%	90%	90%	75%	50%
p	3;6	1;6	<3;0	3	3–3½	2	2.0
b	3;6	1;6	<3;0	6	4–4½		2.0
t	3;6	1;6	<3;0	3	3–3½	2	2.0
d	4;0		3;3	4			
k	4;0	2;0	<3;0	3	3–3½	2	2.0
g	5;11+	1;6	3;3	3	4–4½		2.5
ß		2;0		6			
f	3;6	2;6	<3;0	4	3–3½		2.0
ð		1;6		4			
ɤ							2.0
s	4;0	1;6	3;3	6	6–6½		3.0
x	4;0	2;6	3;3				3.0
tʃ	4;6	2;0	<3;0	4	3–3½		2.0
m	3;6	1;6	<3;0	3	3–3½	2	2.0
n	3;6	1;6	<3;0	3	3–3½	2	2.0
ɲ	3;6	2;6	3;7	3	3–3½	2	2.0
l	3;6	2;0	3;3	3	3–3½		2.5
ɾ	4;6	4;5	3;7	4	4–4½		3.0
r	5;11+	5;0	4;7	6	6–6½		3.5
w	3;6	1;6	<3;0	5		2	
j	3;6	1;6	<3;0		3–3½	2	2.5
h–x				3			

Note: From Bedore (1999).

It is important to consider specific factors that exist with the aforementioned studies of phoneme acquisition. First, there are varying criteria levels for phoneme mastery that exist from study to study. For example, Jimenez (1987) used a criterion of 50% accuracy per phoneme. Linarez (1981), on the other hand, used a criterion of 90% accuracy per phoneme. A second factor is that researchers used different positions of phonemes in words when collecting the information. Finally, dialectal differences must be considered when making determinations about phoneme acquisition. Some dialects, such as the Puerto Rican dialect, omit final consonants from words (Goldstein, 1996). More discussion on dialect will be presented later.

Speech Sounds and Phonological Patterns

Phonological patterns are errors occurring regularly in a class of sounds (e.g., final consonant deletion, stopping, gliding). Consonant sequence reduction is the omission of one consonant or more in a sequence (e.g., *street*→[trit]). Cluster reduction is the omission of all the consonants in a sequence (e.g., *tree*→[ti]). Final consonant deletion is the omission of a consonant at the end of the word (e.g., *ball*→[ba]). Fronting occurs when there is a substitution of an anterior consonant for a posterior consonant (e.g., *pat*→[kat]). Backing is the substitution of a posterior consonant for an anterior consonant (e.g., *cat*→[that]). Stopping occurs when there is a substitution of a stop consonant for a fricative, liquid, nasal, or glide (e.g., *Sue*→[tu]). Gliding is the act of replacing a nonglide consonant for a /w/ or /j/ (e.g., *rabbit*→[wabit]) (Hodson, 2007).

Children's phonological patterns will vary by age and frequency, because not all children develop exactly the same. Developmental milestones have been developed in English over the past 30 years in order to determine if a child is presenting phonological patterns past the age they are generally suppressed (Hodson, 2007). According to Preisser, Hodson, and Paden (1988), cluster reduction and deviations of liquids were the most commonly occurring phonological patterns in a study of 60 English-speaking children, examining eight phonological patterns. In another investigation of phonological patterns, Haelsig and Madison (1986) examined the occurrence of 16 phonological processes in typically developing English-speaking children, ages 3-5. The authors of this study deduced that children 3-3 1/2 years old exhibited cluster reduction, weak syllable deletion, glottal replacement, labial assimilation, and gliding most prominently. Children from 4 1/2 to 5 years old displayed the patterns of weak syllable deletion and cluster

reduction. Moreover, from 3 to 4 years of age, phonological patterns were found to have the greatest suppression

Hodson's phonological patterns (see Hodson, 2007) data gives specific developmental milestones that children present at certain ages. These data have been used by many SLPs to diagnose not only monolingual English-speaking children, but also children who are bilingual (English-Spanish). Moreover, these data help determine what phonological patterns a child should or should not be presenting at a certain age. For Example, by the age of two years old, children should have final consonants, use words to communicate, and "syllableness" (i.e., child demonstrates syllable awareness). Children at three years of age have /s/ clusters, anterior-posterior contrasts, and an expansion of their phonemic repertoire. By the age of four, omissions are rare, most "simplifications" are suppressed, and they present adult-like speech. Children five to six years old have liquids /l/ (5 years), /r/ (6 years), and the phonemic inventory is stabilized. By seven years of age, sibilants and 'th' are perfected and the children exhibit speech comparable to an adult.

In order to determine if a child is presenting with a speech sound disorder or phonological disorder in Spanish, there are a handful of studies with normative data for different age groups of children. From a collection of studies on Spanish phonological development, Goldstein and Iglesias (1998) deduced that the majority of phonological patterns of Spanish-speaking children are mastered by the age 3 ½ years old. Typically developing Spanish-speaking preschoolers generally exhibit the phonological patterns of cluster reduction, liquid simplification, and stopping greater than 10% of the time. Goldstein (1999) summarized some of the findings for phonological acquisition of Mexican-American and Puerto Rican children from

the following studies: Acevedo, 1987, 1991; Eblen, 1982; Bleile and Goldstein, 1996; Goldstein and Iglesias, 1996 (see Table 3).

Table 3: Spanish Phonological Patterns

Acquisition by Age 4		
1. mastery (90% accurate) of vowels and many consonants		
2. consonants *not* typically mastered:		
a. g, f, s, ɲ, flap ɾ (martillo), trill r (rojo); consonant clusters (tɾen)		
Acquisition by Age 5		
1. mastery of most consonants		
2. periodic errors on the following consonants:		
a. ð, x (reloj), s, ɲ, tʃ, ɾ, r, l; consonant clusters		
3. moderate occurrences of:		
a. cluster reduction	/tɾen/ (train) → [ten]	
b. unstressed syllable deletion	/elefante/ (elephant) → [fante]	
c. stridency deletion	/sopa/ (soup) → [opa]	
d. tap/trill /r/ deviation	/roo/ (red) → [doo]	
4. low occurrences of:		
a. fronting	/boka/ (mouth) → [bota]	
b. prevocalic singleton omission	/dos/ (two) → [os]	
c. stopping	/sopa/ (soup) → [topa]	
d. assimilation	/sopa/ (soup) → [popa]	
Acquisition by Age 7		
1. mastery of all consonants		
2. infrequent errors on:		
a. x, s, tʃ, ɾ, r, l; consonant clusters		

Note: From Goldstein (1999).

The phonological patterns that are not commonly seen are palatal fronting, assimilation, and final consonant deletion. Children with phonological disorders will display initial consonant deletion, weak syllable deletion, and velar fronting, near 10% of the time. Typically developing and disordered Spanish-speaking children also have been shown to present uncommon phonological pattern development that includes deaffrication, backing, spirantization, and denasalization.

Studies of Predominantly Monolingual Spanish-Speaking Children. In order to provide normative data in the field of Spanish dialect in preschool children, Goldstein and Iglesias (1991)

studied the phonological patterns of 49 children (39 children typically developing and 10 speech-delayed) of the Puerto Rican descent ranging in ages from 3;0-4;11. The children were administered a word specific assessment with pictures to elicit specific phonological patterns, evaluating simple consonant-vowel, consonant-vowel (CVCV) forms, clusters, and multi-syllabic words. The speech productions of the children were analyzed first without taking dialect into account and secondly taking dialect into account for phonological variations. For the typically developing children, the data showed that all syllabic processes tested were affected when taking dialect into account. Other data collected showed that final consonant deletion, liquid simplification, and cluster reduction showed the greatest changes due to dialect. The speech-delayed children showed greater percentages of phonological processes than the typically developing children and more use of syllabic and substitution processes.

In a separate study by Goldstein and Iglesias (2001), one hundred-eight, 3 and 4 year old Puerto Rican children were assessed, using the Assessment of Phonological Disabilities. Nine phonological patterns that are exhibited in the speech of typically developing Spanish-speaking children were studied and include: final consonant deletion, velar fronting, stopping, palatal fronting, liquid simplification, assimilation, weak syllable deletion, cluster reduction, and initial consonant deletion. According to the results of this study, the referent of a dialect should be used when assessing a child because it will change the diagnosis due to differences in production of different speech sounds. All of the children with phonological disorders were still categorized with a phonological disorder when compared to the referent, but severity categories changed to less severe for the majority of the children. The consonant sound categories that determined severity ratings were fricatives, glides, liquids, and nasals. The phonological patterns that dialect had the most effect on were final consonant deletion, liquid simplification, and weak syllable

deletion for both typically developing children and children with phonological disorders. Clinicians should be aware of the results collected from this study because clinicians who have children who speak different dialects of Spanish on their case load need to use the normative data specifically normed on that child's dialect. The normative data on his/her specific data can be used to compare typically developing Spanish-speaking children of their dialect and children with phonological disorders to be able to correctly diagnose the child.

In 1996, Goldstein and Iglesias studied 54, 3 and 4-year-old Spanish-speaking children of Puerto Rican descent, determining that age and dialect are contributors to the phonological productions of these children. The main phonological patterns shown by the 3 year old children were cluster reduction and liquid simplification, and the 4 year old children were cluster reduction and final consonant deletion. The greatest effect of age was seen in the 4 year old children. The older 4 year olds created significantly fewer errors than the younger 4 year olds for total cluster errors. The overall results for the 3 and 4 year olds showed that there were no phonological patterns that stood out as far as percentage of errors. Results were also consistent with previous studies (Anderson & Smith, 1987; Gonzalez, 1981; Mann et al., 1992; Stepanof, 1990) that indicated cluster reduction and liquid simplification were high occurring phonological patterns. In contrast, the results showed that stopping, weak syllable deletion, velar fronting, assimilation, and palatal fronting had few errors. The phonological patterns of final consonant deletion and initial consonant deletion did not show results typical of those of previous studies, due to different testing measures and the dialectal differences of the studies (e.g., Mexican-American Spanish versus Puerto Rican Spanish). The results, however, were typical for the children of Puerto Rican descent.

Studies of Bilingual English- and Spanish-Speaking Children. Gildersleeve-Neumann et al. (2008) stated that English monolingual normative data is not sufficient for a growing Spanish-speaking Hispanic population in the United States. The English normative data should not be used to assess children who speak Spanish because it will create an over or under estimation of the number of speech referrals due to differing speech and language development of Spanish-speaking children from English-speaking children.

Goldstein & Washington (2001) studied the development of phonological patterns of 12 typically developing Spanish-English bilingual children primarily of Puerto Rican descent. The results indicated that the children modeled typical development of monolingual English and Spanish children. All of the children had low vowel and consonant errors. In English, the phonological patterns with the highest occurrence were final consonant deletion and stopping and the sound classes with the most errors were fricatives and affricates. In Spanish, the phonological patterns that occurred the most were cluster reduction and liquid simplification and the sound classes with the highest number of errors were the tap and trill /r/. The bilingual children in this study showed more similarities than difference in their speech sound productions, but made errors and substitutions that were atypical of monolingual children. For example, on the Spanish test, the bilingual children tended to substitute /l/ for the flap and trill /r/, which is not a typical substitution for monolingual Spanish speakers. The results of this study imply that not only do the languages spoken by the children need to be accounted for when assessing a child, but also the dialect must always be considered. The dialects of the children in this study were accounted for and errors were not deducted according to the language referent. Dialect can play a role in the assessment of the monolingual and bilingual children.

Further investigations of bilingual children's phonological productions were studied by Goldstein, Fabiano, & Washington (2005). They examined the children's productions according to the varying amount of each language output they received. Participants included 15 children, of the Latino descent, who were typically developing and 5 years of age. They were categorized as predominantly English-speaking (PE), predominantly Spanish-speaking (PS), or Spanish-English bilingual (bilingual) according to a language profile in each language. The overall results indicated that the children (PE, PS, and bilingual) showed no significant differences in their speech production depending on the amount of output they received in each language. This study indicates the need to realize the individual differences of the bilingual children. While there were no major significant differences in the phonological production of the PE, PS, and bilingual children, their productions are not exact either, requiring knowledge of the distinct differences these children show.

Gildersleeve-Neumann et al. (2008) compared the amount of exposure of each language the child had (monolingual English, English-Spanish bilingual who were predominantly exposed to English, and relatively balanced English-Spanish bilingual children) in order to determine the effects of English and Spanish development in terms of rate and timing of speech sound acquisition. The 33 children participating in the study ranged from age 3;1-3;10 and they all spoke English in which English, Mexican Spanish-English, and Mexican Spanish were spoken at home. The children were then split up into the categories of English-only (E), predominantly English (PE), and balanced bilingual English-Spanish (ES) groups. The results showed that all three groups of children had similar sound productions of the English words. No matter the amount of exposure of English or Spanish they had, participants produced similar sounds in their English phonetic inventory. The children from all three groups improved in their phonetic

inventory from the initial evaluation to the second evaluation, indicating that children, monolingual or bilingual, will eventually develop all of the English sounds. Patterns of speech development of the ES group showed the patterns of gliding and vocalization more than the other two groups. The errors the children do display make sense according to the phonemic inventory of Spanish and English. Since English speakers produce /l/ with the blade of the tongue and Spanish speakers produce /l/ with the tip of the tongue, cross-linguistic effects will be evident in the productions of their sounds. Also, the trill and tap /r/ do not occur in English, making for more errors in the production of the English /r/. These differences are important to note because the children with the least amount of exposure to English will make the highest number of errors not only because they are exposed to English the least, but because the /r/ is a late developing sound of typically developing Spanish-speaking children (Goldstein, 1995). Patterns of final consonant deletion and cluster reduction were seen with the highest error frequency in the ES children because of the word restrictions of the Spanish language that played a role in their English productions. This is seen for the vowels as well. The vowels that occur in only English are produced with the least amount of accuracy and vocalization was used to make the production of the English /r/ easier. Other productions of the children were easier because they occur in both languages. For example, stopping and cluster deletion are both early occurring productions in English and Spanish, making it easier to carry over the rules from one language to the other. These findings suggest the implications of knowing the rules and development of both languages to assess a bilingual child. The carryover of the Spanish rules to English by the ES children suggests that difficulty on those sounds make it harder to produce the sounds in English. The data does suggest that all three groups of children made the same amount of progress in

development from T1 to T2, which implies children who are bilingual will eventually develop a full phonetic inventory in both languages.

Prezas (2008) investigated the phonological patterns of 60 bilingual Spanish-English children of the Mexican descent ranging in age from 4;0 to 5;10. Although this was a multistep research investigation, for purposes of this project there will be a focus on the results of the phonological patterns. The children were administered the Assessment of Phonological Patterns in Spanish-Revised (APPS-2; Hodson & Prezas, 2008) and the Hodson Assessment of Phonological Patterns-Third Edition (HAPP-3; Hodson, 2004) in order to compare English and Spanish phonological productions. The results indicated that the phonological patterns with the highest occurrence in English and Spanish were sequences/cluster reduction, liquids, and glides. The researcher found that participants' scores on the Assessment of Phonological Patterns in Spanish were not significantly different from their scores on the HAPP-3 (Prezas, 2008). Based on the results, the researcher concluded that the typically developing participant's phonological patterns were not significantly different from Spanish to English.

Speech Sounds and Dialectal Considerations in Spanish

Spanish Dialectal Differences. Dialect of a language is influenced by a variety of factors (e.g., vocabulary, grammar, pronunciation) that comprise a language (Merriam-Webster Dictionary, 2009). Spanish is a language spoken by more than 300 million people in the world and spoken with various dialectal differences (Encarta, 2004). Whereas the dialectal differences in English primarily affect vowel sounds, the dialectal differences in Spanish are the result of consonant differences, both in substitution and omission form (Goldstein, 2001). Due to dialectal differences across the Spanish-speaking population, phonological development among the different dialects is needed to appropriately assess children who speak Spanish.

Goldstein and Iglesias (1991) suggest that in order to correctly assess Spanish-speaking children's phonological development, normative data based on their dialect is necessary. Furthermore, more normative data on dialect is needed not only in the area of children who are typically developing, but also Spanish-speaking children who are phonologically delayed. Published research on Spanish dialect variation is limited in the United States. The majority of published research regarding dialects and Spanish-speaking children includes children of Mexican (Gonzalez, 1978; Summers; 1982), Mexican-American (Acevedo, 1991; Eblen 1982, Jimenez; 1987), and Puerto Rican (Goldstein & Iglesias, 1991; Goldstein & Iglesias, 1996; Goldstein & Iglesias, 2001; Goldstein & Washington, 2001) descent**.**

Dialectal Considerations of Mexican and Puerto Rican Spanish. Mexican and Puerto Rican Spanish are two of the most common Spanish dialects in the US. Although similar in relation to vowels and some consonants, both dialects also differ in specific ways. For example, Puerto Rican Spanish include the omission of the final /s/, substitution of final /h/ for /s/, substitution of initial /ɸ/ for /f/, omission of /ð/ intervocalically, substitution of initial and final /h/ for /x/, substitution of /ʃ/ for /ʧ/, substitution of /ɲ/ for /n/ before a pause or vowel, substitution of initial /R, x/ for /r/ (trill), and the substitution of final /r/ (rural) for /l/ (Canfield, 1981; Cotton & Sharp, 1988; Lombardi & de Peters, 1981; Navaro-Tomas, 1966). Although the variations are common, they are not subject to all people who speak Puerto Rican Spanish (Goldstein, 1995). In contrast, the Mexican dialect shows the majority of people do not delete the final /s/ as compared to the Puerto Rican dialect. The Mexican dialect has shown free variation of the phone /b/→/v/, omission of /k/ and /g/ adjacent to consonants, omission of the /s/ in final position, substitution of /h/ for /s/ in final position, the replacement of /h/ for /x/ in final word position, the production of /ʃ/ for /x/ in initial position, and the production of /R/ in place of

/r/(trill) in initial word position (Canfield, 1981; Cotton & Sharp, 1988; Lombardi & de Peters, 1981; Navaro-Tomas, 1966).

Other Dialectal Considerations. Other dialects of Spanish have scarcely been studied (i.e., Bolivian Spanish; Fantini, 1985, Dominican Spanish; De la Fuente, 1985). There is a pressing need for further research of other Spanish dialects in order to correctly identify children with speech disorders. Although there is a need for continued study of all dialects of Spanish, a growing need exists for the study of speech sounds and phonological patterns of children from South American (e.g., Chilean) descent. As of 2002 (USCB, 2003), 14.3% of the Hispanic population had origins from South America. In the United States, no norm referenced information is available on the Chilean dialect or acquisition norms of phonological patterns. This poses challenges for assessment and treatment of children who come from a Chilean background.

Dialect varies according to region and culture and affects the age and patterns of speech acquisition of varying dialects. Due to the limited amount of research providing dialectal information on the Spanish language, children of the Hispanic descent are at risk of misdiagnoses of speech sound disorders. Collecting data from children of the Chilean dialect will help reduce the number of misdiagnosis. Age of acquisition of speech sounds of differing dialects is crucial to define children with a phonological difference or disorder.

STATEMENT OF PURPOSE

The purpose of this study was to examine the phonological patterns of pre-school children from the Chilean and Mexican-American dialects. The following questions were addressed:

1. What were the phonological patterns of Spanish-speaking Chilean and Mexican-American children?
2. Which phonological deviations (e.g., cluster reduction, final consonant deletion) occurred more frequently in Chilean Spanish-speaking children compared to Mexican-American Spanish-speaking children?
3. How did dialectal differences between Chilean and Mexican-American Spanish-speaking children impact performance in phonological deviation categories and on a measure of phonological accuracy?

METHODOLOGY

Participants

Chilean Children. Twenty-one typically developing children of Chilean descent participated in the study. Ages ranged from 3;8 (years;months) to 5;9, with a mean age of 5;1. There were a total of five boys and 16 girls. The children of Chilean descent were recruited from Colegio Mayor in Santiago, Chile with assistance from the faculty and staff at the Universidad Mayor in Santiago. Criteria for participation in the study included: (a) no evidence of organic anomalies related to the speech and hearing mechanisms, (b) passing of a hearing screening bilaterally at 500, 1000, 2000, and 4000 Hz at 25 dB, (c) no prior history of speech-language services or a developmental delay, and (d) Spanish as the primary language spoken in the home.

Mexican-American Children. Twenty-one typically developing children of Mexican-American descent were age-matched with the children of Chilean descent to ensure data was age-matched for a comparative analysis (Prezas, 2008). Ages ranged from 3;9 to 5;8, with a mean age of 5;1. There were a total of 10 boys and 11 girls. The children attended a Head Start center in Wichita, Kansas (Prezas, 2008). The criteria for participation included (a) no evidence of organic anomalies related to the speech and hearing mechanisms, (b) passing of a hearing screening bilaterally at 500, 1000, 2000, and 4000 Hz at 25 dB, (c) no prior history of speech-language services or a developmental delay, and (d) Spanish as the primary language spoken in the home. Each child passed the Receptive One- Word Picture Vocabulary Test-Spanish Bilingual Edition (Brownell, 2000) within 1.5 standard deviations from mean, to determine typically developing speech and language skills. All preliminary data, data collection, and procedures were followed in the same manner as with the Chilean participants.

Preliminary Data

The investigators secured parental approval via a packet of information given to parents that included a parent letter, consent form, and questionnaire (see Appendix A, B, and C). The parent letter and consent form provided parents with information pertaining to the purpose and description of the study. The questionnaire was used to verify participant history and included the following information: child and family background information, dialectal background, language use in the home, developmental milestones, and additional speech-language information.

All participants were tested individually in a room at the attending school/center. Two bilingual graduate students in speech-language pathology and one faculty member at the attending university completed the hearing screenings, parent reports, and speech and language screening tool for the children. A licensed bilingual speech-language pathologist supervised the administration of testing procedures for this study.

Data Collection

The children's phonological productions were collected using the Assessment of Phonological Patterns in Spanish- 2nd Edition (APPS-2) (Hodson & Prezas, 2008). The APPS-2, which is a diagnostic tool intended for both monolingual Spanish and Bilingual Spanish-English children was administered to each child. The APPS-2 included forty-four words in Spanish, chosen to target phonological patterns. Test results of each child were evaluated using scoring criterion from the APPS-2. The following phonological patterns were evaluated: (1) omissions including omission of syllables, omission of initial consonant clusters, omission of medial consonant clusters, omission of initial consonants, omission of medial consonants, omission of final consonants, and (2) deficiencies including nasals, glides, liquids (e.g., /l/, /r/), stridents, and velars. This testing instrument was chosen to compare the dialectal differences of the Mexican-

American phonological productions to the Chilean phonological productions, for specific reasons. First, the APPS-2 has been found to be highly correlated with the HAPP-3 (Hodson, 2004; Prezas, 2008), which is the English counterpart to the assessment, and both can be used together in cases in the US (e.g., bilingual children). In addition, unlike other phonological assessments of Spanish, the APPS-2 was designed to assess consonant sequences (an important phonological pattern to the Spanish language). Moreover, the APPS-2 uses manipulatives to elicit spontaneous responses from the children. The use of objects over pictures have been found to elicit more spontaneous responses in Spanish-speaking children (Prezas, 2007) and children generally prefer objects to pictures (Hodson, 2007).

The clinician asked the child “que es esto?” (“what is this?”) to elicit a response. Delayed imitation or modeled words were used by the clinician if the children could not name the object spontaneously. Live responses were recorded by the examiner and a recording was taken for reliability measures.

Procedures

Administration and Scoring. The APPS-2 was administered according to testing guidelines. A Total Occurrences of Major Phonological Deviations (TOMPD) score was calculated for each child. The TOMPD is the overall score derived from the APPS-2 to represent the total score of all phonological deviations. Each participant’s phonological productions were transcribed by the investigator at the time of utterance. All utterances were recorded using a Marantz PMD 670 digital recorder for later transcription to determine reliability.

Data Analyses. Data files were extracted from the Marantz PMD 670 digital recorders and uploaded to a Dell Inspiron and converted to MP3 files. Consensus on speech sound productions was achieved using Wave Pad Sound Editor (NCH Software). This software allowed investigators to slow down, amplify, and relisten to specific segments of the testing in isolation.

Reliability Assistant. Live transcriptions were recorded at the time of testing. After testing was completed, one bilingual graduate student skilled in phonetic transcription of the Spanish language independently transcribed all phonological productions for each child from the recordings. Every word on the APPS-2 was compared with the results from the live transcriptions and recorded transcriptions. All discrepancies between the live transcriptions and recording transcriptions were re-listened to with both transcribers and 100% consensus was reached for all productions.

Reliability. Independent transcriptions of the APPS-2 were compared and analyzed using a point-by-point agreement index:

$$\text{Point-by-point agreement index} = \frac{A}{A + D} \times 100 = \text{percentage of agreement}$$

Where (A) represents the number of measured points on which the reliability assistant and the investigator agreed and (D) the number of points on which they disagreed. The percentage of agreement was 94% for Chilean children and 95% for Mexican-American children.

Analyses

Descriptive statistics were used to report the percentages (e.g., frequency, mean, standard deviation) of phonological deviations for Chilean and Mexican-American children by dialectal group and by age. A series of One-way Analyses of Variance were used to analyze whether significant differences existed between dialects. These analyses included the following: dialect by TOMPD and dialect by phonological deviation (i.e., syllables, /s/ clusters, consonant clusters, initial consonant deletion, medial consonant deletion, final consonant deletion, nasals, glides, liquids, stridents, and velars).

RESULTS

The purpose of this investigation was to report the phonological deviations of Chilean and Mexican-American children. Specifically, looking at the phonological patterns of Spanish-speaking Chilean and Mexican-American children, which phonological deviations occurred most frequently, and how the dialectal differences between Chilean and Mexican-American Spanish-speaking children impact performance in phonological deviation categories and on a measure of phonological accuracy.

Chilean Children

The TOMPD scores and phonological deviations of 3, 4, and 5-Year-Old Chilean children were calculated (see Figures 1 and 2). Twenty-one children of Chilean descent participated in the administration of the APPS-2 in order to investigate their phonological deviations, ranging in ages from 3;10-5;9. There were a total of five boys and 16 girls. An average TOMPD of 17.9 (SD=12.42) was calculated among the children and a point-by-point agreement of 94% was reached.

Figure 1: TOMPD of 3, 4, and 5-Year-Old Chilean Children

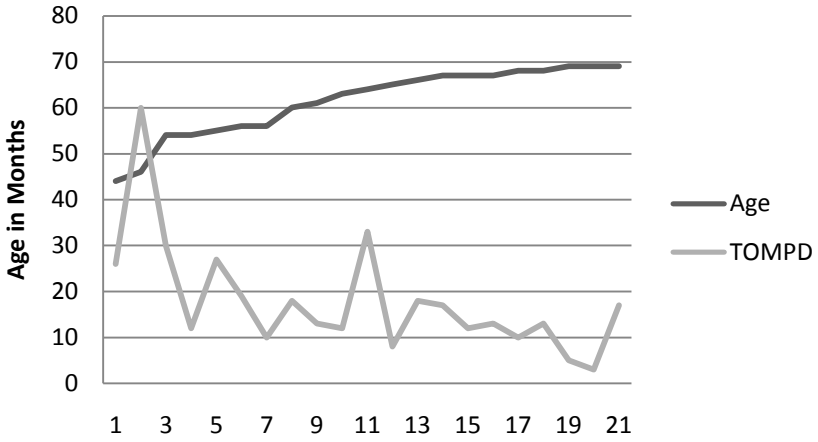
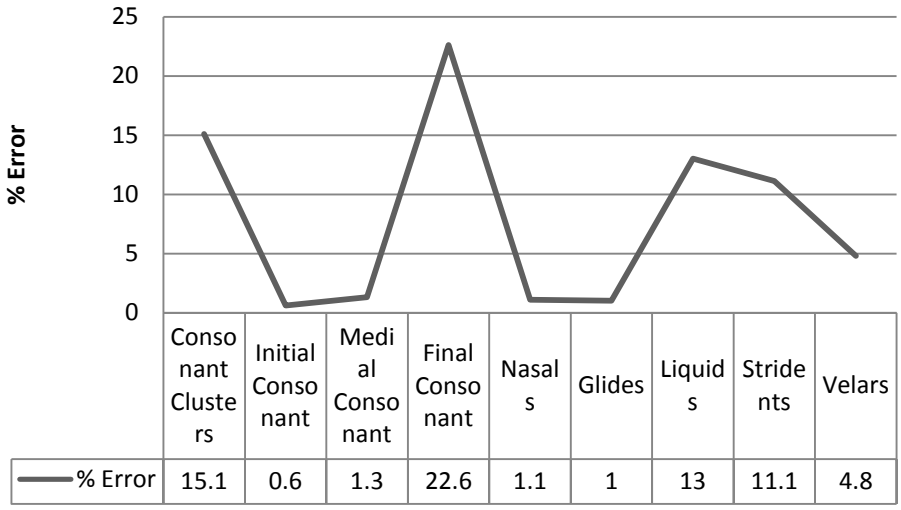


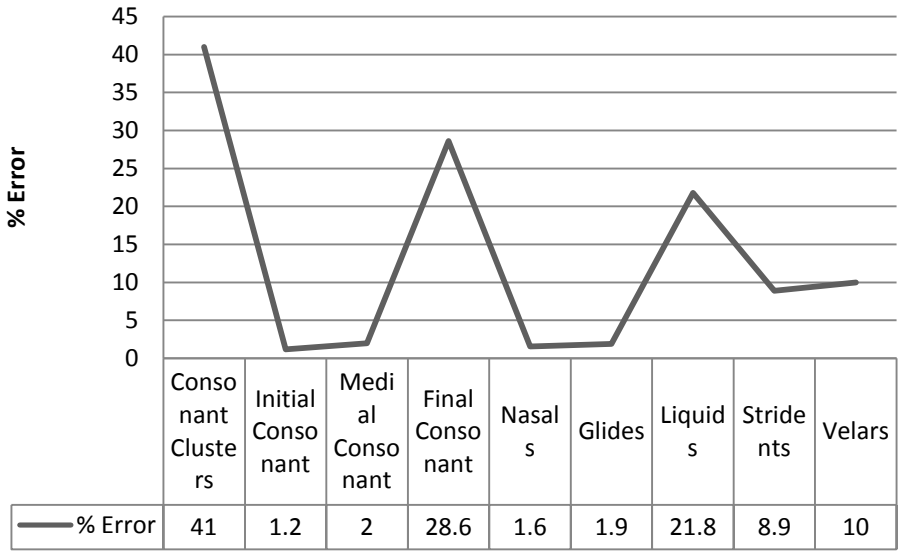
Figure 2: Phonological Deviations of 3-, 4-, and 5-year-old Chilean Children



Based on table 2, the current investigation found that the children of Chilean descent reported the greatest frequency of error with the following phonological patterns: final consonant deletion, consonant cluster reduction, liquid deviations, and strident deletion. Final consonant deletion was evidenced at an error rate of 22.6%. Final consonant deletion was typically demonstrated by dropping the final /s/ on plural and non plural words across all ages. Some instances of final consonant deletion included: /lapis/→/lapi/, /jaßes/→/jaße/, and /djentes/→/djente/. Consonant cluster reduction occurred 15.1% of the time. Examples of consonant cluster reduction were /eskwela/→/ekwela/ and /estufa/→/etufa/. Another phonological deviation frequently evidenced were stridency deviations such as substitutions of /tʃ/→/ʃ/ (e.g., /tʃikle/→/ʃikle/). The following graphs show the differences of phonological deviations between the two age groups of Chilean children. Additional data related to mean percentage correct for phonological deviations by age and dialect were calculated (see Appendix D).

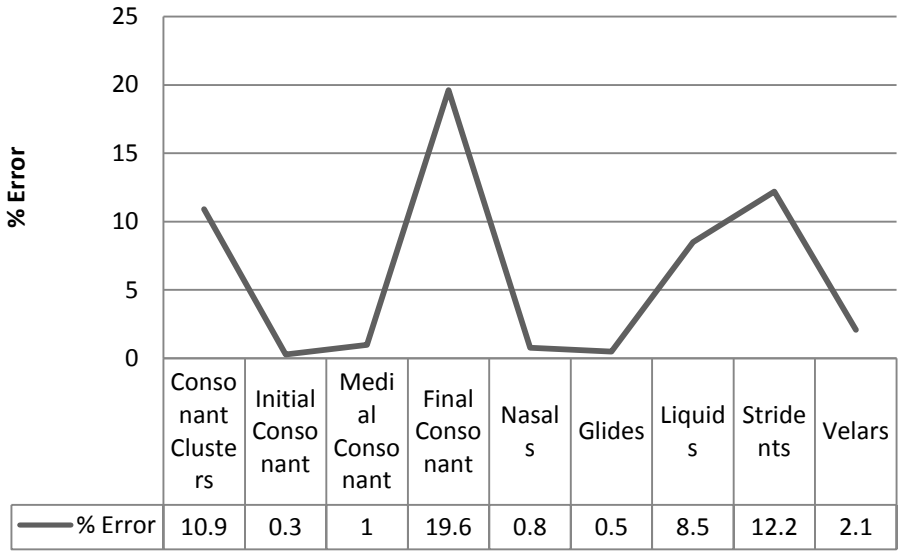
The phonological deviations of Chilean children by ages (e.g., 3, 4) are reported below (see Figures 3 and 4).

Figure 3: Phonological Deviations of 3- and 4-Year-Old Chilean Children



	Consonant Clusters	Initial Consonant	Medial Consonant	Final Consonant	Nasals	Glides	Liquids	Stridents	Velars
% Error	41	1.2	2	28.6	1.6	1.9	21.8	8.9	10

Figure 4: Phonological Deviations of 5-Year-Old Chilean Children



	Consonant Clusters	Initial Consonant	Medial Consonant	Final Consonant	Nasals	Glides	Liquids	Stridents	Velars
% Error	10.9	0.3	1	19.6	0.8	0.5	8.5	12.2	2.1

The 3-and-4-year-old children evidenced a remarkably higher percentage of consonant cluster reduction than the 5-year-old children. The 3-and-4-year-old children demonstrated an error rate of 41% with consonant clusters compared to the 5-year-olds at 10.9%. Another difference between the two age groups was final consonant deletion. The 3-and-4-year-old children had a higher error rate of 28.6%, than the 5 year-old children at 19.6%. Liquid and velar deviations were also comparably different. Liquid deviations were seen 21.8% of the time and velar deviations were seen 10% of the time with the 3-and-4-year-old children, contrasted to 8.5% liquid deviations and 2.1% velar deviations with the 5-year-old children.

Mexican-American Children

The TOMPD scores and phonological deviations of Mexican-American children were calculated (see Figures 5 and 6). Twenty-one children of Mexican-American descent ranging in the ages of 3;9-5;8, had an average TOMPD of 10.3 (sd=6.7) and a point-by-point agreement of 93%. There were a total of 10 boys and 11 girls.

Figure 5: TOMPD of 3-, 4-, and 5-Year Old Mexican-American Children

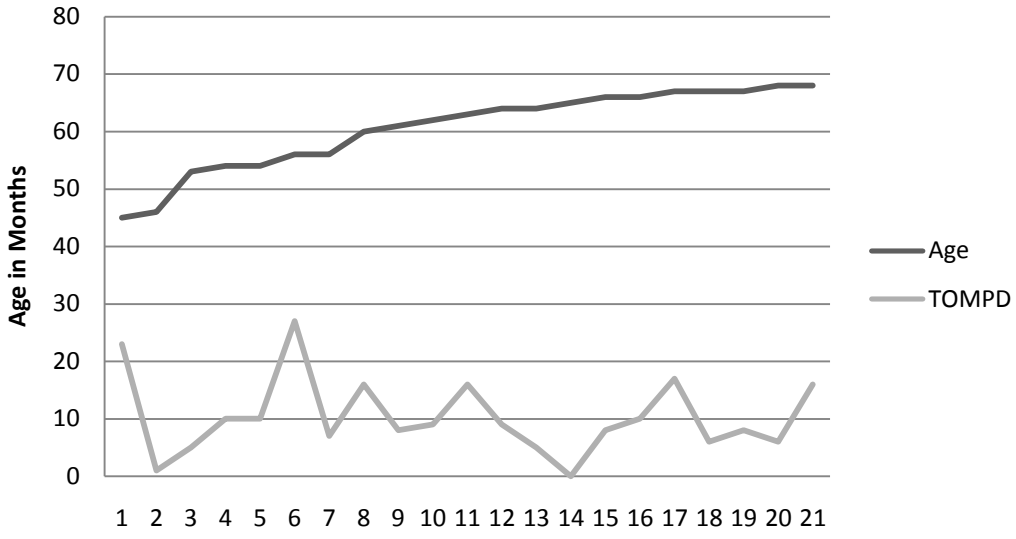
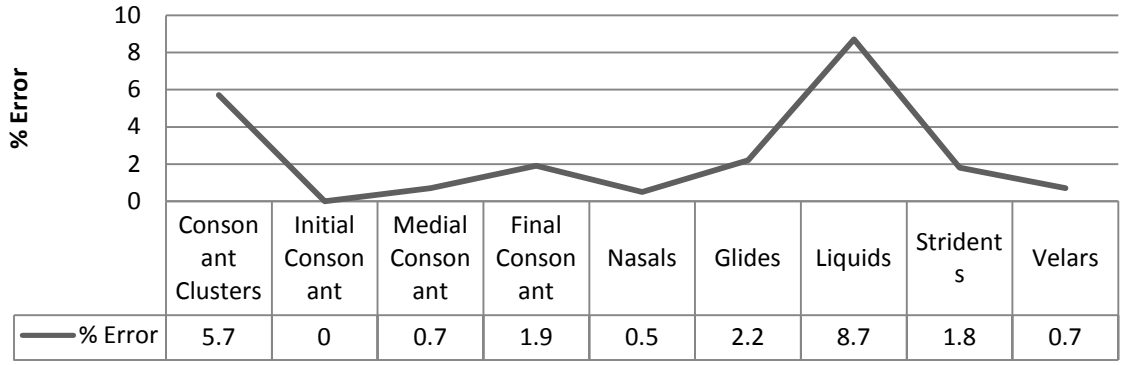


Figure 6: Phonological Deviations of 3-, 4-, and 5-Year-Old Mexican-American Children

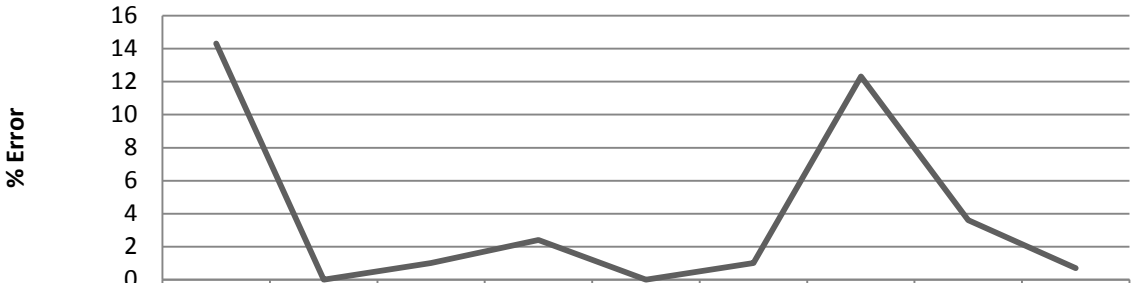


	Consonant Clusters	Initial Consonant	Medial Consonant	Final Consonant	Nasals	Glides	Liquids	Stridents	Velars
% Error	5.7	0	0.7	1.9	0.5	2.2	8.7	1.8	0.7

Liquid deviations, consonant cluster reduction, and glides accounted for the three highest frequencies of error of phonological deviations among the children. Liquid deviations occurred 8.7% of the time and were observed on words such as rojo, barco, and naris (e.g., /roxo/→/loxo/, /barko/→/balko/, and /naris/→/nalis/). Consonant cluster reduction was evidenced at 5.7% and examples include /arbol/→/abol/ and /klema/→/kema/. Deviations of glides occurred 2.2% of the time. The glide deviations consisted of instances of omission. The following charts demonstrate phonological deviations of 3 and 4-year-old children and 5-year-old children.

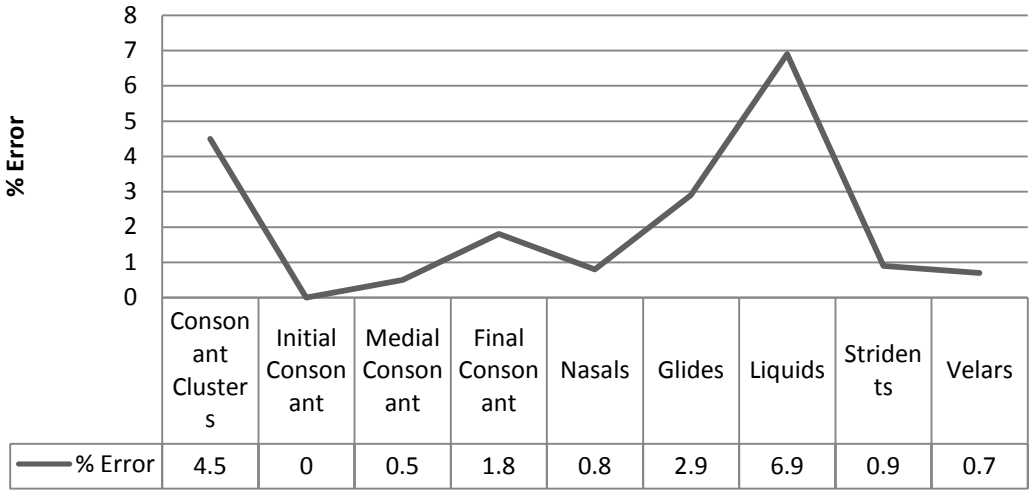
The phonological deviations of Chilean children by age are reported below (see Figures 7 and 8).

Figure 7: Phonological Deviations of 3- and 4-Year-Old Mexican-American Children



	Consonant Clusters	Initial Consonant	Medial Consonant	Final Consonant	Nasals	Glides	Liquids	Stridents	Velars
% Error	14.3	0	1	2.4	0	1	12.3	3.6	0.7

Figure 8: Phonological Deviations of 5-Year-Old Mexican-American Children



The 3-and 4-year-old children exhibited greater deviations of consonant clusters, liquids, and stridents than the 5-year-old children. Deletion of consonant clusters was observed 14.3% of the time with the 3-and 4-year-old children, versus only 4.5% of the time with the 5-year-old children. Also, liquid deviations of the 3-and 4-year-olds occurred 12.3% of the time compared to 6.9% with the 5-year-old children. Differences in the percentage of deviations of stridents was not as great, but the 3-and 4-year-old children were at an error rate of 3.6% and the 5-year-old children at .9%. Significant differences between the two age groups of children were not seen.

Chilean versus Mexican-American Children

A series of One-Way Analyses of Variance (ANOVAs) were calculated in order to compare the phonological productions of Chilean and Mexican American children. The ANOVA's were corrected for number of comparisons. Data was analyzed by groupings of 3-and-4-year-olds, 5-year-olds, and combined ages for both dialects. TOMPD scores were analyzed, along with each phonological deviation type: syllables, /s/ clusters, consonant clusters, initial consonant deletion, medial consonant deletion, final consonant deletion, nasals, glides, liquids, stridents, and velars.

3- and 4-year-old children. The TOMPD scores of 3-and-4-year-olds were not significantly different, although they were approaching significance ($F[1,12] = 3.93$, $p = .07$). Chilean TOMPD scores were generally higher (though not significantly different) than Mexican-American TOMPD scores for 3-and-4-year-olds. Upon closer examination of the phonological deviations, final consonant deletion was significantly different ($F[1,12] = 9.19$, $p < .01$). Chilean children evidenced more final consonant deletion than Mexican-American children. In addition, 3-and-4-year-old Chilean children evidenced more /s/ cluster deviations (i.e., omission) than Mexican-American 4-year-olds ($F[1,12] = 16.91$, $p < .01$). The other 9 phonological deviations were not found to be significant: syllables ($p = .161$), clusters ($p = .161$), initial consonant deletion ($p = .147$), medial consonant deletion ($p = .502$), nasals ($p = .147$), glides ($p = .552$), liquids ($p = .333$), stridents (.113), and velars ($p = .334$).

5-year-old children. When comparing the TOMPD scores of 5-year-old children, there was not a significant difference ($F[1,26] = 3.12$, $p = .089$). Similar to the 3-and-4-year-olds, Chilean and Mexican American 5-year-olds were not found to score significantly different on the overall TOMPD score for the APPS-2. Upon a closer examination of each phonological deviation type, five of the 11 phonological deviations were found to be significant between groups, including consonant cluster reduction ($F[1,26] = 9.58$, $p < .01$)., final consonant deletion ($F[1,26] = 14.52$, $p < .01$), stridents ($F[1,26] = 32.48$, $p = .000$), /s/ clusters ($F[1,26] = 22.65$, $p = .000$), and syllables ($F[1,26] = 11.77$, $p < .01$). Chilean 5-year-olds were found to produce more consonant cluster reduction, final consonant deletion, and stridency deletion than Mexican American 5-year-olds who were matched for age. Mexican-American 5-year-olds were found to produce more syllable deletion than Chilean 5-year-olds. The other 6 phonological deviations were not

found to be significant: initial consonant deletion (p = .327), medial consonant deletion (p = .376), nasals (p = 1.0), glides (p = .182), liquids (p = .710), and velars (p = .297).

Combined ages. Statistics also were analyzed for all participants (combined ages) by dialect. Overall TOMPD scores by dialect revealed a significant difference ($F[1,40] = 6.04$, $p < .02$). Average TOMPD scores for 17.9 for Chilean children and 10.3 for Mexican American children. Similar to 5-year-old children, five of the 11 phonological deviations were found to be significant between groups, including consonant cluster reduction ($F[1,40] = 6.12$, $p < .02$)., final consonant deletion ($F[1,40] = 23.82$, $p = .000$), stridents ($F[1,40] = 30.14$, $p = .000$), /s/ clusters ($F[1,40] = 35.93$, $p = .000$), and syllables ($F[1,40] = 13.92$, $p < .01$). Chilean children were found to produce more consonant cluster reductions, final consonant deletion, and stridency deletion than Mexican-American children. Mexican-American children were found to produce more syllable deletion than Chilean children. The other 6 phonological deviations were not found to be significant: initial consonant deletion (p = .075), medial consonant deletion (p = .270), nasals (p = .390), glides (p = .323), liquids (p = .336), and velars (p = .207).

DISCUSSION

The present study investigated the phonological deviations of Chilean and Mexican-American children. Moreover, this study investigated whether speech-sounds and phonological deviations were significantly different between groups (i.e., Mexican-American and Chilean dialect). A total of 42 children were given the APPS-2 in order to record their phonological patterns and deviations. Twenty-one typically developing children from Santiago, Chile and twenty-one typically developing children from Wichita, Kansas participated in the administration of the APPS-2. There was an average TOMPD of 17.9 calculated for the children from Chile and an average TOMPD of 10.3 for the children from the United States of America.

Chilean Dialect

The results indicated that children from Chile showed the highest percentage of phonological deviations with final consonant deletion, consonant cluster reduction, and stridency deletion. Final consonant deletion was evident on plural and non-plural words. This was a consistency observed with all of the children from both age groups. These data may indicate that final consonant deletion is a dialectal feature of the Chilean dialect and should not be considered an error when scoring a phonological assessment of a child from Chile. As mentioned before, some dialects, such as Puerto Rican, Mexican, and Cuban omit final consonants from words (Goldstein, 1996). Furthermore, consonant cluster reduction occurred frequently. Clinicians need to consider the amount of consonant cluster reduction present with a child and recognize the commonly occurring consonant cluster reductions in order determine if their percentage of error is too high for their specific dialect. Children from Chile evidenced a high percentage of consonant cluster reduction because they omitted the /s/ from /s/ clusters. The /s/ clusters included espejo, estrella, estufa, escuela, and peskado and Chilean children evidenced the

following productions: /espexo/→/epexo/, /estreja/→/etreja/, /estufa/→/etufa/, /eskwela/→/ekwela/, and /peskado/→/pekado/. Some variations included an aspirated sound (i.e., /h/) in place of the /s/ (e.g., /estufa/→/ehtufa/). These reductions caused a higher percentage of error for consonant clusters which could affect the diagnosis of a child if the clinician is unaware of common phonological patters of consonant cluster reduction for the Chilean dialect.

Mexican-American Dialect

Children of the Mexican-American descent from the United States demonstrated the highest percentage of phonological deviations with liquids, consonant clusters, glides, and strident. Previous studies show consistent results of Spanish-speaking children's productions with the present investigation (e.g., occurrence of consonant cluster and liquid phonological deviations appeared more frequently) (Anderson & Smith, 1987; Goldstein & Iglesias, 1996a; Gonzáles, 1981; Mann et al., 1992; Prezas, 2008; Stepanof, 1990). One was account for a higher percentage of error for consonant clusters is because the Mexican-American children, in some cases, dropped the /e/ in /s/ clusters (i.e., sequences). For example, they would produce /eskwela/ → /skwela/ and /estufa/ → /stufa/. Although this was not a primary question of the current study, consonant sequence omission of the /e/ phoneme in Mexican-American children may be due to the fact that the children are Spanish-English bilingual. Therefore, the English exposure may play a role in the simplification of dropping the /e/. Also, the children evidenced liquid simplifications such as substituting /r/ → /ð/ as seen in the word /kutʃ ara/ → /kutʃ aða/. These simplifications have been reported in other investigations of bilingual children (Prezas, 2008).

Chilean and Mexican-American Dialect

The greatest differences between Mexican-American 3-and-4 year olds and-5-year olds were demonstrated with /s/ clusters. The 3-and-4-year-olds demonstrated a much higher incidence of

this phonological deviation. This is a possible result of the 3-and-4-year-old demonstrating greater variability in phonological pattern production because phonological deviations have not yet been suppressed.

The results from the APPS-2 illustrated that the TOMPD scores of the Chilean children and Mexican-American children of children were not significantly different when divided by age. However, when comparing the TOMPD scores of Chilean vs. Mexican-American children (combined ages), a significant difference was found. The average TOMPD scores were 17.9 for Chilean children and 10.3 for Mexican American children. It is important to note that both averages of scores still fell within what is considered to be “mild to no disorder” on the APPS-2 assessment. Therefore, the difference represented does not show a difference that would classify Chilean children as having a phonological disorder. It simply shows a dialectal difference between the two groups.

Based on the dialectal differences, specific phonological patterns between groups were noted and implications were derived. For example, information on phonological patterns frequently produced by children of different dialectal backgrounds will help clinicians assess more reliably and will help provide more effective treatment. Based on the data the difference in the TOMPD scores of Chilean children were not significant enough to place them in a higher severity range than the Mexican-American children. Both groups evidenced dialectal differences unique to the dialect. Therefore, there are specific phonological patterns that need to be assessed differently in assessment, such as /s/ clusters and consonant sequences. These should be assessed differently because the children from both groups are following common phonological patterns of their dialect.

Clinical Significance

Based on the results from the investigation, there is a need for increased awareness of typical development of Spanish speaking children of different dialects. As the results show, typically developing Chilean children show a significant percentage difference of final consonant deletion, cluster reduction, stridency deletion, and /s/ cluster deletion from Mexican-American children. Phonological patterns norms need to be established in order to correctly diagnose children of different dialects. This will help to decrease the level of over- and under-identification for services (Goldstein, 2004). There is a need for this information because children who are emigrating from other countries or have parents or care takers who speak varying dialects of Spanish should not be treated for dialectal differences. According to the American Speech-Hearing Association (ASHA, 1983), it is not ethical to treat for dialectal differences. If clinicians are aware and educated on the dialect differences of Spanish, they will be able to assess children for effectively and efficiently. Important information regarding dialect could be obtained during case history information if clinicians are aware of the appropriate questions they should be aware of before evaluating the child. Children demonstrating different dialects will have different sound inventories, and create substitutions and omissions not common to all dialects. The information gained from these studies will allow for ethical assessment and treatment of children from different Spanish dialects.

The information obtained from the APPS-2 demonstrated that TOMPD scores from both dialects, although found to have a significant difference, did not lead to a change in severity rating on the assessment measure. Based on information from this study, there is a strong likelihood that typically developing Chilean children in the United States who are being administered the APPS-2 would not receive an average score that would place them in a higher

severity range on the measure. Interestingly, however, based on the data from this study, the Chilean children would evidence more final consonant deletion, stridency deletion, and /s/ cluster/sequence reduction than Mexican-American children. Mexican-American children would evidence more syllable deletion (i.e., omission of the /e/ phoneme in /s/ sequence words) than Chilean children. Speech language pathologists working with these populations would need to consider these data. Moreover, SLP's could use a measure such as the APPS-2 to give them results of overall severity of phonological patterns with both dialects taken into account.

Potential Limitations

A potential limitation to the study was the difference in socioeconomic status (SES) of the Chilean and Mexican-American children. The children in the Chilean study were of middle SES and children in the Mexican-American study were of lower SES, which could have accounted for difference in error patterns. The children tested in Santiago, Chile attended a private school, Colegio Mayor, in which parents pay tuition in order for their children to attend. Contrary to the school in Santiago, The Head Start centers are aimed at children of parents who cannot afford private schools or daycares for their children before they enter the public school system. Consequently, differences in SES can lead to variations of dialect between the two groups of children.

An added potential limitation was the testing areas. Due to limited available testing areas at the school in Chile and at the Head Start centers, more extraneous noise was present than originally thought. Extraneous noise not only impinged on the transcriber's capability to transcribe accurately, it caused unintentional distractions for the children being tested.

In addition, one word samples were collected to derive the results. In the future, it would be suggested to look at a continuous narrative of speech samples because it could potentially

illustrate more or less incidence of cluster reduction. One possibility that accounted for a high percentage of liquid deviations is the interference of the English /r/ with the Spanish /r/. The children of Mexican-American descent commonly substituted the English /r/ for the Spanish flap or trill /r/ due to exposure in both languages.

Moreover, in the current investigation, there was a smaller sample size of 3-and-4-year-old children compared to 5-year-old children. Larger sample sizes of both groups of children could help determine more specific phonological patterns and deviations over a larger sample. Also, in the future, a more in depth study of the phonological patterns and phonological deviations of 3-year-old children would help determine normative data for their age group for comparison data.

Finally, further research needs to be conducted on typically developing Chilean children's phonological processes in order to assure the results of the current study are accurate. The data from the children should be compared to normal adults who speak the Chilean Spanish dialect to confirm typically developing phonological processes of their dialect.

CONCLUSION

In conclusion, the present study investigated the phonological patterns of 42 Spanish-speaking children of the Chilean and Mexican-American dialect in order to determine: phonological patterns of each dialect, which phonological deviations occur more frequently in each dialect specifically, and how the dialectal differences impact performance in phonological deviation categories and on a measure of phonological accuracy. Phonologic deviations that occurred most frequently from the Chilean children were final consonant deletion, consonant cluster reduction, and stridency deletion. Children from Chile evidenced a high percentage of consonant cluster reduction because they omitted the /s/ from /s/ clusters. These reductions caused a higher percentage of error for consonant clusters which could affect the prognosis and determinations for therapy of a child if the clinician is unaware of common phonological patters of consonant cluster reduction for the Chilean dialect. The Mexican-American children exhibited liquid deviations, consonant cluster reduction, and glides most frequently. One account for a higher percentage of error for consonant clusters is because the Mexican-American children, in some cases, dropped the /e/ in /s/ clusters (i.e., sequences). When the two dialects were compared, the results from the APPS-2 illustrated that the TOMPD scores of the Chilean children and Mexican-American children of children were not significantly different when divided by age. However, when comparing the TOMPD scores of Chilean vs. Mexican-American children (combined ages), a significant difference was found. Therefore, dialectal differences determined that specific phonological patterns and deviations need to be considered differently in assessment, such as /s/ clusters and consonant sequences. It is important that dialect is taken into account when assessing Spanish-speaking children in order to evaluate and diagnose correctly.

APPENDIXES

APPENDIX A

Estimados Padres de la Familia:

En Texas Christian University, nosotros estamos estudiando la pronunciación de los sonidos y el vocabulario en español de los niños de habla hispana. El estudio consiste en que los niños nombren objetos y dibujos. Nosotros escribiremos los sonidos que dicen los niños y también los grabaremos. Además, les pediremos que nos cuenten una historia en español que acaban de oír. Las actividades tomarán aproximadamente 50 minutos.

Si ustedes permiten que su niño participe en este estudio, por favor firmen la autorización y contesten las preguntas que aparecen en la página siguiente.

Atentamente,

Raul Prezas, PhD y Maria Muñoz, PhD
Supervisores
Carah Sullenbarger, BS y Christy Cameron, BSE
Estudiantes Graduado
Texas Christian University

Dear Parents/Caregivers:

At Texas Christian University, we are studying the Spanish speech sounds and vocabulary of children from a Hispanic background. The study consists of having children name objects and pictures. Children's responses will be written down and audio recorded. In addition, we will have your child retell a story in Spanish. The process will last approximately 50 minutes.

If you give permission for your child to participate in this study, please sign the consent form and answer the questions that appear on the subsequent page.

Sincerely,

Raul Prezas, PhD and Maria Muñoz, PhD
Supervisors
Carah Sullenbarger, BS and Christy Cameron, BSE
Graduate Students
Texas Christian University

APPENDIX B

Protected Health Information Authorization Form

As a subject in the studies entitled "Influence of Spanish dialect on picture and object naming by pre-schoolers," and "Phonological productions of Mexican and Chilean Spanish speaking pre-schoolers" you will be asked to provide protected health information about your child. The information may be obtained by either verbal question and answer format (e.g., one on one interview) or by a questionnaire. For the purpose of this research project, you will be asked information in relation to: assessment and therapy of speech, language, cognition, and/or swallowing. Your child's protected health information will be confidential by being de-identified and coded in such a way that it will not be able to be identified by his/her name or initials. Your child's information will be stored in a locked cabinet when not in use and only the appropriately designated research personnel will have access to your protected health information. All of your child's protected health information will be kept private. The data may be reported in publications or presentations but will be expressed as an average for the group without any reference to the individual results. There may be the possibility that your child's protected health information may need to be accessed once the study has ceased. If so, the information will be re-identified using a different coding procedure such that your information continues to remain confidential.

This form is designed to inform you of the procedures involved in the collection and use of your child's protected health information to be utilized in the study, and to obtain your authorization to collect and utilize the information. If you still have questions, please feel free to ask now or at any time during the study.

Your child's health information will be shared at TCU with people who are involved in the research project. We may also share your information with others outside of TCU who are sponsoring the research.

By signing this form, you are agreeing to allow Maria L. Muñoz, PhD, Raul Prezas, PhD, Carah Sullenbarger and Christy Cameron (graduate students in Communication Sciences and Disorders) to use and share your health information in this research study with the following person(s) or organization(s).

_____
_____
_____
_____
_____

If you change your mind later and do not want us to collect or share your child's health information, you should contact the researcher listed below by telephone or by letter. You need only say that you do not wish to have the researcher collect and share your health information.

APPENDIX B (Continued)

I _____ authorize collection of the protected health information outlined above. I have read the description of the procedures in the collection and use of my protected health information, the procedures have been explained to me, and my questions have been answered to my satisfaction.

The chair of the TCU Institutional Review Board is Dr. Meena Shah; Dr. Shah can be reached by phone at 817.257.7665. The director of Sponsored Research at TCU is Dr. Janis Morey; Dr. Morey can be reached by phone at 817.257.4877.

Date_____

_____
Participant's signature (please place your initials to the right of each of the previous paragraphs indicating that the consent form has been verbally discussed with you.)

_____
Principal Investigator

_____
Signature of Witness

Forma de Autorización de Información de Salud Protegida

Como un sujeto en los estudios titulados "Influence of Spanish dialect on picture and object naming by pre-schoolers," and "Phonological productions of Mexican and Chilean Spanish speaking pre-schoolers" le pediremos su información protegido de la salud (PHI). La información puede ser obtenida por formato verbal con preguntas y respuestas (por ejemplo, en una entrevista) o por un cuestionario. Para el propósito de este proyecto de investigación, le van a preguntar información en relación de: la historia clínica con respecto a la evaluación y la terapia de comunicación, cognición, y/o de tragar. El PHI de su niño se mantendrá confidencial por medio del uso de códigos en lugar de su nombre para que otros no pueda identificarlo por el nombre o iníciales. La información será guardada en un gabinete cerrado cuando no en uso y sólo no más el personal designado tendrá acceso a su PHI. Toda su información protegida de la salud será privada. Los datos pueden ser publicados en publicaciones o presentaciones pero serán expresados como un promedio del grupo sin referencia a sus resultados individuales. Es posible que el PHI pueda se acezado después la conclusión del estudio. Si eso es el caso, la información será re-identificado utilizando un procedimiento diferente de la codificación para que su información se mantenga confidencial.

APPENDIX B (Continued)

Esta forma es diseñada para informarle de los procedimientos en la colección y el uso del PHI en este estudio, y para obtener su autorización para obtener y utilizar la información. Si tiene preguntas, por favor preguntarlos ahora y también durante el estudio.

Su información de salud será compartida en TCU con personas que están participando en el proyecto de investigación. También podemos compartir su información con otros fuera de TCU que patrocinan la investigación.

Firmando esta forma, usted se permita a: Maria L. Muñoz, PhD, Raul Prezas, PhD, Carah Sullenbarger and Christy Cameron (estudiantes de posgrado en Ciencias de Comunicación y Desórdenes) a utilizar y compartir su información de la salud en este estudio de investigación con los siguientes personas o organizaciones.

_____
_____
_____
_____
_____

Si usted cambia de opinión y no quiere que obtengamos su información de salud, usted debe contactar el investigador que esta listó abajo por teléfono o por carta. Nomas necesita decir que no quiere que el investigador colecte y comparta su información de salud.

Yo_____ autorizo la colección de la información protegida de salud resumido arriba. Ha leído la descripción de los procedimientos en la colección y el uso de mi información protegida de salud, los procedimientos han sido explicados a mí, y mis preguntas han sido contestadas a mi satisfacción. La directora del comité Institucional de investigaciones de TCU es Dr. Meena Shah; puede contactar Dr. Shah por teléfono a 817.257.7665. El director de Sponsored Research es Dr. Janis Morey; puede contactar Dr. Morey por teléfono a 817.257.4877.

Fecha:_____

_____
Firma de participante (por favor de poner sus iníciales a la derecha de cada uno de los párrafos anteriores, eso indica que hemos hablado con usted).

_____
Investigador Principal

_____
La firma de Testigo

APPENDIX C

Questionnaire

Dear parents/caregivers:

Please answer the following questions. The information that you provide us is confidential. The name of your child will not appear in the study.

Child's Name:_____ Date of Birth:_____

Age:_____ Gender:_____School:_____

Demographic Information:

How many adults live in the household? ____ How many children live in the household? _____

How many children in the home are: younger than the child?_____ Older than the child?_____

Circle the regional background(s) that best identifies your child's nationality:

Mexican Cuban Puerto Rican Chilean Central American Other South American

Other nationality: _____

Language Preference Information:

Please check which languages your child speaks in the home: Spanish____ English____ Other____

Please list other languages:_____

At what age did your child start speaking: Spanish?_____ English?_____ Other_____

When **adults** speak to one another in the home, what is the preferred language?

Spanish_____ English_____ Both_____

When **children** speak to one another in the home, what is the preferred language?

Spanish_____ English_____ Both_____

Which language does your child use more in the home? _____

Speech, Language, and Hearing Information:

APPENDIX C (Continued)

Has your child ever had any speech or language difficulties? Yes_____ No_____

If "Yes," please describe:

_____
_____
_____

Has your child ever had a speech language evaluation? Yes_____ No_____

If "Yes," did your child receive services? Yes_____ No_____

Has your child ever had ear infections? Yes_____ No_____

If "Yes," how many? _____

At what age did your child say his/her first word? _____

What was the first word? _____

Do family members have trouble understanding your child's speech?

Yes____ No____

Do persons outside the family have difficulty understanding your child's speech?

Yes___ No____

Additional Comments:

_____
_____
_____

APPENDIX C (Continued)

Cuestionario

Estimados Padres de Familia:

Favor de contestar las siguientes preguntas. La información que nos proporcione se mantendrá confidencial. El nombre de su hijo(a) no aparecerá en el estudio.

Nombre del niño(a):_____ Fecha de nacimiento:_____

Edad:_____ Sexo:_____ Escuela:_____

Información Demográfica:

¿Cuántos adultos viven en la casa? _____ ¿Cuántos niños viven en la casa? _____

¿Cuántos niños en el hogar son: menor que el niño(a)?____ mayor que el niño(a)?____

Rodee el origen regional que mejor identifica mejor la nacionalidad del niño(a):

mexicano cubano puertorriqueño chileano centroamericano otro sudamericano

Otra nacionalidad: _____

Información de Preferencia de Idioma:

Por favor cheque qué idiomas habla su niño(a) en el hogar: español___ inglés ___ Otro___

Liste por favor otros idiomas:_____

¿En qué edad empezó su niño(a) a hablar: español?_____ inglés?_____ Otro_____

¿Cuándo adultos hablan con el uno al otro en el hogar, qué es el idioma preferido?

español_____ inglés_____ ambos idiomas_____

¿Cuándo niños hablan con el uno al otro en el hogar, qué es el idioma preferido?

español_____ inglés_____ ambos idiomas_____

¿Cuál idioma utiliza su hijo(a) más en el hogar? _____

APPENDIX C (Continued)

Información del Habla, Lenguaje, y Audición:

¿Su hijo(a) ha tenido dificultades con el habla o lenguaje? Sí_____ No_____

Si la respuesta es afirmativa, describa por favor:_____
_____
_____
_____

¿Le han hecho alguna evaluación del habla o lenguaje a su hijo(a)? Sí_____ No_____

¿Si la respuesta es afirmativa, recibió su hijo(a) servicios? Sí_____ No_____

¿Su hijo(a) ha tenido infecciones del oído? Sí_____ No_____

¿ Si la respuesta es afirmativa, cuántas? _____

¿A qué edad dijo su niño su primera palabra? _____

¿Qué fue la primera palabra? _____

¿Tienen los miembros de la familia dificultad de entender el habla de su hijo(a)?

Sí_____ No_____

¿Tienen las personas fuera de la familia dificultad en entender el habla de su hijo(a)?

Sí_____ No_____

Comentarios adicionales:
_____
_____
_____

APPENDIX D

Mean Percentages of Spanish Phonological Deviations Evidenced by Chilean (Spanish) 3, 4-and 5-year-old Children (N=21)

Phonological Deviations	Mean Percentage in Error	Mean Percentage Correct
Consonant Cluster Reduction	15.1	84.9
Initial Consonant Deletion	.6	99.4
Medial Consonant Deletion	1.3	98.7
Final Consonant Deletion	22.6	77.4
Liquids	13	87
Nasals	1.1	98.9
Glides	1	99
Stridents	11.1	88.9
Velars	4.8	95.2

Mean Percentages of Spanish Phonological Deviations Evidenced by Chilean (Spanish) 3-and-4-year-old Children (N=7)

Phonological Deviations	Mean Percentage in Error	Mean Percentage Correct
Consonant Cluster Reduction	41	59
Initial Consonant Deletion	1.2	98.8
Medial Consonant Deletion	2	98
Final Consonant Deletion	28.6	71.4
Liquids	21.8	78.2
Nasals	1.6	98.4
Glides	1.9	98.1
Stridents	8.9	91.1
Velars	10	90

APPENDIX D (Continued)

Mean Percentages of Spanish Phonological Deviations Evidenced by Chilean (Spanish) 5-year-old Children (N=14)

Phonological Deviations	Mean Percentage in Error	Mean Percentage Correct
Consonant Cluster Reduction	10.9	89.1
Initial Consonant Deletion	.3	99.7
Medial Consonant Deletion	1	99
Final Consonant Deletion	19.6	80.4
Liquids	8.5	91.5
Nasals	.8	99.2
Glides	.5	99.5
Stridents	12.2	87.8
Velars	2.1	97.9

Mean Percentages of Spanish Phonological Deviations Evidenced by Mexican-American (Spanish) 3, 4- and 5-year-old Children (N=21)

Phonological Deviations	Mean Percentage in Error	Mean Percentage Correct
Consonant Cluster Reduction	5.7	94.3
Initial Consonant Deletion	0	100
Medial Consonant Deletion	.7	99.3
Final Consonant Deletion	1.9	98.1
Liquids	8.7	91.3
Nasals	.5	99.5
Glides	2.2	97.8
Stridents	1.8	98.2
Velars	.7	99.3

APPENDIX D (Continued)

Mean Percentages of Spanish Phonological Deviations Evidenced by Mexican-American (Spanish) 3-and-4- year-old Children (N=7)

Phonological Deviations	Mean Percentage in Error	Mean Percentage Correct
Consonant Cluster Reduction	14.3	85.7
Initial Consonant Deletion	0	100
Medial Consonant Deletion	1	99
Final Consonant Deletion	2.4	97.6
Liquids	12.3	87.7
Nasals	0	100
Glides	1	99
Stridents	3.6	96.4
Velars	.7	99.3

Mean Percentages of Spanish Phonological Deviations Evidenced by Mexican-American (Spanish) 5-year-old Children (N=14)

Phonological Deviations	Mean Percentage in Error	Mean Percentage Correct
Consonant Cluster Reduction	4.5	95.5
Initial Consonant Deletion	0	100
Medial Consonant Deletion	.5	99.5
Final Consonant Deletion	1.8	98.2
Liquids	6.9	93.1
Nasals	.8	99.2
Glides	2.9	97.1
Stridents	.9	99.1
Velars	.7	99.3

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EDUCATION

Texas Christian University Fort Worth, Texas **May 2010**
Master of Science in Speech-Language Pathology
Emphasis in Bilingual Speech-Language Pathology

- PRAXIS successfully completed
- Cumulative GPA: 3.794

Purdue University West Lafayette, Indiana **May 2008**
Bachelor of Science in Speech, Language, and Hearing Sciences

EXPERIENCE

Harris Methodist Hospital **Fort Worth, Texas**
Graduate Student Intern **January 2010-May 2010**

- Assessed and treated patients in acute, rehabilitation, and outpatient settings in English and Spanish

Cook Children's Medical Center **Fort Worth, Texas**
Graduate Student Intern **June 2009-August 2009**

- Assessed, treated, provided family education, and created formal evaluations for children in English and Spanish in the outpatient setting

Head Start **Fort Worth, Texas**
Graduate Student Clinician **August 2008-May 2009**

- Screened children's receptive and expressive language, speech sounds, and proficiency of languages spoken
- Formally assessed and treated children's speech and language in English and Spanish

Miller Speech and Hearing Clinic **Fort Worth, Texas**
Graduate Student Assistant **August 2008- May 2010**

- Analyzed conversational samples for sixty bilingual Spanish-English speaking children as a research assistant

Miller Speech and Hearing Clinic **Fort Worth, Texas**
Graduate Student Clinician **August 2008- May 2010**

- Administered formal assessments of speech, language, fluency, and voice, and created formal evaluation reports, interviewed families during the evaluation process, and counseled on results of evaluations
- Developed treatment plans, goals, and objectives and conducted treatment for children with speech sounds disorders, phonological disorders, language impairments, fluency disorders, and adults with voice disorders, aphasia, and cognitive deficits in English and Spanish

RELEVANT EXPERIENCE/ACCOMPLISHMENTS

Thesis

- Phonological productions of Mexican-American and Chilean Spanish-speaking preschoolers
- Research conducted in Santiago, Chile in May 2009 and San Juan, Puerto Rico in March 2010

Bilingual Training

- Received academic and clinical training and techniques for the identification, assessment, and management of communication disorders in linguistically and culturally diverse adults and children with an emphasis on Spanish-English speakers

PROFESSIONAL AFFILIATIONS

National Student Speech-Language-Hearing Association

- Member since August 2006
- Student volunteer at TSHA convention in Fort Worth, Texas 2010

ABSTRACT

PHONOLOGICAL PRODUCTIONS OF SPANISH-SPEAKING CHILEAN AND MEXICAN-AMERICAN PRESCHOOLERS

The purpose of this study was to investigate the phonological productions of Spanish-speaking Chilean and Mexican-American preschoolers. Twenty-one typically developing children of Chilean descent participated in the study and were age-matched with twenty-one children of Mexican-American. Chilean children's ages ranged from 3;8 (years;months) to 5;9, with a total of five boys and 16 girls. Mexican-American children's ages ranged from 3;9 to 5;8, with a total of 10 boys and 11 girls. The children were administered the Assessment of Phonological Processes-Spanish (APPS-2). Based on the results, children from Chile showed the highest percentage of phonological deviations in the following categories: final consonant deletion, consonant cluster reduction, and stridency deletion. Mexican-American children evidenced the highest percentage of phonological deviations in the following categories: liquids, consonant clusters, glides and strideents. The results from the APPS-2 illustrated that the TOMPD scores of the Chilean children and Mexican-American children were not significantly different when age was considered. However, when comparing the TOMPD scores of Chilean vs. Mexican-American children (combined ages), a significant difference was found, showing a dialectal difference between the two groups. However, the TOMPD scores of Chilean children were not significant enough to place them in a higher severity range than the Mexican-American children. Both groups evidenced dialectal differences unique to the dialect but within normal limits for their age. Therefore, there are specific dialectal differences of phonological patterns that need to be considered in assessment, such as /s/ clusters and consonant sequences. These differences should not be considered a disorder, because the children from both groups are following common phonological patterns of their dialect. Information on phonological patterns frequently produced by children of different dialectal backgrounds will help clinicians assess more reliably and will help provide more effective treatment.

by Carah Sullenbarger, M.S., 2010
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