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UNIVERSITY OF NORTHERN COLORADO

Greeley, CO

The Graduate School

AN OVERVIEW OF SPEECH-LANGUAGE PATHOLOGISTS'  
CURRENT PRACTICES FOR BILINGUAL CHILDREN  
WITH CHILDHOOD APRAXIA OF SPEECH

A Thesis Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Master of Science

Yessica Villanueva Guerra

College of Natural Health Sciences  
Audiology and Speech-Language Sciences  
Speech-Language Pathology

August, 2023

This Thesis by: Yessica Villanueva Guerra

Entitled: An Overview of Speech-Language Pathologists' Current Practices for Bilingual Children with Childhood Apraxia of Speech

has been approved as meeting the requirement for the Degree of Master of Science in College of Natural and Health Sciences in School of Sport and Exercise Science, Program of Sports Coaching.

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## ABSTRACT

Villanueva Guerra, Yessica. *An Overview of Speech-Language Pathologists' Current Practices for Bilingual Children with Childhood Apraxia of Speech*. Unpublished Master of Arts thesis, University of Northern Colorado, 2023

*Purpose:* This study aimed to explore and describe current practices of speech-language pathologists (SLPs) who presently work or have worked with bilingual children with Childhood Apraxia of Speech (CAS) in diverse settings. Exploration of this topic may contribute to the need for more knowledge in the Speech-Language Pathology field regarding evidence-based practices for the target population. The primary aims addressed in this study were: 1) To describe the assessment procedures currently used by speech-language pathologists to diagnose bilingual children with Childhood Apraxia of Speech, 2) To describe the intervention approaches currently used by speech-language pathologists to treat bilingual children with Childhood Apraxia of Speech, 3) to describe diversity training provided to SLPs who treat bilingual children with Speech Sound Disorders (SSDs) across regions.

*Method:* This study followed a qualitative research approach utilizing a descriptive, questionnaire-based survey design. An online survey of speech-language pathologists working with bilingual children with SSDs and CAS was distributed through e-mail and snowball sampling. The survey requested information regarding the clinicians' background and work setting, the composition of caseloads, diversity training, current assessment procedures used in the field, current intervention approaches used in the field, and service delivery challenges.

*Results:* Seven surveys were received and analyzed. Monolingual and bilingual participants from Colorado, Texas, and Virginia participated in the study. Of the total participants, six reported providing services to bilingual children with SSDs, and only four participants indicated currently providing services to bilingual children with Childhood Apraxia of Speech. Between 10-25% of the participants' total caseload comprised bilingual children with SSDs between ages 4-12, and less than 10% of children in their total caseload were identified as bilinguals with CAS between the ages 5-12. All participants reported being competent and comfortable at assessing and treating individuals from a cultural or racial background other than their own, even though 57.1% of SLPs reported that service bilingual children do not speak a second language. In addition, all participants indicated that they do not utilize the services of interpreters/translators when assessing and treating bilingual children aligning with the lack of coursework received on working with an interpreter throughout their carrier and the ongoing challenge faced by these participants on the lack of interpreters who speak the necessary languages to provide services. Speech-language pathologists employ a combination of formal and informal methods to assess bilingual children with Childhood Apraxia of Speech. These methods are modifications of monolingual English assessment and treatment approaches as they have not yet been explored and are not supported by evidence to be employed with the target group.

*Conclusions:* Results confirm the ongoing growth diversity of the population in our country and the lack and limited resources to provide best-practice to bilingual children with SSDs and Childhood Apraxia of Speech. Clinicians are trying to closely follow the American Speech-Language-Hearing Association's (ASHA) recommended guidelines when providing services to bilingual children. However, despite the increase and improvement of training opportunities, a large proportion of SLP professionals still lack confidence in serving the bilingual Hispanic

population due to insufficient training in this area. Currently, SLPs rely on various modifications of monolingual English assessment and treatment approaches, which may yield uneven or erroneous outcomes as they may not consider cultural and linguistic variables. Hence, the need for specialized skills and the ability to recognize individual differences, given the child's linguistic background and the nuances of bilingual language development, is highly necessary when serving bilingual children with Childhood Apraxia of Speech. The urgent need for more study in this field has been established, particularly on the best effective evaluation technique and treatment method to utilize with this population. Continued descriptions of developmental norms in culturally and linguistically diverse groups, evidence-based screening and assessment techniques, and research-based intervention methods should be included in future studies. Hence, based on these findings, recommendations are to conduct further studies that contribute to developing evidence-based practice guidelines and ensure the best quality of services to culturally and linguistically diverse children with Childhood Apraxia of Speech.

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## CHAPTER I

### INTRODUCTION

The constant growth of culturally and linguistically diverse populations in the United States has increased the number of bilingual and multilingual children in the caseloads of speech-language pathologists (SLPs). According to the latest U.S. census the Hispanic or Latino population became the second largest racial or ethnic group comprising 18.7% of the total population (U.S. Census Bureau, 2021). Data collected through this census on languages spoken at home indicated that 21.5% of people speak a language other than English at home and 13.2% speak Spanish at home. In addition, according to the Demographic Profile of ASHA Members Providing Multilingual Services out of the 213,115 individuals ASHA represents, 17,373 (8.2%) were multilingual service providers. Only 10,807 were ASHA-certified SLPs who were considered Spanish-Language Service Providers (American Speech-Language Hearing Association [ASHA], 2021).

Speech sound disorders are common, and they affect 2%-25% of children 5-7 years of age, with 75% of these children achieving age-appropriate speech by the age of 6 (American Speech-Language-Hearing Association [ASHA], 2007a; Sices et al., 2007). As the diversity in the United States population increases, the population of bilingual children with speech and language disorders also continues to increase (American Speech-Language-Hearing Association [ASHA], 2016). However, SSD interventions for individuals whose primary language is not

English continues to be scarce across the literature as research in this area has focused primarily on monolingual children (Holm et al., 1999).

Relative to the number of studies on speech sound development in typically developing bilingual children, those focusing on bilingual children with SSD are few. According to Goldstein and Gildersleeve-Neumann (2015) studies examining speech sound skills in bilinguals have shown that their skills are commensurate with those of monolingual peers. Both bilingual and monolingual children exhibit errors on many of the same types of elements: consonant clusters, multisyllabic words, and liquids. However, studies suggest that a developing bilingual child may use either one or two phonological systems. Some studies have found that bilingual children develop two separate systems, while others support the opposite view, that bilingual children are likely to use a single phonological system in the early stages of learning. Therefore, one of the most critical issues in research exploring bilingual phonological acquisition is whether bilingual children maintain separate or shared phonological systems. Children with an undifferentiated phonological system may fail to use sounds that occur in one of the two languages which may result in the inappropriate use of phones and allophones in a particular language, leading to phonological errors and interference.

It has been established that bilingual children differ across languages in proficiency, use of language, dialect, communication partners, and communication environments (Goldstein & Gildersleeve-Neumann, 2015). Therefore, a speech-language pathologist working with bilingual children with SSDs requires a specific knowledge base and set of skills and procedures from those required when working with a monolingual child with SSDs (Verdon et al., 2015). However, intervention for children acquiring two languages is difficult for professionals as there is a considerable gap in the literature concerning best practices for this population. In addition,

the few tools for assessment and treatment that currently exist are poorly supported by evidence-based research.

Childhood Apraxia of Speech (CAS) is one of the SSDs that continues to be understudied in bilingual populations. The incidence and prevalence of CAS are challenging to estimate due to factors such as the lack of clear diagnostic guidelines for differential diagnosis. However, it is estimated that 3 to 5 % of children or one to two per thousand children diagnosed with SSD exhibit Childhood Apraxia of Speech (ASHA, 2007a). Furthermore, the incidence and prevalence of bilingual children with CAS remains unknown as no data has been reported thus far. The data from the ASHA profile and the U.S. census emphasized the significant difference between the high percentage of clients needing bilingual services and the low percentage of service providers.

### **Purpose of The Study**

The constant increase of bilingual children within SLPs caseloads and the lack of literature on current practices when working with bilingual children with Childhood Apraxia of Speech pose a challenge for professionals to provide high-quality and evidence-based practices. Currently, little is known about the clinical assessment and treatment practices used by SLPs to identify and treat bilingual children with CAS. This study was therefore designed to contribute to the evidence-base in this area by exploring and describing current practices of speech-language pathologists who presently work or have worked with bilingual children with Childhood Apraxia of Speech in diverse settings. The aims of the current study are as follows:

- A1 Describe the assessment procedures currently used by speech-language pathologists to diagnose bilingual children with Childhood Apraxia of Speech.
- A2 Describe the intervention approaches currently used by speech-language pathologists to treat bilingual children with Childhood Apraxia of Speech.

A3 Describe diversity training provided to speech-language pathologists who treat bilingual children with Speech Sound Disorders across regions.

## CHAPTER II

### REVIEW OF LITERATURE

#### **Diversity Training**

Given the vastly growing diverse population in the U.S., non-English speakers continue to populate public schools, and in turn, legal and ethical considerations need to be assumed when servicing and educating the culturally and linguistically diverse population. The American Speech-Language-Hearing Association (ASHA, 2004) states that SLPs must be prepared to provide services responsive to this diversity to ensure SLPs' effectiveness and provide the quality of services that clients deserve. Professionals working with bilingual children with SSDs will require a specific knowledge base and a different set of skills and procedures from those required when working with monolingual children with SSDs (Verdon et al., 2015). Speech-language pathologists must remember that when working with bilingual children with CAS, other variables, such as cultural and linguistic factors, must be considered (Gildersleeve-Neumann & Goldstein, 2015).

In 1985, the American Speech-Language-Hearing Association (ASHA) issued a position statement entitled "Clinical Management of Communicatively Handicapped Minority Language Populations," attempting to address the training needs of SLPs by outlining the competencies professionals need to serve culturally and linguistically diverse populations accurately. Following the publication of this position statement, an increased number of surveys at national, regional, and state levels have been conducted, with results yielding that a large proportion of

professionals do not receive sufficient diversity training causing a lack of confidence or clinical strategies to assess children from diverse backgrounds (Guiberson & Atkins, 2012).

A study by Hammer et al. (2004) investigated the level of training and confidence of SLPs in serving Spanish-English bilingual children at public schools. Participants, including 213 SLPs from non-diverse rural, non-diverse urban, and diverse urban areas, completed a survey for this study. Results revealed that one-third of the speech-language pathologists had received pre-service training in multicultural issues, with a few reporting taking one or more courses on this topic. Furthermore, many participants reported needing more training on technical issues, and almost half indicated receiving no training on cultural issues. The authors concluded that despite increasing and improving training opportunities, a large proportion of SLP professionals still need more confidence in assessing and serving the bilingual Hispanic population due to insufficient training in this area.

A common challenge monolingual English SLPs face is the utilization of interpreting services due to the need for more availability of interpreters, lack of training for effectively working with interpreters, and clinical restraints such as time and funding (Verdon et al., 2015). A study conducted in 2012 by Guiberson and Atkins investigated SLPs' practices in a specific area of the country that experiences significant growth in culturally linguistically diverse populations. One hundred and fifty-four Colorado SLPs who served children from CLD backgrounds participated in this study by completing a survey. Speech-language pathologists indicated that they often faced challenges accessing interpreters and felt less confident collaborating with them. Furthermore, results indicated that only 25% of SLPs reported feeling competent in assessing a child's language development with the help of an interpreter. These results were expected as only 21% of participants received coursework that included information



on collaborating with interpreters. Similarly, in the study by Hammer et al. (2004) only 25% of participants reported receiving training on working with interpreters.

Literature has demonstrated that efforts to improve the services offered to bilingual children must continue as the population diversity increases in our country. The lack of confidence and limited training SLPs receive on delivering best practice services to culturally and linguistically diverse children and using an interpreter effectively reflects the need for more training to learn strategies and gain confidence.

### **Childhood Apraxia of Speech (CAS)**

Childhood Apraxia of Speech is defined by ASHA (2007a) as a neurological SSD in which the precision and consistency of movements underlying speech are impaired in the absence of neuromuscular deficits. Childhood Apraxia of Speech may occur as the result of a known neurological impairment, may be associated with complex neurobehavioral disorders of known or unknown origin, or diagnosed as an idiopathic neurogenic SSD. The core impairment is in the planning and spatiotemporal programming parameters of movement sequences resulting in speech sound production and prosody errors.

Although there is no definite list of diagnostic features for Childhood Apraxia of Speech at the moment, literature indicates the presence of three consistent segmental and suprasegmental features seen in individuals with a deficit in the planning and programming of speech movements. These features are: (a) inconsistent errors on consonants and vowels in repeated productions of syllables or words, (b) lengthened and disrupted co-articulatory transitions between sounds and syllables (difficulty moving from one sound to the next), and (c) inappropriate prosody, especially in the realization of lexical or phrasal stress (American Speech-Language-Hearing Association [ASHA], 2007b).

As stated by Shriberg et al. (2003) the lexical stress deficit seen in Childhood Apraxia of Speech is suggested to be a result of a speech praxis deficit at either the motor planning or programming stage. Nijland et al. (2003) reported that children with CAS were noted to have problems with varying systemic duration of segments when syllable structures were manipulated without changing phoneme sequences. Even though impaired planning and programming of speech movements are the core deficits seen in Childhood Apraxia of Speech, the development of speech perception, language, and phonology, including phonological awareness, can also be disrupted. Children with Childhood Apraxia of Speech are at risk for literacy, academic, social, and vocational difficulties; thus, effective treatment intervention from speech-language pathologists is essential (Murray et al., 2014).

### **Assessment Interventions For Monolingual Children With Childhood Apraxia of Speech**

As stated by ASHA (2007a) a well-trained speech-language pathologist with expertise in pediatric SSDs, including motor speech disorders, is the appropriate professional to assess and diagnose Childhood Apraxia of Speech. Unfortunately, Childhood Apraxia of Speech is a communication disorder for which there is no specific genetic, neurobiological, or behavioral marker, as many of its characteristics overlap with those of other SSDs (ASHA, 2007a). Currently, professionals in the Speech-Language Pathology field face a challenge in accurately diagnosing Childhood Apraxia of Speech, as there is a lack of validated assessment tools for diagnosing this communication disorder. The American Speech-Language-Hearing Association (n.d.) recommends that professionals conduct a comprehensive assessment consisting of various standardized and non-standardized measures and activities. A comprehensive assessment for

SSDs must include a case history, oral mechanism examination (OME), standardized speech sound assessments, and language assessment or screening.

Speech-language pathologists must conduct an oral mechanism examination by evaluating movement accuracy as this is critical for differentiating Childhood Apraxia of Speech from other Speech Sound Disorders such as childhood dysarthria (American Speech-Language-Hearing Association [ASHA], n.d.). During this examination, SLPs should look for the presence of segmental and suprasegmental features previously discussed to help identify the presence of Childhood Apraxia of Speech or other motor-base planning and speech difficulties. The ASHA practice portal (n.d.) provides professionals with a list of example tasks that must be conducted during an OME. These tasks consist of non-speech articulatory postures, well-practiced/automatic versus volitional speech, speaking tasks requiring single versus sequences of postures, speech production at the single syllable, bi-syllable, multi-syllable, phrase, and sentence levels, and lastly, sequential and alternating movement repetitions using measurements such as diadochokinesis (DDK). It is recommended that SLPs also measure the individual's performance across multiple contexts, such as spontaneous versus imitated utterances, as results can vary across contexts. In addition, smoothness, rate, consistency, lexical stress, and accuracy should be considered as an individual's productions might be smoother when speaking at a slower rate than a faster rate.

### ***Dynamic Assessment***

According to ASHA (n.d.), there are a number of methods and instruments that have been suggested for the assessment of speech motor planning and programming skills that take into consideration the segmental and suprasegmental core features of Childhood Apraxia of Speech. Dynamic Assessment is a method often used in current practices as it assists clinicians in

determining the severity and prognosis of a disorder and even facilitates treatment planning (Strand et al., 2013). The Dynamic Evaluation of Motor Speech Skill (DEMSS) is an assessment tool that can be used for the diagnosis of Childhood Apraxia of Speech as it encompasses dynamic assessment facilitating judgments of severity and prognosis.

The DEMSS is an instrument designed to assist professionals in differentiating the diagnosis of SSD in younger children and identifying those children who present difficulty with the planning and sequencing aspects of speech (ASHA, 2007a). This assessment varies the length, vowel content, prosodic content, and phonetic complexity within sampled utterances to provide information on the speech movements of children who are more severely impaired or are not producing many sounds at the syllable or word level (Strand et al., 2013). DEMSS includes nine subtests and uses dynamic assessment that prompts multiple attempts for scoring as the clinician implements various strategies, such as simultaneous productions, to facilitate the individual's performance. As stated by Strand et al. (2013) characteristics associated with Childhood Apraxia of Speech such as groping, segmentation, timing errors, or other characteristics that are difficult to perceive during tasks can be observed by the clinician while a child is attempting to imitate target stimuli.

A study by Strand et al. (2013) reported the reliability and validity evidence for the DEMSS, where 81 children between ages 3 to 6 participated. Each participant was evaluated with the DEMSS and a standard speech and language test battery. Results from this study yield 89% of the agreement for test-retest reliability, 89% for intra-judge reliability, and 91% for inter-judge reliability. In addition, researchers reported that DEMSS does not over-diagnose Childhood Apraxia of Speech but occasionally fails to identify children with CAS, as evidenced by the positive and negative likelihood ratios and sensitivity and specificity measures. As stated

by the researchers, the study provided initial evidence for the validity and reliability of the DEMSS as part of a comprehensive protocol for differential diagnosis of children with severe SSD.

### **Treatment Approaches for Monolingual Children With Childhood Apraxia of Speech**

Treatment goals for children with CAS focus on facilitating overall communication by increasing speech production and intelligibility and, when indicated, using Augmentative and Alternative Communication (AAC), such as gestures, manual signs, voice output devices, and context-specific communication boards (ASHA, n.d.). According to Gildersleeve-Neumann (2007), speech requires both rapid and continuous decision-making before and during speaking and precise movements during speech. Therefore, intensive and individualized treatment is necessary as Childhood Apraxia of Speech requires repetitive planning, programming, and production practice to gain experience with a new task (Maas et al., 2014).

Intervention models for treating children with identified or suspected Childhood Apraxia of Speech have been classified by rhythmic, motor programming, linguistic, combination, and sensory cueing approaches. According to ASHA (2007a), there is not a specific intervention that has been ruled as the gold standard for treating children with Childhood Apraxia of Speech. However, many of these approaches have been reported to be beneficial in treating Childhood Apraxia of Speech across different levels of severity and the communication needs of a child. Treatment approaches such as Rapid Syllable Transitions (ReST), Dynamic Temporal Tactile Cueing (DTTC), the Nuffield Dyspraxia Programme - 3rd Edition (NDP3, Williams & Stephens, 2004), Prompts for Restructuring Oral Muscular Phonetic Targets (PROMPT), Integral

Stimulation, and the Kaufman Speech to Language Protocol (K-SLP) are treatment options for children with CAS.

### **Rapid Syllable Transitions (ReST)**

Rapid Syllable Transitions is a treatment approach designed to target the core features of Childhood Apraxia of Speech by addressing sound consistency through improving accuracy, rapid and fluent transitions from segment and syllable to the next, and accurate production of lexical stress demanding accuracy on all three aspects simultaneously. This approach utilizes polysyllabic non-words and applies principles of motor learning. The procedure consists of dividing sessions into pre-practice and practice. During practice sessions, the clinician introduces skills and stimuli to be trained and provides opportunities to attempt skills with the clinician's support and cueing. The majority of sessions involve a high number of trials, random order of stimulus presentation, and low-frequency feedback on knowledge of results presented with a 3-5 seconds delay between response and feedback.

In a randomized controlled trial study, Murray et al. (2015) compared ReST to NDP3, in Australia and the United Kingdom. Participants in the study consisted of 26 children with mild to severe Childhood Apraxia of Speech from ages 4 to 12 years old. This study delivered treatment in 1-hr sessions, four days a week for three weeks. The researchers assessed the participants' articulation and prosodic accuracy at pre-treatment, one week, one month, and four months post-treatment to compare treatment, maintenance, and generalization effects. Results indicated that both treatment approaches demonstrated large treatment effects. However, ReST maintained treatment gains from week one to 4-months post-treatment, and significant generalization to untreated stimuli was observed.

## **Dynamic Temporal Tactile Cueing (DTTC)**

Dynamic Temporal Tactile Cueing is a child-specific modification of the integral stimulation approach that incorporates principles of motor learning and a cueing hierarchy (auditory, visual, and tactile) that systematically decreases support as the child achieves success at each level of the hierarchy (ASHA, n.d.; Maas et al., 2014; Strand et al., 2006). Integral stimulation was first applied to acquired apraxia of speech by Rosenbek et al. (1974) and its use has grown due to constant research done by other professionals (Gildersleeve-Neumann, 2007). This method varies the temporal relationship between the stimulus and response. The clinician initially provides maximum multisensory cueing for articulatory movement, then gradually fades of cues (Strand & Debertine, 2000).

Dynamic Temporal Tactile Cueing follows a "watch me and do what I do" approach, along with the implementation of phonetic placement, tactile cueing, prosodic cueing, and gestural curing techniques in variation and gradually faded with repeated practice (Strand et al., 2006). Dynamic Temporal Tactile Cueing provides auditory and visual models that assist in shaping speech movements through slowed rate and visual and tactile cues, adding and fading cues as needed to foster correct speech production (Strand, 2020). Cueing varies for each individual and trial, based on their response, motivation, and the child's needs. The key element of the DTTC approach is for the clinician to constantly add or fade auditory, visual, and tactile cues as needed after each practice trial (ASHA, n.d.).

The integral stimulation technique moves from simplest to more complex as follows: (a) simultaneous production: the child watches and listens and simultaneously produces the stimulus with the clinician, next step the clinician only mouths stimulus along the child, (b) direct imitation: the clinician models and provides cues and the child repeats, next step clinician

provides no cues, (c) imitation after a delay and (d) spontaneous production in response to a question. By incorporating this technique and as the client makes progress, cues are gradually faded, length of stimuli is varied, in addition to the time of presentation of the model to the child's production. Dynamic Temporal Tactile Cueing allows for flexibility in treatment depending on what is needed best to support the client (Gildersleeve-Neumann, 2007; Strand, 2020).

A multiple baseline design study by Edeal and Gildersleeve-Neumann (2011) addressed the integral stimulation approach through the use of the "watch me, and do what I do" technique and implemented cues hierarchically. These cues included auditory, visual, and tactile input that was first implemented simultaneously and faded as needed. The clinician judged what level of cueing was necessary and gradually lessened the support by fading the cues. Participants consisted of two children with CAS of, ages 3 and 6 years old. One child was treated three times weekly for 11 weeks; the other child was treated twice weekly for five weeks. This study utilized an alternating treatment A.B. design with production frequency differing in the two treatments. The higher production frequency treatment required 100+ productions in 15 min, while the moderate-frequency treatment required 30–40 productions simultaneously. Results from this study suggested that high-frequency practice of speech targets in the context of therapy utilizing motor learning principles embedded in the integral stimulation approach resulted in faster acquisition of targets. In addition, better in-session performance and more generalization to untrained probe words than lower frequency practice was evidenced by the increase in the participants' accuracy of speech during the intervention.



## **Principles of Motor Learning (PML)**

According to Dale and Hayden (2013) approaches that target motor learning principles such as mass and distributed practice, concrete stepped learning with high intensity, and functional lexicons that have non-complex motor movements are recommended for children with suspected Childhood Apraxia of Speech or children who have been identified with Childhood Apraxia of Speech. Treatment approaches such as (ReST) and (DTTC) are grounded theoretically in the principles of sensory-motor skill learning and follow a framework that was derived from the development of speech motor control (Dale & Hayden, 2013). Reviewing literature states that motor learning enhances generalization of skills as it aids the transfer of knowledge outside of the practice sessions. The generalization is an indication of true learning and is achieved by incorporating the four main tenets of motor learning into therapy: (a) precursors to learning, (b) conditions of practice, (c) feedback, and (d) influence of rate (Edeal & Gildersleeve-Neumann, 2011).

(a) Precursors to learning; concepts that are established with the client before treatment begins and include the establishment of trust, informing the participant of the treatment goal, and understanding of tasks and procedures by the participant. (b) Conditions to practice; conditions include repetition, blocked versus random practice, mass versus distributed, and practice variability. Blocked practice is when one target is practiced at the time; this is valuable when the client is first learning a new skill as it provides repetitive and numerous opportunities for practicing speech movements. On the other hand, random practice consists of practicing more than one target in the same activity. Mass practice is based on the length of session and time as opposed to the distributed practice, where the length of sessions is distributed over the course of the week. Lastly, practice variability consists of practicing speech targets in different word

positions within words or phrases in conversational speech settings. (c) Feedback; includes extrinsic feedback as knowledge of results (feedback given telling whether the speech target was correctly articulated) or knowledge of performance (specific comments regarding what clients did with their articulators, voice or rate that led to correct production. It also includes intrinsic feedback or feedback that comes from the client's self-assessment of target articulation performance. (d) Influence of rate: consists of slowed rate to influence success in target production and increased rate until speech production is similar to connected speech (Edeal & Gildersleeve-Neumann, 2011).

### **Prompts for Restructuring Oral Muscular Phonetic Targets (PROMPT)**

Prompts for Restructuring Oral Muscular Phonetic Targets is a tactually grounded approach used to stimulate muscle activity and guided articulatory movement by touching and manually manipulating a child's external physical structures that are used for speech production (Hayden, 2004). According to Maas et al. (2014) this approach is based explicitly on a hierarchical interdependence bottom-up model of speech motor control and development. Furthermore, in order to be able to provide treatment using this approach, speech-language pathologists must be trained and certified through the PROMPT Institute to provide PROMPT intervention (Maas et al., 2014).

Dale and Hayden (2013) conducted a randomized controlled trial where they implemented PROMPT approach to compare progress for treatment targets taught with and without tactile cues in three males and one female with CAS ranging from 3 to 5 years old. Treatment consisted of 50-minute sessions twice per week for eight weeks, including at least four weeks of full PROMPT treatment that included tactile kinesthetic-proprioceptive cues.

During the first four weeks, only two of the four children received treatment using only PROMPT and not kinesthetic-proprioceptive cues. The results of the study yield that all participants made significant gains throughout the treatment; however, improved accuracy for all children on both trained and untrained targets when tactile cues were used.

### **Kaufman Speech to Language Protocol (K-SLP)**

This treatment program uses approximations of the target (single words and phrases) to facilitate the development of functional vocabulary until motor learning improves and allows for the use of more complex structures (Gomez et al., 2018). According to Kaufman (2013), the K-SLP is a commercial treatment program that clinicians widely use despite the lack of evidence-based research supporting the use of this approach. It uses an intermediary word and sentence forms that include productions with different or fewer sounds or syllables than the adult production and eventually shapes them into correct adult production. To create word approximations, professionals implement strategies such as epenthesis, segregation of vowel sounds in diphthongs, and "chunking cues" within the K-SLP approach (Kaufman, 2013).

Gomez et al. (2018) conducted a Phase I pilot study using a single-case multiple-baseline across behaviors experimental design to collect preliminary evidence on using the K-SLP to treat children with CAS. Participants consisted of two children aged 4 to 5 years old with severe Childhood Apraxia of Speech who received 12 treatment sessions for one hour per 3 weeks. Treatment involved a pre-practice, a practice phase that included distributed practice and immediate feedback of words and phrases selected. Both participants demonstrated increased response to treatment as evidenced by the improvement of production on treated words with therapy and maintenance of accuracy. However, it was reported that only one participant demonstrated generalization of treatment gains to two sets of untrained words.

## **Bilingual Children with Childhood Apraxia of Speech**

There is a growing body of research supporting evidence-based treatments for CAS. However, there is a lack of existing literature about intervention techniques for developing bilingual children diagnosed with or suspected of childhood apraxia of speech. Existing literature states that bilingual children have differentiated linguistic systems by 2 years old, and these two speech sound systems are likely interlinked, allowing intervention effects in one language to generalize to the other language. Research has not yet demonstrated the best treatment strategies for generalization across languages in bilingual children with CAS. However, it is believed that intensive treatment, likely focusing on early developing sounds to build a stable foundation for further speech development can also be beneficial for bilingual children with Childhood Apraxia of Speech as it is for monolingual children with CAS (Gildersleeve-Neumann & Goldstein, 2015).

Evidence-based intervention practices for bilingual children are largely adaptations of monolingual English intervention practices, and lack of clear assessment and intervention procedures for bilingual children is a challenge for practicing SLPs. Gildersleeve-Neumann and Goldstein (2015) state that cross-linguistic effects on bilingualism and speech development should be described to aid the selection of bilingual intervention practices. Even though it is likely that the two speech sound systems in bilingual children are interlinked, per the dynamic systems theory, the degree of generalization has not been widely explored.

### **Dynamic System Theory (DST)**

Dynamic System Theory explores how seemingly independent components are interconnected in the developmental stages of complex biological systems (Gildersleeve-Neumann & Goldstein, 2015). This theory accounts for the variability across children and child development

and it is considered an indicator of adaptability and flexibility in the system (Terband et al., 2019). The DST's principles include complexity, a wide range of time patterns, and varying degrees of stability and flexibility (Gildersleeve-Neumann, 2005). Developmental variability is noted as continuous, with systems interacting and changing both immediately and over time due to factors such as environment, language history, language use, language proficiency levels, and phonemic and phonetic factors.

According to Goldstein and Gildersleeve-Neumann (2015) DST has been studied in depth in motor learning and has been recently applied to language acquisition of monolinguals, bilinguals and to those with SSD. Furthermore, literature suggests that dynamic interactions between languages result in cross-linguistic generalization during development allowing bilingual children to transfer phonological and articulatory knowledge from one language to another by increasing accuracy of productions (Gildersleeve-Neumann & Goldstein, 2015). Therefore, DST portrays a potential intervention of bilingual children; however, this theory has not been yet explored in the field of bilingual children with CAS.

### **Assessment Interventions for Bilingual Children With Childhood Apraxia of Speech**

According to (Hammer et al., 2004) SLPs must have the ability to distinguish a communication disorder from a communication difference by being skilled at assessing people from a variety of backgrounds, including the accurate administration and interpretation of formal and informal evaluation techniques. However, little is known about assessment procedures implemented when evaluating bilingual children who are suspected of Childhood Apraxia of Speech, although it is known that Childhood Apraxia of Speech will manifest differently in each language. According to ASHA (n.d.) bilingual children with CAS may rely on earlier mastered

sounds across all languages spoken and appear to prefer or use one language over another. The difference may be due to the relative simplicity of the language's phonemic inventory and word structure rather than an indication of language choice or dominance.

One of the core features of Childhood Apraxia of Speech is the inconsistency of vowel production; therefore, when evaluating error patterns, SLPs must consider the variation in vowel systems across languages and the number of vowels within a language. Some languages have more vowel phonemes than others, which can affect intelligibility and the overall frequency of errors. It is imperative that SLPs are cautious when assessing bilingual children, as the normal processes of second language acquisition may be confused with features of Childhood Apraxia of Speech (ASHA, n.d.). Furthermore, ASHA (n.d.) provides an example of syllable reduction or deletion in specific word positions, which may vary by dialect or language. In addition, expected prosody and stress patterns may not be present due to these differences. Children may also exhibit inconsistent error patterns for phonemes in a new language that are absent or allophones in their primary language. For example, /l/ and /r/ are allophones in some languages, and children may struggle to produce these phonemes accurately and clearly in English (ASHA, n.d.).

In Gildersleeve-Neumann and Goldstein (2015), cross-linguistic generalization of speech skills, in addition to the effect of a bilingual intervention on the speech systems of bilingual children, was explored. Participants consisted of two Spanish-English bilingual children, one with a moderate-to-severe SSD and the other with severe Childhood Apraxia of Speech, who was born to parents from Mexico and spoke little to no English. Authors conducted a full assessment on each participant consisting of a case history from parent surveys, evaluation of developmental history and parent concerns related to speech. In addition, authors completed an oral peripheral examination and a pure-tone hearing screener. Language skills of each participant

were evaluated using formal and informal assessment measures such as the Spanish Clinical Evaluation of Language Fundamentals-Preschool 2 (Wiig et al., 2009). Speech production was assessed through standardized but not norm-referenced assessment measures including a single-word and sentence level articulation and phonology tasks in Spanish and English utilizing the Phonological and Articulatory Bilingual Assessment (PABA) (Gildersleeve-Neumann, 2014).

According to Goldstein and Gildersleeve-Neumann (2015), a valid assessment of bilingual children requires understanding their entire speech system and assessing speech production in all languages to fully understand the intelligibility, strengths, and weaknesses of a bilingual child. However, professionals face the challenge of addressing the individual needs of all bilingual children as standardized norm-referenced tests that consider all variables might not exist or may not be cost-effective (Goldstein & Gildersleeve-Neumann, 2015). Once again, professionals in the field of Speech-Language Pathology face a challenge when seeking for evidence that explores the implementation and efficacy of assessment tools when evaluating bilingual children with CAS as there are no currently validated assessment tools for diagnosis of this communication disorder in bilingual children.

### **Treatment Approaches for Bilingual Children with Childhood Apraxia of Speech**

American Speech-Language-Hearing Association's considerations for bilingual and multilingual populations with Childhood Apraxia of Speech suggest that treatment should begin by targeting phonemes shared by both languages or targets that affect both languages. This may yield the most significant improvement in intelligibility across languages in the shortest amount of time, resulting in a cross-linguistic transfer of skills. It is also recommended that treatment should incorporate activities that promote the cross-linguistic transfer of skills and improve

intelligibility, such as activities for home practice in the family's native language (ASHA, n.d.). Although many studies have investigated motor programming and sensory cueing intervention approaches (e.g. Dale & Hayden, 2013; Gildersleeve-Neumann, 2007; Maas et al., 2014; Strand & Debertine, 2000; and Strand et al., 2006), only one intervention study investigating treatment for bilingual children with identified or suspected Childhood Apraxia of Speech has been identified in the literature.

In the study conducted by Gildersleeve-Neumann and Goldstein (2015), participants received treatment in English 2-3 times per week for eight weeks and in Spanish for at least two of every three days consisting of drill play and intense production frequency. Treatment target selection was based on the following criteria: (a) existence of speech sound error in both languages, (b) speech sound error rate, and (c) developmental appropriateness considerations. Treatment involved articulatory placement training, and DTTC principles were also implemented to treat speech targets applied to both languages in isolation and single syllables during a multiple-baselines-across-behavior design. Once a sound or syllable was produced correctly, the authors then targeted the sound in functional words and phrases. Authors measured ongoing treatment performance by utilizing probes in both languages, and overall skills were compared pre-and post-treatment. Results from this study indicated that both participants improved speech skills in both languages in terms of more accurate speech targets and overall intelligibility measures. Furthermore, gains were observed in consonant and vowel accuracy in addition to utterance-level complexity after treatment. Lastly, Gildersleeve-Neumann and Goldstein (2015) concluded that treating the stronger language of a child, which in this study was Spanish, yielded positive effects on the overall speech sound system of the two participants.



The lack of existing literature for intervention techniques for bilingual children diagnosed with or suspected of childhood apraxia of speech is clear. The absence of intervention measures for bilingual children with CAS contributes not only to challenges in the identification of this communication disorder but also represents a challenge for speech-language pathologists to conduct appropriate, culturally and linguistically responsive assessment and treatment for bilingual children with childhood apraxia of speech. This study was therefore designed to add knowledge base in the field of Speech-Language Pathology by investigating specific assessment and treatment procedures employed by SLPs in various settings when working with bilingual children with CAS. The study also presents information regarding SLPs' background, caseload, diversity training and work setting characteristics. The aims of the current study are as follows:

- A1 Describe the assessment procedures currently used by speech-language pathologists to diagnose bilingual children with Childhood Apraxia of Speech.
- A2 Describe the intervention approaches currently used by speech-language pathologists to treat bilingual children with Childhood Apraxia of Speech.
- A3 Describe diversity training provided to speech-language pathologists who treat bilingual children with Speech Sound Disorders across regions.

## CHAPTER III

### METHODS

#### **Research Design**

This study followed a qualitative research approach utilizing a descriptive, questionnaire-based survey design. As Merriam and Tisdell (2016) stated, qualitative research encompasses several methodologies that intend to provide detailed descriptions while imposing minimal disruptions in participants' natural environment. Survey research is often used to gather information about characteristics and a variety of practices in order to use it for descriptive purposes. Furthermore, surveys have been broadly used to study professional and clinician issues in the field of communication disorders (Maxwell & Satake, 2006). Snowball sampling was used to recruit participants as it can be an effective technique when the target population is difficult to access, such as in this study. It identifies individuals or key participants who easily meet the criteria it has been established for participation in the study. These key participants are asked to refer or pass along specific information to other individuals who can provide rich information for the study (Merriam & Tisdell, 2016).

#### **Participants**

Permission for research and recruitment was obtained from the Institutional Review Board (IRB) at the University of Northern Colorado (UNC) (see Appendix A). An IRB approved description of the study including purpose of the study, eligibility criteria, incentive and a link to the consent form and survey was distributed via an email invitation to Clinical Fellows and

ASHA-certified speech-language pathologists in the United States working with bilingual children with Speech Sound Disorders and Childhood Apraxia of Speech in various settings (e.g., private practice, schools, and hospitals). In addition, the email invitation was shared with organizations that focus on treatment of pediatric speech sound disorders such as Apraxia Kids, PROMPT Institute and Oral Motor Institute.

Participants were recruited through snowball sampling of professionals who are currently clinical fellows, registered members of the Colorado Speech-Language-Hearing Association (CSHA), certified members of the American Speech-Language-Hearing Association including but not limited to members of the following ASHA Special Interest Groups: SIG 1: Language Learning and Education; SIG 2: Neurogenic Communication Disorders; SIG 14: Cultural and Linguistic Diversity; and SIG 16 School-Based Issues. Snowball sampling was utilized, beginning with SLPs associated with the University of Northern Colorado, who were encouraged to forward the invitation email with a link to the survey to other SLPs with whom they might have connections.

### **Survey/Questionnaire**

A survey instrument was developed for the purpose of collecting data regarding the current practices of SLPs when providing services to bilingual children with Speech Sound Disorders and Childhood Apraxia of Speech. The survey items were adapted from instruments used in the following six studies: Caesar and Kohler (2009); Dawson (2000); Guiberson and Atkins (2012); Pascoe et al. (2010); Roseberry-McKibbin et al. (2005); and Skahan et al. (2007). In addition, items specific to the purpose of this study were also included by the primary researcher. Survey questions included yes-no, multiple-choice, 5-point Likert-type scale responses, and some open-ended questions. The data analyzed in this study were gathered from

responses to questions from four sections. Section 1 included ten questions regarding the background and work setting information. Questions in part 1 focused on gathering demographic information and languages spoken other than English. Section 2 consisted of seven questions addressing the composition of SLPs caseloads. Two questions within this section were composed of 4 additional questions to gather detailed information of children with Speech Sound Disorders and/or Childhood Apraxia of Speech within participants' caseloads. Section 3 had two questions that addressed diversity training. Section 4 included 17 questions regarding service delivery. Questions in part 4 focused on types of assessments and treatments currently used in practice and how SLPs select and implement treatment for bilingual clients. The survey questions used in this study can be found in Appendix B.

To verify face validity of questions in the survey, this was reviewed by two professional speech-language pathologists. Adjustments to the survey content regarding clarity, appropriateness and comprehensiveness of each item were made.

## **Procedures**

An invitation to participate in this study was sent via email consisting of a brief message explaining the purpose of the study and a link to the study's survey through Qualtrics. Once participants clicked on the link to the survey, they were directed to an informed consent page, which included a statement of the study's purpose and type of research conducted, a summary of the study's procedures, contact information of the primary research, and research advisors, and a statement that participation was voluntary and that participants could end their participation at any time without risk of prejudice or penalty. Participants were initially given 4 weeks to respond to the survey; however, due to the initial low response rate, the survey was kept active for a longer period of time. The invitation to participate email is shown in Appendix C.

To protect the participant's anonymity, and as no risk of harm to participants was anticipated with survey-based research, the standard consent procedure of obtaining a formal signature was requested to be waived. Consent materials are shown at the beginning of the survey (see Appendix D). Study participants volunteered based solely on interest in the purpose of the research and were able to withdraw from the study at any time without any negative repercussions.

The survey concluded with a "thank you" letter written by the researcher, thanking the participants for their time and contribution to this study. In addition, the participants had the opportunity to choose to participate in an anonymized raffle clicking by clicking "yes" to the multiple-choice question "Would you like to enter a raffle for the chance to win a prize?" shown in the "thank you" letter. Participants who consented to participate were directed to the raffle sign-up through an anonymized link to a separate survey, where they provided their names and email. Winners for the three gift cards were randomly selected from a secure exported data list and contacted by the primary researcher.

### **Data Analysis**

Data were obtained through one survey developed by the primary researcher via Qualtrics software (2023), a technology program designed for online survey creation and data collection. In the creation of the surveys associated with this study, Qualtrics uses an anonymous link or URL and does not collect identifying information (e.g., name, email, address). This anonymous link to the survey was distributed to potential participants, groups and organizations mentioned above. For analysis purposes, participants' collected responses were randomly assigned an identification number. Demographic information (age, ethnicity, current work state) was included to analyze whether these variables influence survey responses. This ID number was

linked to the name and email address, which were recorded in a separate, secure database. Furthermore, the contact information was kept confidential during the recruitment process. Data were only accessible to the primary researcher and research advisors and used for the purpose of conducting this study only. All identifying data will be deleted no later than three years. If necessary, the remaining data will be retained to complete any additional analysis, and the IRB will be updated.

## CHAPTER IV

### RESULTS

This study gathered information about the current practices of speech-language pathologists when assessing and treating bilingual children with Childhood Apraxia of Speech. Participation in this research involved completing an online survey by monolingual and bilingual certified SLPs who currently treat the target population or have done it in the past. Data representing a total of seven participants' survey responses will be presented. Participants could go backward and skip a question without answering it or leave an answer blank and continue to the remaining survey questions without penalty. It was noticed that participants were more likely to respond to multiple choice style questions than free response style questions that required the generation and type of a response to the question. The present chapter includes four sections: a) clinician's background and work setting, b) composition of caseloads, c) diversity training, d) current assessment procedures used in the field for bilingual children with Childhood Apraxia of Speech e) current intervention approaches used in the field for bilingual children with Childhood Apraxia of Speech, and f) service delivery challenges.

#### **Clinician's Background and Work Setting**

The first section of this survey sought to gather demographic information about certified SLPs, including but not limited to the number of years of practice, state of residence, racial/ethnic background, fluency in languages other than English, and current work setting. Table 4.1 provides descriptive characteristics of participants who completed the survey (n=7).

**Table 4.1.***Characteristics of Speech-Language Pathologists Who Completed Survey*

<b>State</b>	<b>No.</b>	<b>%</b>
Colorado	5	71.4
Virginia	1	14.3
Texas	1	14.3
<b>Years Working as SLP</b>	<b>No.</b>	<b>%</b>
1-5	1	14.3
6-10	5	71.4
11-15	1	14.3
<b>Education</b>	<b>No.</b>	<b>%</b>
BA/BS	3	27.3
MA/MS	7	63.6
PhD	0	0
Other	1	9.1
<b>Racial/Ethnic Background</b>	<b>No.</b>	<b>%</b>
White or Caucasian	5	55.6
Latino/Hispanic	4	44.4
American Indian/Native American	0	0
African American/Black	0	0
Asian	0	0
Other	0	0
<b>Age</b>	<b>No.</b>	<b>%</b>
20-29	1	14.3
30-39	4	57.1
40-49	1	14.3
50-59	1	14.3
>59	0	0
<b>Speak Other Language</b>	<b>No.</b>	<b>%</b>
Yes	3	42.9
No	4	57.1
<b>Other Language</b>	<b>No.</b>	<b>%</b>
Spanish	3	42.9
<b>Work Area</b>	<b>No.</b>	<b>%</b>
Urban	5	83.3
Rural	1	16.7
<b>Work Setting</b>	<b>No.</b>	<b>%</b>
Birth-to-three center	0	0
Developmental Preschool	2	20
County/State early intervention services	0	0
Medical Center/ Hospital-Based Service	0	0
University Clinic	0	0
Private Clinic	1	10
Other <sup>a</sup>	7	70

*Note.* <sup>a</sup>Other work settings: PK-6 Elementary School, K-5 Elementary School, Public Schools, Home Health and Independent Contractor, K-12 Public School, Head Start Preschool.



The participants for this study included seven certified speech-language pathologists from three states across the country. The majority of participants reported living in Colorado (71.4%), and the remaining SLPs reported either living in Virginia (14.3%) or Texas (14.3%). The participants' years working as licensed SLPs were relatively broad, with participants working between two and 14 years. One participant reported working as a licensed SLP for two years; two participants have worked for seven years; three were noted practicing for 8-10 years. Most participants reported earning a MA/MS (63.6%), the remaining 27.3% reported a BA/BS, and 9.1% reported earning a Doctor of Speech-Language Pathology degree (SLPD).

Participants reported their race/ethnicity on a survey question that allowed them to choose multiple answers and add their own. The majority of participants (n=5) identified themselves as White or Caucasian (55.60%), with two identifying themselves as Latino/Hispanic. The age range for participants was also relatively broad, with participants between the ages of 20 to 50 years. Most participants (57.1%) reported being between ages 30-39, 14.3% reported being between ages 20-29, 40-49, and 50-59. Of the total number of participants, only three reported speaking another language, such as Spanish (42.9%), while the remaining 57.1% of participants reported speaking only English.

Regarding work area, the majority of participants, 83.3%, reported working in an urban area, while the remaining 16.7% reported working in a rural/suburban area. Approximately 20% of participants reported working at a developmental preschool, and 10% reported working at a private practice. In addition, all participants (70%) reported working at other work settings, including PK-5/6 elementary schools, kindergartens, preschools, Head Start preschools, and home health and independent contractors with schools as bilingual evaluators.

### Composition of Caseloads

It is common for SLPs to have a complex caseload as they provide services to a wide variety of populations, from early intervention to adults and a variety of ethnic backgrounds. Thus, this section of the survey sought to collect information about the participants' caseloads, including information on the population currently served, common ethnic backgrounds of clients, the number of bilingual children in their caseloads, and if participants served any bilingual children with Speech Sound Disorders and Childhood Apraxia of Speech. In addition, participants responded to detailed questions such as the severity of the disorder, ages of children, and type of Childhood Apraxia of Speech to gather more in-depth information regarding the population of interest in this study in their caseloads.

**Figure 4.1**

*Speech-Language Pathologist's Total Caseload and Bilingual Caseload*

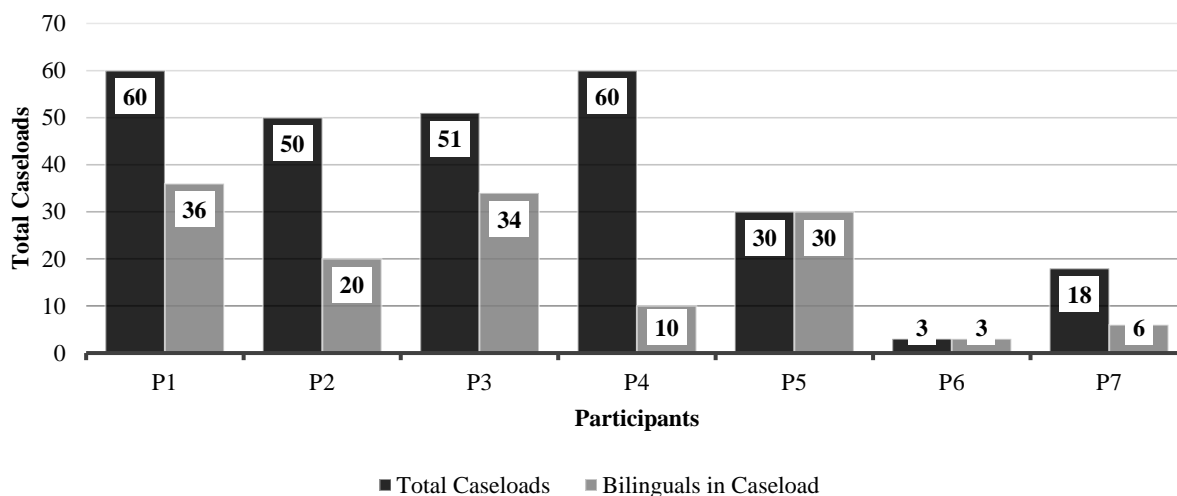


Figure 4.1 shows the total number of children served by each participant and the total number of bilingual children that composed each participant's caseload. The total number of children on the seven participants' caseloads ranged from three to 60 children. Most participants (n=4) reported having a caseload ranging between 41 to 60 children, with two participants

reporting a caseload of 60 children and one with a caseload of 51 children. Two participants ranged their caseloads between 1-20 children, with one participant reporting 18 children and one with a caseload of only three children. One participant reported a caseload ranging from 21-40, with 30 children in the current caseload. Two participants, P5 and P6, reported that 100% of their caseload was comprised of bilingual children. P1 and P3 reported that bilingual children comprised 60% and 66% of their total caseloads. Of the 50 children composing P2's total caseload, it was reported 40% are bilingual. In comparison, there were fewer bilingual children in P4 and P7 caseloads, as it was reported that bilingual children comprised 17% and 33% of their total caseloads.

**Table 4.2**

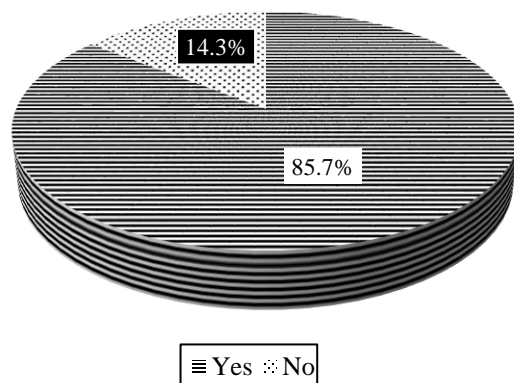
*Age Population and Ethnic Background in Caseloads*

<b>Population Currently Served</b>	<b>No.</b>	<b>%</b>
Early Intervention	1	7.1
Preschool Age	5	35.7
School Age	7	50
Teen Age	1	7.1
Adults	0	0
<b>Caseload Ethnic Background</b>	<b>No.</b>	<b>%</b>
Asian	3	15.8
Hispanic	7	36.8
American Indian/Native American	4	21.1
African American/Black	5	26.3
Other	0	0

Table 4.2 provides information on the age populations and ethnic backgrounds that composed the participants' caseloads. The school-age population was reported to be the highest population served in this survey as all seven participants indicated providing services to this population (50%), five participants indicated providing services to preschool-age children (35.7%), one participant served early intervention (7.1%) and one participant provided services to the teenage population (7.1%). All seven participants indicated having children from Hispanic backgrounds in their caseloads (36.8%). Five participants indicated that they have African American children on their caseloads (26.3%). American Indian/Native Americans followed, with four participants indicating to serve this population (21.1%) currently. Lastly, Asian background was also represented on caseloads, but at a smaller percentage as only 3 participants indicated serving children from this ethnic background (15.8 %).

**Figure 4.2**

*Participants That Previously or Currently Serve Bilingual Children with Speech Sound Disorders*



### **Bilingual Children with Speech Sound Disorders**

Figure 4.2 displays the results from the survey question: "Have you ever served or are you currently serving bilingual children with SSD?" The majority of participants (n=6) responded "yes," and only one participant responded "no." The participant who responded "no"

to this question was automatically directed to the next section of the survey excluding all questions regarding bilingual children with SSDs. Therefore, only six participants of the total seven responded to questions within this part of a section of the survey. The following table demonstrates the percentage of total number of bilingual children with SSD in the participants' current caseloads.

**Table 4.3**

*Bilingual Children with Speech Sound Disorders in Participants' Caseloads and Ages*

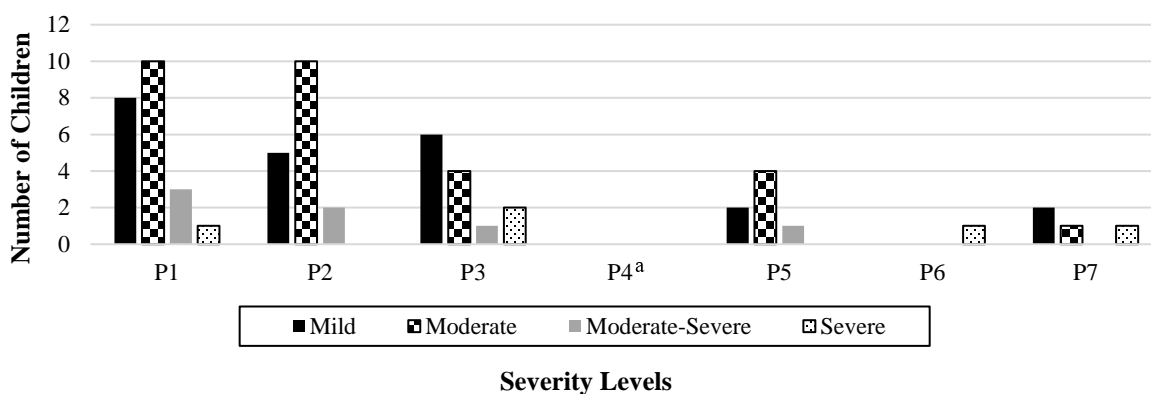
<b>Bilingual Children with SSD in Current Caseload</b>	<b>No.</b>	<b>%</b>
<10%	0	0
10-25%	4	66.7
26-50%	1	16.8
51-75%	1	16.8
>75%	0	0
None	0	0
<b>Ages of Bilingual Children with SSD in Current or Past</b>	<b>No.</b>	<b>%</b>
0-3	1	1.6
4-5	18	28.1
5-12	45	70.3
12+	0	0

As shown in Table 4.3 most participants (n=4) who completed this section of the survey reported that bilingual children with Speech Sound Disorders comprise 10-25% of their total caseload. One participant reported that this population comprised 26-50% of the total caseload, and another reported that bilingual children with SSD were between 51-75%. The participants

informed that the majority (70.3%) of bilingual children with SSD in their caseload were between ages 5-12 years, 28.1% between ages 4-5 years, and 1.6% within ages 0-3 years.

**Figure 4.3**

*Reported Severity Levels of Bilingual Children with Speech Sound Disorders Per Participant*

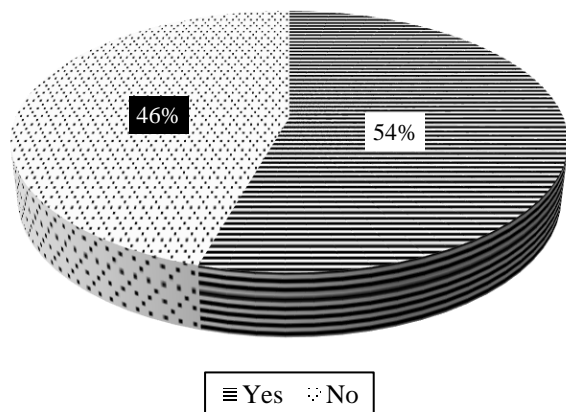


*Note.* <sup>a</sup> P4 did not complete this part of the survey due to no bilingual children with SSD in current or past caseload.

Figure 4.3 provides information reported per participant on the severity levels of bilingual children with SSDs in their caseload. P1, P2, and P5 reported that most of their cases were within the moderate severity category, whereas P3 and P7 reported that most of their bilingual children with SSDs were within the category of mild severity. P1, P6, and P7 reported only one case within the severe category, while P2 and P5 reported zero cases within this category. P1 reported three cases within the moderate-severe category, and P2 reported 2 cases. P3 and P5 reported only one case within this severity category, while P6 reported zero cases.

**Figure 4.4**

*Participants That Previously or Currently Serve Bilingual Children with Childhood Apraxia of Speech.*



### **Bilingual Children with Childhood Apraxia of Speech**

Figure 4.4 displays the results from the survey question: "Have you ever served or are you currently serving bilingual children with CAS?" The majority of participants (n=4) responded "yes," and three participants responded "no." The participants who responded "no" to this question were automatically directed to the next section of the survey excluding all questions regarding bilingual children with Childhood Apraxia of Speech. Therefore, only four participants of the total seven responded to questions in this survey section. The following table demonstrates the percentage of the total number of bilingual children with Childhood Apraxia of Speech in the participants' current caseloads.

**Table 4.4***Bilingual Children with Childhood Apraxia of Speech in Participants' Caseloads and Ages*

<b>Bilingual Children with Childhood Apraxia of Speech in Current Caseload</b>	<b>No.</b>	<b>%</b>
<10%	3	75.0
10-25%	0	0
26-50%	0	0
51-75%	0	0
>75%	0	0
None	1	25.0

<b>Ages of Bilingual Children with Childhood Apraxia of Speech in Current or Past Caseload</b>	<b>No.</b>	<b>%</b>
0-3	1	14.3
4-5	1	14.3
5-12	5	71.4
12+	0	0

<b>Verbal/Non-Verbal Childhood Apraxia of Speech</b>	<b>No.</b>	<b>%</b>
Verbal	6	85.7
Non-Verbal	1	14.3

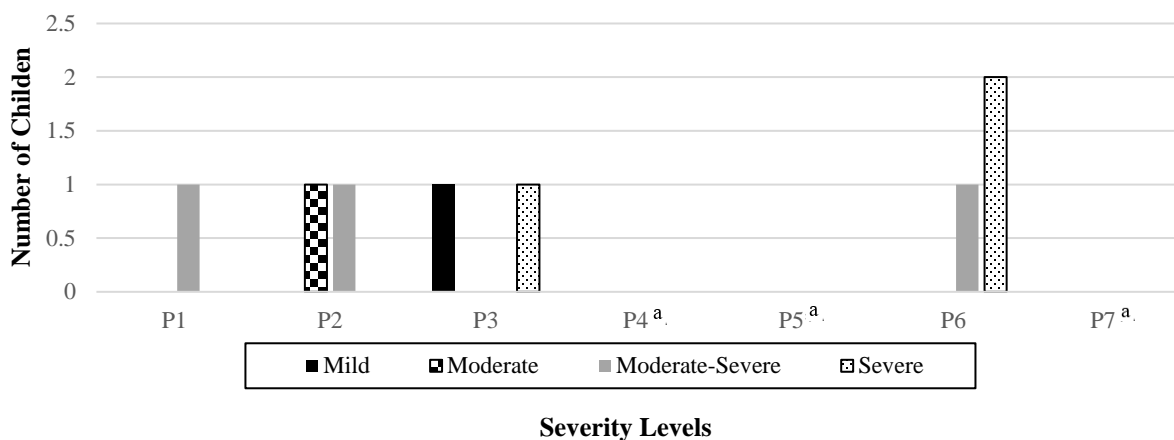
As demonstrated in Table 4.4 the majority of participants (n=3) who completed this section of the survey reported that bilingual children with Speech Sound Disorders comprise less than 10% of their total caseload. One of the four participants who responded "yes" to the above question reported zero cases of bilingual children with CAS in the current caseload but reported having treated three cases in the past. Therefore, the information provided by this participant was



considered in the following sections. All participants (n=4) indicated that 71.4% of their bilingual children with Childhood Apraxia of Speech in their current or past caseloads were between ages 5-12 years, 14.3% between ages 4-5 years, and ages 0-3 years. Furthermore, 85.7% of the cases reported by participants were classified in the verbal category, and 14.3% were classified as non-verbal.

**Figure 4.5**

*Reported Severity Levels of Bilingual Children with Childhood Apraxia of Speech Per Participant*



*Note.* <sup>a</sup> P4, P5 and P7 did not complete this part of the survey due to no bilingual children with Childhood Apraxia of Speech in current or past caseload.

Figure 4.5 provides information reported per participant on the severity levels of bilingual children with CAS in their caseload. Three out of four participants who reported serving or having served bilingual children with Childhood Apraxia of Speech reported only one case within the moderate-severity category. P3 and P6 reported cases within the severity category; P3 reported only one, while P6 reported two cases. In addition, P3 reported one case within the mild severity category, and P2 informed one within the moderate severity category.

### **Diversity Training**

As a result of efforts by states of the United States and ASHA to provide continuing education opportunities for in-service SLPs, this portion of the survey sought to gather

information about the type of diversity training SLPs have received to inform best practice and deliver services to individuals from diverse cultural and linguistic backgrounds.

**Table 4.5**

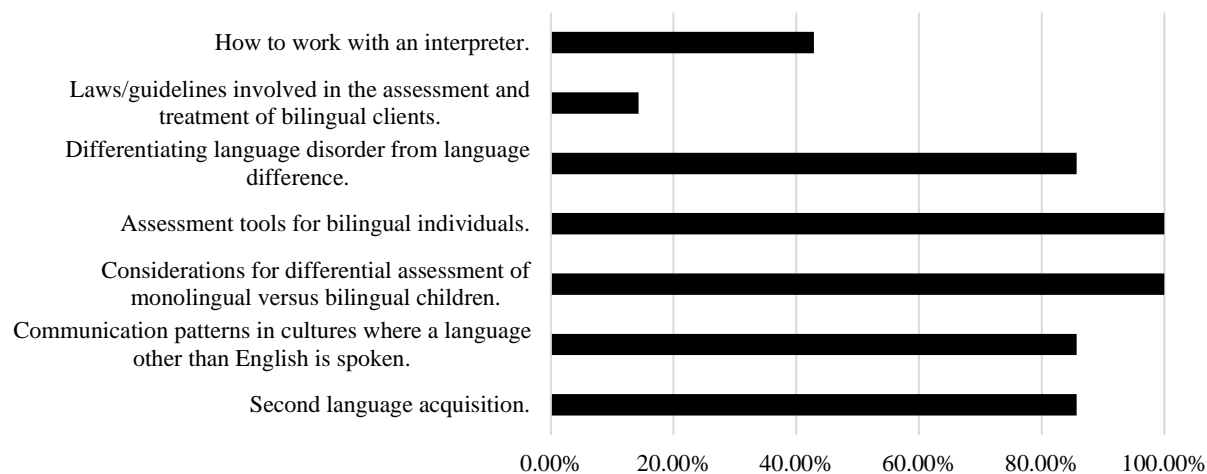
*Providers of Specialized Training*

<b>Providers</b>	<b>No.</b>	<b>%</b>
Graduate program	6	33.3
Mentorship from other SLP	1	5.7
Professional workshop	6	33.3
Employer	3	16.7
Other	2	11.1

Of the participants, 100% indicated that they had received specialized training in providing services to individuals with diverse cultural or linguistic backgrounds (see Table 4.5).

The majority of participants (n=6) indicated that training was provided through graduate programs and professional workshops (33.3%). In contrast, three participants reported having received training through an employer, including but not limited to school districts (16.7%).

One participant indicated that training was received through mentorship from another SLP (5.7%), while two participants reported receiving training from other non-specified providers (11.1%).

**Figure 4.6***Speech-Language Pathology Coursework*

Regarding specific diversity coursework in Speech-Language Pathology, Figure 4.6 shows that 100% of the participants indicated they have completed coursework that included the topics of assessment tools for bilingual individuals and considerations for differential assessment of monolingual versus bilingual children. Of the participants, 85.7% indicated that they completed coursework that included differentiating language disorder from language difference, communication patterns in cultures where a language other than English is spoken, and second language acquisition. However, only 42.9% of the participants indicated that they completed coursework that included information on how to work with an interpreter, and an even smaller percentage (14.3%) received coursework that included information on laws/guidelines involved in the assessment and treatment of bilingual clients.

**Table 4.6****Participants' Perspectives to Diversity Service Statements**

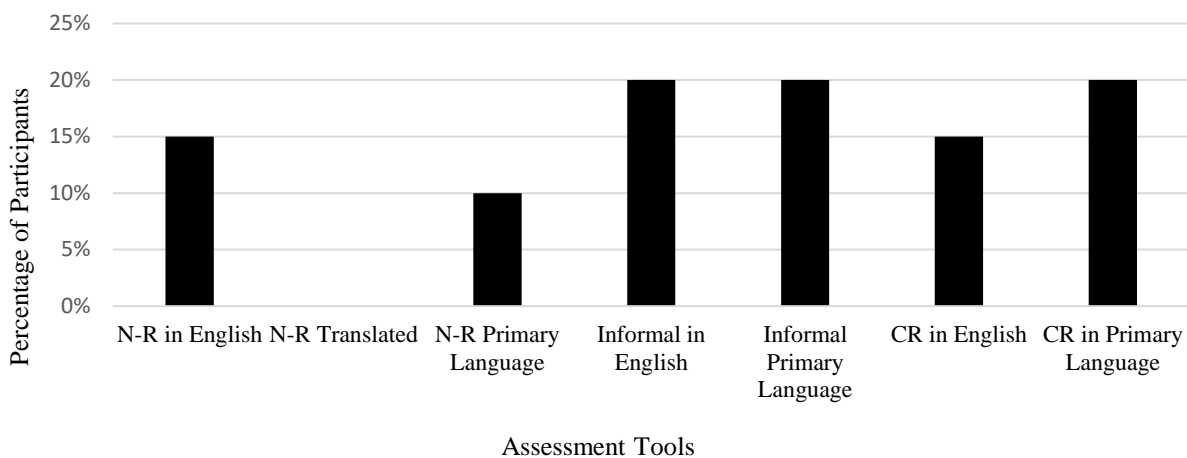
<b>Statements</b>	<b>Rating Response Frequency In (%)</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
I am competent at assessing and treating bilingual/multilingual clients.	0 (0.0)	0 (0.0)	0 (0.0)	4 (57.1)	3 (42.9)
Compared to other speech-language specialists, I am very skilled in clinical interactions with culturally and linguistically diverse clients.	0 (0.0)	0 (0.0)	1 (14.3)	5 (71.4)	1 (14.3)
I am comfortable assessing and treating an individual from a cultural or racial background other than my own.	0 (0.0)	0 (0.0)	0 (0.0)	5 (71.4)	2 (28.6)
Special knowledge and training are needed in order to provide services to foreign-born clients who want to improve their English skills.	0 (0.0)	0 (0.0)	1 (14.3)	4 (57.1)	2 (28.6)
Communication skills may vary across cultures.	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	6 (85.8)
A course in cultural and linguistic diversity should be required for graduate students in speech-language pathology programs.	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (100.0)
Special knowledge and skills are needed to diagnose or treat individuals from nonmainstream backgrounds.	0 (0.0)	0 (0.0)	0 (0.0)	3 (42.9)	4 (57.1)
Clinical Competence is related to cross-cultural knowledge.	0 (0.0)	0 (0.0)	0 (0.0)	4 (57.1)	3 (42.9)
I have sufficient training to be able to adequately serve the clients on my caseload.	0 (0.0)	0 (0.0)	0 (0.0)	4 (57.1)	3 (42.9)
In assessment with mainstream, English speaking populations, I rely on the results of standardized assessments.	0 (0.0)	2 (28.8)	4 (57.1)	1 (14.3)	0 (0.0)
In assessments with culturally and linguistically diverse children, I rely on the results of standardized assessments.	2 (28.8)	3 (42.7)	2 (28.6)	0 (0.0)	0 (0.0)
Code switching is a normal behavior for a bilingual child to exhibit.	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (100.0)
Bilingual and multicultural issues should be considered specialty areas of clinical practice.	0 (0.0)	1 (14.3)	2 (28.6)	1 (14.3)	3 (42.7)
Bilingual and multicultural issues should be an integrated part of graduate programs in speech-language pathology.	0 (0.0)	0 (0.0)	0 (0.0)	1 (14.3)	6 (85.7)
Bilingual and multicultural issues should be taught as a special course in graduate programs in speech-language pathology.	0 (0.0)	1 (14.3)	0 (0.0)	2 (28.6)	4 (57.1)
When serving culturally and linguistically diverse clients, I prefer to collaborate with another professional with a specialty in ELL or bilingualism.	0 (0.0)	0 (0.0)	2 (28.6)	3 (42.9)	2 (28.6)
Code switching is indicative of language deficiency or language confusion.	6 (85.7)	1 (14.3)	0 (0.0)	0 (0.0)	0 (0.0)

*Note.* 1= Strongly disagree, 2= Disagree, 3= No opinion, 4= agree, 5= Strongly agree

Participants rated their reactions to each statement above using a 5-point Likert-type scale (1= Strongly disagree, 2= Disagree, 3= No opinion, 4= agree, 5= Strongly agree) (see Table 4.6). All participants reported that they were competent and comfortable in assessing and treating individuals from diverse cultural and linguistic backgrounds. However, more than 50% of participants reported that they prefer to work with specialists in bilingualism when working with individuals from linguistically diverse backgrounds.

### **Current Assessment Procedures Used in The Field for Bilingual Children with Childhood Apraxia of Speech**

This section of the survey sought to gather detailed information regarding participants' assessment procedures when serving bilingual children with CAS. Of the seven participants who completed this survey, only four completed this section as they indicated they currently serve or have served bilingual children with Childhood Apraxia of Speech or suspected Childhood Apraxia of Speech.

**Figure 4.7***Assessment Tools Used to Diagnose Childhood Apraxia of Speech in Children*

**N-R in English** = Norm-Reference tests administered in English

**N-R Translated**= Norm-referenced English tests translated into the client's primary language by an interpreter

**N-R Primary Language**= Norm-referenced tests in the client's primary language other than English.

**Informa in English**= Informal, non-standardized measures administered in English

**Informal Primary Language**= Informal, non-standardized measures administered in the client's primary language

**CR in English** = Criterion referenced measures in English

**CR Primary Language**= Criterion referenced measures in the client's primary language other than English

As shown in Figure 4.7, all participants who completed this section of the survey (n=4) reported using informal, non-standardized measures administered in English, informal, non-standardized measures administered in the client's primary language, and criterion-referenced measures in the client's primary language other than English when assessing children with or suspected Childhood Apraxia of Speech. In comparison, 15% of participants indicated to use norm-reference tests administered in English and criterion-referenced measures in English. Fewer participants reported using norm-referenced tests in the client's primary language other than English (10%), and none of the participants indicated using norm-referenced English tests translated into the client's primary language by an interpreter during assessment sessions.

**Table 4.7***Informal Assessment Tools*

<b>Participant</b>	<b>Informal Tools</b>	<b>Quotations</b>
<b>P1</b>	<i>Language Sample</i>	• N/A
	<i>Diadochokinetic Tasks</i>	• N/A
	<i>Observation</i>	• “Observation of inconsistencies in sound production, observation of groping, etc.”
	<i>Peter Flipsen Book on CAS</i>	• N/A
<b>P2</b>	<i>Oral Motor Mechanism Exam Measures</i>	• “Multisyllabic words/phrases from the child's primary language as provided by family repeated 3x to look at consistency, prosody, and transitions between syllables”
	<i>Language Sample</i>	• “Syllable shapes present, phonemic/phonetic repertoire observed in English and other language, or both, depending on level of English language acquisition”
	<i>Syllable Repetition Task (non-sense words)</i>	• “As long as targeted phonemes in the SRT are in the child's first language”
	<i>ProCad or Maximum Performance Task</i>	• “To differentiate CAS from Dysarthria”
	<i>Dynamic Assessment</i>	• “For expressive/receptive language assessment”
<b>P3</b>	<i>Sequencing Deficits</i>	• “I have a list of words in English and Spanish. I have the child repeat the words after me. The words have all sounds in each language as well as different syllable shapes and diphthongs. This usually gives me an idea if there is difficulty with sequencing and where to start treatment (e.g., difficulty with sequencing velar-alveolar transitions, difficulty producing Spanish diphthongs like "ue").”
	<i>Prosodic Differences</i>	• “I take note of this during conversation/language sample”
	<i>Inconsistency On Repeated Productions</i>	• “Use a protocol for calculating percent inconsistency on a sentence ("Buy bobby a puppy") and a series of multisyllabic words by Iuzzini-Seigel et al. (2017)”
<b>P6</b>	<i>Speech Samples</i>	• “Phonetic Transcriptions”
	<i>Oral Motor Mechanism Exam</i>	• N/A
	<i>Parent Interview</i>	• N/A
	<i>Observation</i>	• “In home/school environment”
	<i>Bjorem and Apraxia Kids</i>	• N/A
	<i>Resources</i>	

**Informal Assessment Measures**

All participants (n=4) reported using the informal and formal assessment tools described above (see Table 4.7). Participants responded to an open-ended question that allowed them to list informal procedures for assessing bilingual children with CAS. The most common tool was a speech/language sample, with three out of four participants reporting using it as part of their informal assessment. As shown in Table 4.7, P1 reported that language sampling, diadochokinetic tasks, and observations were mainly used as informal assessment tools. Like P1,

P2 also reported that a language sample forms part of the assessment process in addition to performing an oral motor mechanism exam, syllable repetition task using non-sense words, the Profile of Childhood Apraxia of speech and Dysarthria (ProCAD) or Maximum Performance Task, and Dynamic Assessment. P3 reported utilizing multisyllabic words, sequencing deficits, and prosodic differences lists as informal assessment measures. Lastly, P6 also reported performing an oral motor mechanism exam, conducting observations in home/school environments, and gathering speech/language samples and parent interviews as informal tools.

### *Dynamic Assessment*

All participants (n=7) responded to this question in the survey. Results indicated that 85.7% of participants were familiar with the use of Dynamic Assessment, and 14.3% of respondents were unfamiliar with the approach. P1 described the implementation of Dynamic Assessment as a "quick test/probe for a specific skill followed by explicit instruction, modeling, etc., and then another test/probe," and also reported that "dynamic cueing and teaching" should be part of all Childhood Apraxia of Speech assessments; however, it can be challenging "when the SLP is not familiar with the phoneme in the child's native language." P2 reported that "dynamic assessment would follow MLE over a few sessions targeting a single skill" and that "loads of pre-teaching, visuals, and wait time" should be included from the beginning to allow for differences in language processing. P3 reported that using DTTC "encourages Dynamic Assessment," based on a child's success; this participant takes data every session and constantly changes "targets or elicitation strategies." P5 reported using Dynamic Assessment in Culturally and Linguistically Diverse (CLD) populations' evaluations "to look at the child's "learnability" regardless of previous exposure to skills/knowledge/vocabulary," this participant described that would test the child and "take the skill the child did poorly in," then "create a brief intervention"



where the skill is taught, then re-test to "measure learnability." Lastly, P7 stated to use Dynamic Assessment during evaluations often "to help identify language difference or disorder." Alike P5, P7 also reported using a skill that a child "performed poorly in during other informal language assessments" and explicitly teaching that skill using "scaffolded questions and visuals" and then re-teach the skill by utilizing a different set of targets to "determine if the child made progress or not."

### Current Intervention Approaches Used in Field for Bilingual Children with Childhood Apraxia of Speech

**Figure 4.8**

*Treatment Intervention Tools Implemented for Children with Childhood Apraxia of Speech*

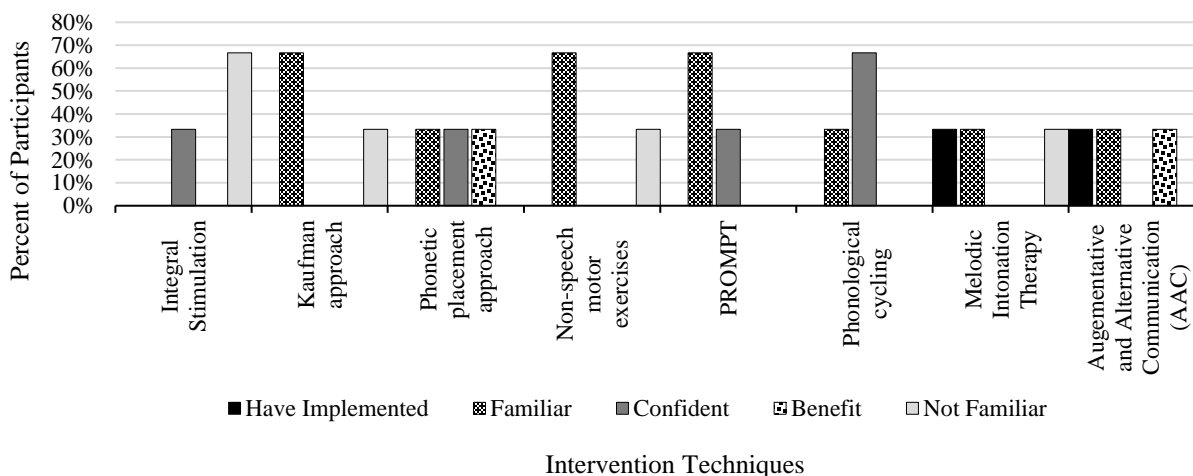
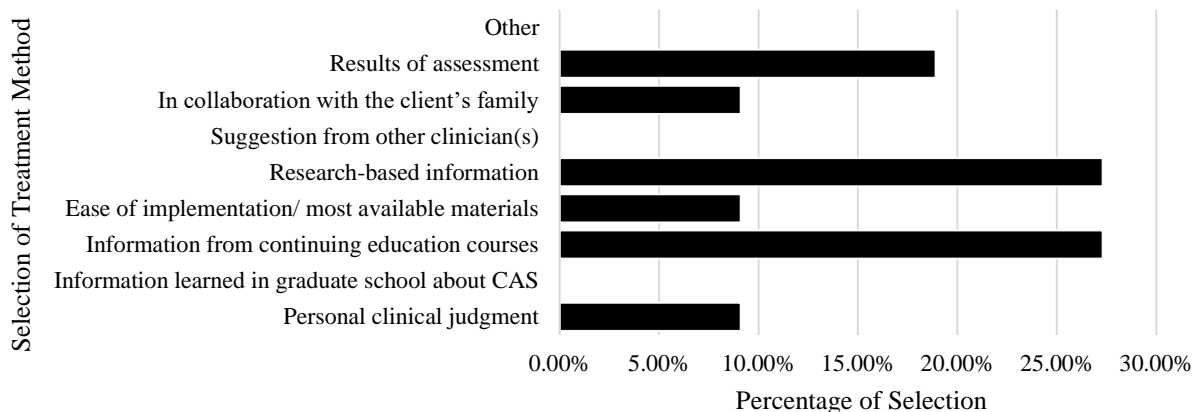


Figure 4.8 displays the results from interventions that participants (n=3) have implemented, are familiar or not familiar with, are confident about, and think techniques are beneficial when treating bilingual children with CAS. Participants indicated to have implemented melodic intervention (33.3%) and augmentative and alternative communications (AAC) (33.3%). None of the participants reported to have implemented techniques such as integral stimulation, PROMPT, non-speech oral motor exercises, Kaufman approach, phonological cycling, and the

phonetic placement approach when treating bilingual children with Childhood Apraxia of Speech.

However, approaches such as PROMPT, non-speech oral motor exercises and the Kaufman Approach were reported as the most familiar to 66.7% of participants while fewer participants (33.3%) indicated being familiar with melodic intonation, AAC, phonological cycling, and phonetic placement approach. On the other hand, results indicated that 33.3% of participants claimed to be unfamiliar with techniques such as melodic intonation, non-speech motor exercises, and the Kaufman approach.

Participants reported the most comfort with the phonological cycling approach as an intervention for bilingual children with CAS, as 66.7% indicated they were comfortable with this technique. Only 33.3% of participants indicated to be confident about PROMPT, and the phonetic placement approach and reported perceiving a benefit with using AAC and phonetic placement approaches. Of all treatment techniques, participants were the least confident using melodic intonation, non-speech motor exercises, and AAC, as none reported that they were comfortable using these techniques. Furthermore, while 33.3% of the participants reported comfort with the integral stimulation approach, 66.7% of participants indicated to have no knowledge of this approach as an intervention tool for bilingual children with Childhood Apraxia of Speech.

**Figure 4.9***Selection of Treatment Method for Children with Childhood Apraxia of Speech*

**Selection of Treatment Methods and Targets for Bilingual Children with Childhood Apraxia of Speech**

As demonstrated in Figure 4.9, a total of four participants responded to this question. The majority of participants (n=3) reported selecting a treatment method to use to target Childhood Apraxia of Speech in bilingual children based on information from continuing education courses and research-based information (27.3%), while 18.9% of participants (n=2) indicated to base their selection on results of assessments. At least one participant indicated selecting a treatment method based on personal clinical judgment, ease of implementation/most available materials, and in collaboration with the client's family (9.1%).).

Regarding the selection of treatment targets, one of the participants reported basing this decision on "functional words and phrases" in addition to "important words to the child (e.g., classmates' names), while another participant indicated selecting targets for treatment based on "phonetic/phonemic/syllable shape analysis, IPC and parent interviews." Furthermore, another participant reported to look at assessment results and for words that follow the sequencing

patterns that the student had the most trouble with and "find words that are motivating but not too high frequency (to avoid negative practice)."

### **Treatment Sessions of Children with Speech Sound Disorders vs Children with Childhood Apraxia of Speech**

According to the data, all participants reported that they do not use the services of bilingual interpreters when treating bilingual children with Speech Sound Disorders and Childhood Apraxia of Speech. The majority of participants reported conducting treatment sessions in both English and a child's primary language (66.7%), while only 33.3% of participants reported delivering treatment sessions in English with bilingual children with Speech Sound Disorders and Childhood Apraxia of Speech. Most participants (75%) who indicated using both languages in session reported that 10-25% of each session is conducted in a language other than English, while only 25% of participants indicated they implement another language 51-75% of each session.

The majority of participants (66.7%) indicated providing therapy sessions for bilingual children with SSD twice weekly in a combined service delivery model of group and individual sessions (50%). While 33.3% of participants reported only providing therapy sessions once weekly in individual sessions. Only 16.6% of participants indicated providing services only in group sessions. When participants were asked to indicate the frequency of therapy sessions for bilingual children with CAS, sessions were increased. While the majority of participants indicated still providing services twice a week, 25% indicated providing services three times per week. A combination of the service delivery model of group and individual sessions was reported to be preferred when delivering services to bilingual children with Childhood Apraxia of Speech. At the same time, 25% of participants preferred group or individual sessions.

### Service Delivery Challenges

Speech-language pathologists often encounter many challenges when working with culturally and linguistically diverse populations. Table 4.8 presents the nine most frequent challenges and participants' frequency of challenges.

**Table 4.8**

*Frequency of Challenges Encountered by Participants*

Challenges	Rating Response Frequency In (%)				
	1	2	3	4	5
Lack of appropriate less biased assessment instruments	0 (0.0)	1 (25.0)	0 (0.0)	1 (25.0)	2 (50.0)
Don't speak the language of the client being assessed	1 (25.0)	0 (0.0)	0 (0.0)	2 (50.0)	1 (25.0)
Lack of knowledge about the culture of the client being assessed	0 (0.0)	4 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)
Lack of knowledge about the nature of second language acquisition	3 (75.0)	0 (0.0)	0 (0.0)	1 (25.0)	0 (0.0)
Lack of knowledge about the phenomenon of bilingualism	3 (75.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (25.0)
Lack of availability of other professionals who speak the client's languages	0 (0.0)	3 (75.0)	1 (25.0)	0 (0.0)	0 (0.0)
Difficulty distinguishing a language difference from a language disorder	1 (25.0)	2 (50.0)	0 (0.0)	0 (0.0)	1 (25.0)
Lack of interpreters who speak the necessary languages to provide services	0 (0.0)	2 (50.0)	1 (25.0)	0 (0.0)	1 (25.0)
Lack of knowledge of developmental norms in client's primary languages	0 (0.0)	1 (25.0)	3 (75.0)	0 (0.0)	0 (0.0)

*Note.* 1 = rarely 2 = sometimes 3 = often 4 = usually 5 = almost always

Out of the seven total participants, only four participants responded to this question. Half of the participants (50%) reported almost always facing the challenge of the need for appropriate,

less biased assessment instruments and usually encountering the challenge of not speaking the language of the client being assessed. The lack of knowledge of developmental norms in the client's primary languages often challenges 75% of the participants. All participants (100%) reported that the lack of knowledge about the culture of the client being assessed is sometimes challenging when delivering services to culturally and linguistically diverse populations. Lastly, 75% of participants indicated that they rarely face the challenge of lack of knowledge about the nature of second language acquisition and lack of knowledge about the phenomenon of bilingualism.

## CHAPTER V

### DISCUSSION AND CONCLUSION

The present study aimed to explore and describe current practices of speech-language pathologists who presently work with or have worked with bilingual children with CAS in diverse settings. This study was motivated by the lack of literature on current practices when working with bilingual children with CAS, as it poses a challenge for professionals not only in identifying this communication disorder but also represents a challenge for SLPs to conduct appropriate, culturally, and linguistically responsive assessment and treatment for this population. Hence, this study intended to contribute to the knowledge base of treatment for Childhood Apraxia of Speech by investigating specific assessment and treatment procedures employed by SLPs in various settings when working with bilingual children with Childhood Apraxia of Speech.

#### **Summary of Findings**

The following discussion summarizes the preliminary findings of this study, the potential implications of these results, and the study's limitations and offers future directions for addressing gaps between research and practice.

#### **Clinicians' Background Information**

Participants also indicate that bilingual children with speech and language difficulties comprise a substantial proportion (40%-100%) of the caseloads of more than half of the SLPs participating in this study. It is important to note that all participants reported providing services

within an educational setting such as kindergartens, preschools, and elementary schools. Information gathered from this study confirms the constant growth of minority groups in the United States as the Hispanic or Latino population has become the second largest racial or ethnic group comprising 18.7% of the total population (U.S. Census Bureau, 2021). Furthermore, it is estimated that one-third of all school-age children are from culturally and linguistically diverse groups (Hammer et al., 2004).

Of the total participants, six reported providing services to bilingual children with SSDs, and only four participants indicated currently providing services to bilingual children with Childhood Apraxia of Speech. Between 10-25% of the participants' total caseload comprised bilingual children with SSDs between ages 4-12, and less than 10% of children in their total caseload were identified as bilinguals with Childhood Apraxia of Speech between the ages 5-12. As the incidence and prevalence of bilingual children with CAS remain unknown due to no data reported thus far, the preliminary information gathered from this study helps identify this area for future research. It serves as an initial insight into this topic.

### **Diversity Training**

Due to the ongoing increase of diversity in the United States population, competency is necessary. In this study, all participants indicated to have received diversity training from various settings such as graduate programs and professional workshops with coursework focusing on assessment tools for bilingual individuals and considerations for differential assessment of monolingual versus bilingual children, among others. However, results also indicated that information for collaborating with interpreters is an area in which only some SLPs in this study indicated receiving training, and even fewer SLPs received training about the laws and guidelines involved in the assessment and treatment of bilingual clients.



The high percentage of SLPs receiving diversity training is likely the result of the ongoing efforts of ASHA to provide continuing education opportunities for professionals and mandating that all SLPs possess competence in assessing and serving children from diverse backgrounds, including bilingual, Hispanic children (Hammer et al., 2004). However, the results of this study also indicated that efforts to improve SLPs' knowledge in serving culturally and linguistically diverse populations are still needed. All the participants agreed that a course in cultural and linguistic diversity should be required for graduate students. Bilingual and multicultural issues should be an integrated part of graduate programs in Speech-Language Pathology.

An interesting finding was that all participants reported being competent and comfortable at assessing and treating individuals from a cultural or racial background other than their own, even though 57.1% of SLPs reported that service bilingual children do not speak a second language. Therefore, more than half of SLPs in this study can offer services to bilingual children in the child's second language only – typically English. These preliminary findings do not align with ASHA's statement that "SLPs should be able to provide appropriate services to individuals from different cultural groups and to provide treatment in the individuals' native language" (ASHA, 1985). However, professionals face a significant challenge as ethical guidelines state that a child should not be denied intervention because of a language mismatch with the clinician. However, SLPs may not be competent to offer therapy in all languages (Pascoe et al., 2010).

In addition, all participants indicated that they do not utilize the services of interpreters/translators when assessing and treating bilingual children. This response was expected as very few participants indicated to have received coursework on working with an interpreter throughout their career and the ongoing challenge faced by these participants on the

lack of interpreters who speak the necessary languages to provide services. According to the literature, a demand for high levels of competency in at least two community languages and a professional obligation to effectively train and use interpreters could be enforced to improve best practices. However, this would require employers and service providers to commit to providing interpreters or bilingual coworkers, even if this requires more financial resources (Jordaan, 2008). Hence, continued efforts to improve speech-language pathologists' competencies and provide necessary resources are needed.

### **Assessment Procedures for Bilingual Children with Childhood Apraxia of Speech**

The findings from this study provide valuable information to the field, as little is known about assessment procedures implemented when evaluating bilingual children suspected of Childhood Apraxia of Speech. As previously stated, a valid assessment of bilingual children requires understanding their entire speaker system and assessing speech production in all languages to fully understand a bilingual child's intelligibility, strengths, and weaknesses (Goldstein & Gildersleeve-Neumann, 2015). However, standardized norm-referenced tests that consider all variables might not exist or may not be cost-effective.

In this study, all participants reported conducting informal, non-standardized measures administered in English, informal, non-standardized measures administered in the client's primary language, and criterion-referenced measures in the client's primary language other than English when assessing children with or suspected Childhood Apraxia of Speech. Conducting measures in the child's language is part of providing best practices. It aligns with the literature stating that a valid assessment of bilingual children must assess speech production in all languages to fully understand a bilingual child's intelligibility, strengths, and weaknesses

(Goldstein & Gildersleeve-Neumann, 2015). It is important to note that information on specific formal assessments was not collected as the survey did not include the question.

As reported in this study, the participants' most common informal assessment tools were taking a speech and language sample and conducting an oral mechanism exam. These tools are commonly used when assessing monolingual children with Childhood Apraxia of Speech (ASHA, n.d.). Both tools are valuable to clinicians as they can look for crucial speech characteristics common in children with Childhood Apraxia of Speech and identify any physical abnormalities with the child's oral mechanism. In addition, all participants who reported delivering services to bilingual children with CAS indicated utilizing dynamic assessment when assessing this population. These results support data from Strand et al. (2013), which state that this method is commonly used in current practices to assist clinicians in determining the severity and prognosis of a disorder and even facilitate treatment planning (Strand et al., 2013).

Other methods, such as ProCAD and Syllable Repetition Tasks, were mentioned by participants as informal tools they utilized with the population of interest in this study. These methods are also commonly used when serving monolingual children with CAS. However, there is no current research on the effectiveness of these tools on bilingual children with Childhood Apraxia of Speech. Evidence-based intervention practices for bilingual children are largely adaptations of monolingual English intervention practices; therefore, it is not surprising that current SLPs utilize tools such as ProCAD and Syllable Repetition Tasks when assessing bilinguals with CAS. Hence, future research should study the implementation and efficacy of common assessment tools (formal and informal) used with monolinguals in children who speak a second language and are suspected of Childhood Apraxia of Speech.

### **Intervention Approaches for Bilingual Children with Childhood Apraxia of Speech**

For many bilingual children, the home language is often more important than English in a variety of communication settings. For the treatment of speech and language disorders, current best practices advocate for providing intervention in both the home language as well as in English (Goldstein & Gildersleeve-Neumann, 2015). The results of this study are in agreement with recommended practices, as most participants indicated provided treatment intervention in both languages, with at least 10-25% of each session being conducted in the child's primary language.

The selection of treatment methods to target Childhood Apraxia of Speech in bilingual children was highly reported to be based on a combination of information gathered from continuing education courses and research-based information, followed by the selection based on the results of assessments. Regarding the selection of treatment targets, the results of this study yield that participants based their decision according to "functional words and phrases," "important words to the child (e.g., classmates' names), and "phonetic/phonemic/syllable shape analysis, IPC and parent interviews." ASHA's considerations for bilingual and multilingual populations with CAS suggest that treatment should begin by targeting phonemes shared by both languages or targets that affect both languages. This may yield the most significant improvement in intelligibility across languages in the shortest time, resulting in a cross-linguistic transfer of skills. It is also recommended that treatment should incorporate activities that promote the cross-linguistic transfer of skills and improve intelligibility, such as activities for home practice in the family's native language (ASHA, n.d.).

According to the information gathered from this study, treatment intervention tools such as Melodic Intonation Therapy (MIT) and AAC devices are the techniques most often implemented by participants in treatment sessions. MIT is an intervention method based on facilitating spoken language by exaggerating three elements of spoken language prosody: Pitch, tempo, rhythm of utterances, and stress for emphasis. In a study by Helfrich-Miller (1984), two children with CAS demonstrated significant improvements in articulation and phonemic sequencing using MIT. Similarly, Alternative and Augmentative Communication (AAC) has also been effective for some children with Childhood Apraxia of Speech across multiple studies (Murray et al., 2014). However, even though MIT and AAC have been proposed as alternative and effective treatment methods for children with CAS, to date, no research studies have explored their implementation and effectiveness for bilingual children with Childhood Apraxia of Speech.

Participants' responses revealed increased familiarity with PROMPT, Kaufman Approach, and non-speech oral motor exercises. In order to implement PROMPT, clinicians must be certified, which could have affected their responses as they may not be certified to implement it. It would have been beneficial to gather further information on certifications to identify whether or not this influenced responses. PROMPT is a tactually grounded approach to stimulating muscle activity and guided articulatory movement by touching and manually manipulating a child's external physical structures for speech production (Hayden, 2004). In 2013, Dale and Hayden conducted a study where four children made significant gains throughout the treatment improving accuracy for both untrained and trained targets when tactile cues were used.

The Kauffman approach was another tool participants reported being familiar with. This treatment program uses approximations of the target (single words and phrases) to facilitate the development of functional vocabulary until motor learning improves and allows for more complex structures (Gomez et al., 2018). Although this approach is commonly used for the treatment of Childhood Apraxia of Speech, published research articles currently need to report the implementation and efficacy of the treatment of bilingual children with CAS.

Another commonly used approach for the treatment of Childhood Apraxia of Speech is integral stimulation therapy. This approach was initially designed to treat adults with apraxia of speech and was later modified for children with CAS by Strand and Debertine in 2000, becoming the DTTC approach. An interesting finding from this study revealed that some participants did not know about integral stimulation therapy. However, when asked to describe their implementation of Dynamic Assessment and a typical treatment session, these participants mentioned the implementation of DTTC in treatment sessions with bilingual children with Childhood Apraxia of Speech. According to (Strand & Debertine, 2000), DTTC is a type of integral stimulation therapy that involves a "listen to me/watch me/do what I do" method in four stages of temporal hierarchy. Hence, participants apply integral stimulation as part of the DTTC approach when treating bilingual children with CAS. Nevertheless, it is possible that participants' contradictory responses might be due to confusion with the wording of "integral stimulation" instead of "DTTC" as a treatment tool option in the question and the possibility of minimal knowledge of the DTTC approach.

Despite the increased evidence to support the implementation and efficacy of DTTC for children with Childhood Apraxia of Speech, SLPs continue to face challenges associated with delivering adequate and appropriate services to bilingual children with CAS due to poor

resourcing. According to Gomez et al. (2022) there is a dissemination issue of getting vital information to the hands of practicing SLPs contributed to factors such as lengthy research timelines from the beginning of a research project to the distribution of findings. This issue can be due to relying on time-poor clinicians to appraise research effectively and limiting factors to the clinician, such as internal motivation to implement changes in clinical practices and organizational support (Gomez et al., 2022).

On the other hand, using non-speech motor exercises is not supported by research as a treatment for Childhood Apraxia of Speech. These exercises are intended to increase unnecessary strength in the oral mechanism, as children with CAS do not exhibit muscle weakness (Caruso & Strand, 1999). Hence results from this study regarding the implementation of non-speech motor exercises when treating bilingual children with Childhood Apraxia of Speech are concerning. These results are inconsistent with the literature and findings from Gomez et al. (2018) and Gomez et al. (2022). In 2018, Gomez et al., conducted a study to describe the treatment approaches used by SLPs, explore their perspectives of evidence-based practices, and identify perceived barriers to implementing practical research recommendations through an online survey. Results from this study appropriately revealed that 88% of participants did not use non-speech motor exercises due to the lack of empirical research evidence.

Similarly, in 2022, Gomez et al., conducted another study to provide baseline information that described the practices of clinicians in the US and Canada regarding Childhood Apraxia of Speech management. The authors gathered data concerning treatment approaches SLPs use to treat Childhood Apraxia of Speech, treatment format and intensity, attitudes, and perspectives of SLPs to EBP, and perceived barriers to the implementation of EBP in Childhood Apraxia of Speech treatment. Regarding non-speech motor exercises, results revealed that 60-80% of

participants reported "never" using this approach when treating children with CAS, also due to the lack of empirical research evidence to support its efficacy. In addition, participants reported that responses were not only based on the lack of treatment efficacy data but also on research that has demonstrated the ineffectiveness of Childhood Apraxia of Speech.

Non-speech oral motor exercises are not supported as a treatment for monolingual children with CAS and should not be implemented as a treatment approach when serving bilingual children. Hence results from the current study demonstrate SLPs' need for more understanding of the scientific literature on non-speech oral motor exercises and require further education on evidence-based practice for children with CAS. Therefore, continued efforts are needed to ensure that bilingual children with Childhood Apraxia of Speech receive the most efficacious intervention to improve overall outcomes.

### **Limitations of The Study**

The findings of this study have to be seen in light of some limitations. The most significant limitation of this study was the low response to the survey resulting in a small sample size. Although snowball sampling is an effective technique when targeting a population challenging to access, such as in this study, it is a non-random sampling approach vulnerable to community bias. It does not guarantee population representation, limiting the extent to which results can be generalized. The interpretation of results was further hampered by the study's small sample size ( $n = 7$ ), which restricted statistical power to run more in depth analysis. The low response to the survey could be attributed to SLP's limited time to complete surveys. Thus, this research can be classified as exploratory.

A second limitation of this study was the lack of clarity in the eligibility criteria for participants in the invitation email. This email invitation should have mentioned that, besides



certified SLPs, clinical fellows and monolingual service providers in the Speech-Language Pathology field were also welcome to participate in the study. As a result, many people may have chosen not to complete the survey because they did not believe the survey applied to them.

Furthermore, the survey's conclusions were limited due to a few issues with the survey questions. Some survey questions did not yield precise results, and a few questions could have been written better to obtain more specific information. For example, most respondents struggled with question #5 in the caseload section since instructions on accurately submitting the responses needed to be provided; thus, no data were obtained from this question. A more thorough piloting of the questionnaire would have been beneficial in detecting some of these difficulties and increasing the validity of the survey.

The study also used relatively little qualitative data. More open-ended questions about SLPs' use of tests, decisions they make in treatment, and the rationales and background they bring to making those decisions when providing services to bilingual children with Speech Sound Disorders and Childhood Apraxia of Speech could have offered a more detailed description of actual practice. It would have been valuable to gain more information on service delivery methods and decision-making, specifically from the monolingual SLPs who reported speaking English only and did not use the services of bilingual interpreters when treating the population of interest in this study. In addition, qualitative data that provided insight into how effective various CAS treatments can be when combined with different approaches used with bilingual children would have gained value to this study.

Despite these shortcomings, this study did provide helpful information about SLPs' backgrounds, diversity training, professional perspectives, and common informal assessment

tools used when treating; however, it may be difficult to draw conclusions that may be generalized to the full population of SLPs in the United States.

### **Implications for Future Research**

This present study was designed to contribute to the existing body of literature on Speech-Language Pathology by investigating specific assessment and treatment procedures employed by SLPs in various settings when working with bilingual children with CAS, as limited information is currently available. The results of this study support continued investigation of intervention strategies to be utilized when serving bilingual children with or suspected Childhood Apraxia of Speech. Future research using a larger sample of SLPs may provide both more comprehensive and comparative data regarding assessment and treatment practices in various settings nationwide. Further studies can also help to identify how an SLP should incorporate treatment for Childhood Apraxia of Speech into an overall comprehensive treatment approach that best fits the needs of a bilingual child.

As stated by (Goldstein & Gildersleeve-Neumann, 2015), to better serve bilingual children, we need to understand the effectiveness as well as efficiency of English-only, Spanish-only, and bilingual therapy for bilingual children. Hence, further studies that take a whole-child perspective, including assessment of the bilingual child in all their languages, should be conducted to understand better the cross-linguistic effects on bilingualism and speech development to better assist professionals with selecting the best language environments. Randomized control studies using a within-group research design that utilizes various assessment tools with the same participants may help determine the most sensitive and reliable assessment tools and diagnostic characteristics. Longitudinal treatment studies should also be conducted to

determine the most effective assessment and treatment approach for bilingual children with Childhood Apraxia of Speech.

### **Conclusion**

This study aimed to explore and describe current practices of speech-language pathologists who presently work or have worked with bilingual children with CAS in diverse settings. A survey was distributed through the use of snowball sampling and generated seven responses. Overall, the results from this study are consistent with data reporting an ongoing diversity growth of the population in our country and the lack and limited resources to provide best-practice to bilingual children with Speech Sound Disorders and Childhood Apraxia of Speech. This study found that most SLPs who participated and worked in educational settings assess and manage a large proportion of bilingual children with diverse SSDs. However, due to the small sample size in this study, it is not easy to generalize conclusions to the whole population of SLPs in the United States.

The incidence and prevalence of monolingual children with CAS continues to be a challenge for professionals to estimate due to various factors, such as the lack of clear diagnostic guidelines for differential diagnosis. It is even more challenging to estimate the incidence and prevalence for bilingual children with Childhood Apraxia of Speech as, to our knowledge, no research has been published investigating this population's proportion in SLP's current caseloads. Hence, this study serves as an initial insight into this topic by providing important preliminary information regarding the number of bilingual children with CAS in SLP caseloads and helps identify areas for future research.

Findings from this study convey that most clinicians are making their best effort to closely follow ASHA's recommended guidelines when providing services to bilingual children.

However, despite the increase and improvement of training opportunities, a large proportion of SLP professionals still lack confidence in serving the bilingual Hispanic population due to insufficient training in this area. Laws/guidelines involved in the assessment and treatment of bilingual clients are an area in which SLPs likely require additional training, as only a few participants indicated to know about this topic. In addition, findings regarding the limited use of interpreters when SLPs are English-speaking only and providing services to bilingual children is concerning. Few participants indicated they received coursework on working with an interpreter throughout their careers. They faced the challenge of a lack of interpreters who speak the necessary languages to provide services. These findings concluded that continued efforts to improve speech-language pathologists' competencies and provide necessary resources are still needed.

According to the findings of this study, SLPs typically employ a combination of formal and informal methods to assess bilingual children with CAS. However, the implementation and efficacy of these strategies have yet to be explored and are not supported by evidence to be employed with the target group. Currently, SLPs rely on various modifications of monolingual English assessment and treatment approaches, which may yield uneven or erroneous outcomes and do not consider cultural and linguistic variables. Hence, the need for specialized skills and the ability to recognize individual differences, given the child's linguistic background and the nuances of bilingual language development, is highly necessary when serving bilingual children with Childhood Apraxia of Speech.

There is an urgent need for more research in this area, particularly on effective evaluation techniques and treatment methods for this population. Continued descriptions of developmental

norms in culturally and linguistically diverse groups, evidence-based screening and assessment techniques, and research-based intervention methods should be included in future studies.

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APPENDIX A  
INSTITUTIONAL REVIEW BOARD APPROVAL



UNIVERSITY OF  
NORTHERN COLORADO

Institutional Review Board

Date: 11/17/2022

Principal Investigator: Yessica Villanueva Guerra

Committee Action: **IRB EXEMPT DETERMINATION – New Protocol**

Action Date: 11/17/2022

Protocol Number: [2211045670](#)

Protocol Title: Speech-Language Pathologists Current Practices for Bilingual Children with Childhood Apraxia of Speech

Expiration Date:

The University of Northern Colorado Institutional Review Board has reviewed your protocol and determined your project to be exempt under 45 CFR 46.104(d)(702) for research involving

Category 2 (2018): EDUCATIONAL TESTS, SURVEYS, INTERVIEWS, OR OBSERVATIONS OF PUBLIC BEHAVIOR. Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met: (i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects; (ii) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or (iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 45 CFR 46.111(a)(7).

You may begin conducting your research as outlined in your protocol. Your study does not require further review from the IRB, unless changes need to be made to your approved protocol.

**As the Principal Investigator (PI), you are still responsible for contacting the UNC IRB office if and when:**



### Institutional Review Board

- You wish to deviate from the described protocol and would like to formally submit a modification request. Prior IRB approval must be obtained before any changes can be implemented (except to eliminate an immediate hazard to research participants).
- You make changes to the research personnel working on this study (add or drop research staff on this protocol).
- At the end of the study or before you leave The University of Northern Colorado and are no longer a student or employee, to request your protocol be closed. \*You cannot continue to reference UNC on any documents (including the informed consent form) or conduct the study under the auspices of UNC if you are no longer a student/employee of this university.
- You have received or have been made aware of any complaints, problems, or adverse events that are related or possibly related to participation in the research.

If you have any questions, please contact the Research Compliance Manager, Nicole Morse, at 970-351-1910 or via e-mail at [nicole.morse@unco.edu](mailto:nicole.morse@unco.edu). Additional information concerning the requirements for the protection of human subjects may be found at the Office of Human Research Protection website - <http://hhs.gov/ohrp/> and <https://www.unco.edu/research/research-integrity-and-compliance/institutional-review-board/>.

Sincerely,



Nicole Morse  
Research Compliance Manager

University of Northern Colorado: FWA00000784



APPENDIX B  
STUDY'S QUESTIONNAIRE

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**Section 1. Clinician's Background and Work Setting**


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Q1. In what state do you currently work?

Q2. How many total years have you been working as a Speech-Language Pathologist?

Q3. Please mark your degrees

- BA/BS
- MA/MS
- Ph.D.
- Other

Q4. What is your racial/ethnic background?

- White or Caucasian
- Latino/Hispanic
- Asian
- African American/Black
- American Indian/Native American
- Other:

Q5. What is your age?

- 20–29 years old
- 30–39 years old
- 40–49 years old
- 50–59 years old
- >59 years old

Q6. Do you speak a language other than English with enough proficiency to conduct assessment and/or treatment in that language?

- Yes
- No

Q7. If yes, what languages?

Q8. Do you work in an urban or rural area?

Q9. What is your current work setting?

- Birth-to-three center
- Developmental Preschool
- County/State early intervention services
- Medical Center/ Hospital-Based Service
- University Clinic
- Private Practice
- Other/Please specify:

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**Section 2. Composition of Caseloads**


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Q1. How many children are currently on your caseload?

Q2. What population do you currently serve?

- Early intervention
- Preschool age
- School age
- Teen age
- Adults

Q3. Do you serve children from any of the following cultural backgrounds?

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- 
- Asian
  - Hispanic
  - African American/Black
  - American Indian/Native American
  - Other

Q4. How many children on your current caseload are bilingual?

Q5. What are the three most common ethnic groups among your bilingual children?

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Q6. Of the total number of children on your caseload, what percentage are bilingual children with Speech Sound Disorders?

- < 10%
- 10–25%
- 26–50%
- 51–75%
- >75%

Q7. How many of these children would you place in the following severity categories?

- Mild
- Moderate
- Moderately-Severe
- Severe

Q8. How many of these children are within the following ages?

- 0-3 years
- 4-5 years
- 5-12 years
- 12+ years

Q9. Of the total number of children in your caseload, what percentage are bilingual children with Childhood Apraxia of Speech?

- < 10%
- 10–25%
- 26–50%
- 51–75%
- >75%

Q10. How many of these children would you place in the following categories?

- Verbal
- Non-verbal

Q11. How many of these children would you place in the following severity categories?

- Mild
- Moderate
- Moderately-Severe
- Severe

Q12. How many of these children are within the following ages?

- 0-3 years
-

- 
- 4-5 years
  - 5-12 years
  - 12+ years

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Notes/Additional information

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Section 3. Diversity Training

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Q1. Have you received specialized training in providing services to individuals from diverse cultural or linguistic backgrounds?

- Yes
- No

Q2. If yes, the specialized training was provided by (*Check all that apply*):

- Graduate program
- Mentorship from other SLP
- Professional workshop
- Employer (e.g., school district)
- Other/Please specify:

Q3. Have you had any speech language pathology coursework that addressed the following issues? (Check all that apply)

- Second language acquisition
  - Communication patterns in cultures where a language other than English is spoken
  - Considerations for differential assessment of monolingual versus bilingual children
  - Assessment tools for bilingual individuals
  - Differentiating language disorder from language difference
  - Laws/guidelines involved in the assessment and treatment of bilingual clients
  - How to work with an interpreter
- 

Section 4. Service Delivery

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Q1. On average, what is the frequency of your therapy sessions for bilingual children with CAS? Times per week:

- 1x
- 2x
- 3x or more

Q2. On average, what is the frequency of your therapy sessions for bilingual children with SSD? Times per week:

- 1x
- 2x
- 3x or more

Q3. How do you deliver services for bilingual children with CAS?

- Individual
- Group
- Both

Q4. How do you deliver services for bilingual children with SSD?

- Individual
- Group
- Both

Q5. Do you use the services of a bilingual interpreter when treating children with SSDs?

Yes

No

Q6. If yes, what language(s) do you need assistance with?

Q7. These interpreters were most often:

Family members/Friends of Clients

Professional interpreters

Community member

Paraprofessional

Other school personnel

Q8. Do these interpreters translate standardized tests in English into the students' primary language for testing?

Yes

No

Q9. Please use the scale below to react to the following statements:

1= Strongly disagree, 2= Disagree, 3= No opinion, 4= agree, 5= Strongly agree

	1	2	3	4	5
I am competent at assessing and treating bilingual/multilingual clients.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compared to other speech-language specialists, I am very skilled in clinical interactions with culturally and linguistically diverse clients.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am comfortable assessing and treating an individual from a cultural or racial background other than my own.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Special knowledge and training is needed in order to provide services to foreign-born clients who want to improve their English skills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication skills may vary across cultures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A course in cultural and linguistic diversity should be required for graduate students in speech-language pathology programs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Special knowledge and skills are needed to diagnose or treat individuals from nonmainstream backgrounds.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clinical Competence is related to cross-cultural knowledge.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have sufficient training to be able to adequately serve the clients on my caseload.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In assessment with mainstream, English speaking populations, I rely on the results of standardized assessments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In assessments with culturally and linguistically diverse children, I rely on the results of standardized assessments.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Code switching is a normal behavior for a bilingual child to exhibit.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Bilingual and multicultural issues should be considered specialty areas of clinical practice.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Bilingual and multicultural issues should be an integrated part of graduate programs in speech-language pathology.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Bilingual and multicultural issues should be taught as a special course in graduate programs in speech-language pathology.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
When serving culturally and linguistically diverse clients, I prefer to collaborate with another professional with a specialty in ELL or bilingualism.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Code switching is indicative of language deficiency or language confusion.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Q10. Please indicate the frequency with which you encounter challenges when providing services to bilingual children with CAS (try to do something in qualtrics so they can skip this question)

1 = never 2= rarely 3 = sometimes 4 = often/usually 6 = almost always

	1	2	3	4	5
Lack of appropriate less biased assessment instruments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't speak the language of the client being assessed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of knowledge about the culture of the client being assessed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of knowledge about the nature of second language acquisition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of knowledge about the phenomenon of bilingualism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of availability of other professionals who speak the client's languages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Difficulty distinguishing a language difference from a language disorder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of interpreters who speak the necessary languages to provide services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Lack of knowledge of developmental norms in client's primary languages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Q11. Which assessment methods have you used to assess bilingual children with suspected CAS? (*check all that apply*)

- Norm-referenced tests administered in English
- Norm-referenced English tests translated into the client's primary language by an interpreter
- Norm-referenced tests in the client's primary language other than English.
- Informal, non standardized measures administered in English
- Informal, non standardized measures administered in the client's primary language
- Criterion referenced measures in English
- Criterion referenced measures in the client's primary language other than English

Q12. If you use informal assessment tools, please describe them:

Q13. Are you familiar with the use of Dynamic Assessment?

- Yes
- No

Q14. If so, please describe how you implement Dynamic Assessment in treatment.

Q15. How do you select the treatment method that you will use to target CAS in bilingual children? (*you may select more than one*)

- Personal clinical judgment
- Information learned in graduate school about CAS
- Information from continuing education courses
- Ease of implementation/ most available materials
- Research-based information
- Suggestion from other clinician(s)
- In collaboration with the client's family
- Results of assessment
- Other/Please specify:

Q16. For each of the following treatment techniques, please check which you have implemented with a bilingual child with CAS, which you are familiar with, which you would be confident implementing, and which treatments you have seen benefit a bilingual child with CAS

	Have Implemented?	Familiar?	Confident?	Benefit?	Not Familiar
Integral Stimulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PROMPT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Melodic Intonation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Therapy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-speech Motor Exercises	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Augmentative and Alternative Communication (AAC)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clinician Knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Behavioral Modification techniques (e.g. ABA)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kaufman Approach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Phonological Cycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Phonetic placement Approach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other/ Please specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q17. Treatment sessions are conducted in which of the following:

- English
- Other language
- Both

Q18. If both, what percentage of the session is conducted in a language other than English?

- < 10%
- 10–25%
- 26–50%
- 51–75%
- >75%

Q19. Please describe your process of selection for treatment targets when treating bilingual children with CAS

Q20. Please describe a typical treatment session when treating bilingual children with CAS



## APPENDIX C

### EMAILED INVITATION FOR PARTICIPATION IN STUDY

Hello,

My name is Yessica Villanueva and I am a graduate student from the Audiology and Speech-Language Department at the University of Northern Colorado. I am conducting my research study on current practices of Speech-Language Pathologists when treating bilingual children with speech sound disorders with a focus on childhood apraxia of speech. This is a very important topic within our field and limited research has been done to explore current intervention techniques for developing bilingual children diagnosed with or suspected of childhood apraxia of speech.

This study involves completion of one anonymous online survey regarding current practices of SLPs primarily delivering services to bilingual children with childhood apraxia of speech, however if you provide services to children with a wide variety of speech sound disorders you are also welcome to participate in this study! All personal identifying information will be excluded from this research. Please note that participation is voluntary, and you may choose to discontinue at any time in the process. For your time, you will have the opportunity to choose to enroll in a raffle for one of three \$25 Amazon gift cards following completion of the survey.

If you are interested in participating, please click on the link below to sign a consent form prior to beginning the survey. If you have any questions regarding this research, you can contact me via email (vill4357@bears.unco.edu) or phone (910-644-3835).

Thank you for your consideration.

Sincerely,

Yessica Villanueva, B.S.  
Graduate Student  
Audiology and Speech-Language Pathology  
University of Northern Colorado

Follow this link to the survey:

[survey link]

Or copy and paste the URL below into your internet browser:

APPENDIX D  
STUDY'S CONSENT FORM

An Overview of Speech-Language Pathologist's Current Treatment Interventions for Bilingual Children with Childhood Apraxia of Speech.

Researcher: Yessica Villanueva, B.S., Graduate Student; vill4357@bears.unco.edu

Researcher Advisor: Caitlin Raaz, PhD, CCC-SLP, Audiology and Speech-Language Sciences; caitlin.raaz@unco.edu

This study will seek to explore current practices of Speech-Language Pathologists when assessing and treating bilingual children with speech sound disorders with a focus on childhood apraxia of speech.

If you volunteer to contribute to this research, you will complete one anonymous online survey which should take between 40 to 45 minutes.

For the purposes of maximizing confidentiality, all data collected from this study will be de-identified to protect your privacy. All information will be kept secure and will be viewed only by the primary researcher and research advisors.

For your time and participation, you will have the opportunity to enter a drawing for three \$25 Amazon gift cards following completion of the survey. There is no specific benefit to the participant from this study. However, the study may benefit the field of Speech-Language Pathology by exploring and reporting current practices of professionals when working with bilingual children with SSD and CAS. Information gathered within this study can serve as a foundation for future research studies and to inform SLPs' practice while developing intervention plans. If you have any questions about the study, you may contact the researcher by phone or email. You may also contact the researcher's advisor, Dr. Caitlin Raaz by email.

Participation in this study is voluntary. You may decide not to participate and if you begin participation, you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Please take all the time you need to read through this document and decide whether you would like to participate in this research study. If you decide to participate, your completion of the research procedures indicates your consent. Please keep this form for your records. If you have any concerns about your selection or treatment as a research participant, please contact the Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-2161.

Do you consent to these terms?

- Yes, I consent
- No, I do not consent