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An Adaptation of an Auditory Perception Test

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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

AN ADAPTATION OF AN AUDITORY PERCEPTION TEST

A thesis submitted in partial fulfillment of

the requirements for the degree of

MASTER OF SCIENCE

in

SPEECH LANGUAGE PATHOLOGY

by

Daniel Gonzalez

2018

To: Dean Ora L. Strickland
College of Nursing and Health Sciences

This thesis, written by Daniel Gonzalez, and entitled An Adaptation of an Auditory Perception Test, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this thesis and recommend that it be approved.

Monica Hough

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Alliete Alfano, Major Professor

Date of Defense: June 26, 2018

The thesis of Daniel Gonzalez is approved.

Dean Ora L. Strickland
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Vice President for Research and Economic Development
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Florida International University, 2018

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ABSTRACT OF THE THESIS

AN ADAPTATION OF AN AUDITORY PERCEPTION TEST

by

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Florida International University, 2018

Miami, Florida

Professor Alliete Alfano, Major Professor

The Auditory Perception Test for the Hearing Impaired, 3rd edition (APT/HI-3) was adapted into an auditory perception assessment tool for Spanish-speaking children called the Auditory Perception Test for the Hearing Impaired—Spanish (APT/HI-S). Test items from the APT/HI-S were then validated by three groups of Spanish-English bilinguals to determine if selected words were developmentally and linguistically appropriate for 3-year old children. Survey results revealed that 37 out of 62 words were considered developmentally and grammatically appropriate. The APT/HI-S was then administered to two 3-year old and two 5-year old children, two with typical hearing and two with hearing loss. Results revealed that language proficiency played an integral role in the measurement of auditory perception skills. The children demonstrated better performance when tested in their dominant language, reinforcing the need to have a language-specific assessment tool to obtain a more accurate picture of auditory and speech perception skills in children.

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CHAPTER I

REVIEW OF THE LITERATURE

Introduction

The Auditory Perception Test for the Hearing Impaired, 3rd Edition (APT/HI-3) (Allen, 2015) served as the primary resource for the adaptation entitled the Auditory Perception Test for the Hearing Impaired – Spanish (APT/HI-S). This auditory/speech perception test follows a hierarchical organization of auditory skills, namely those of detection, identification, discrimination, and comprehension (Erber 1982), thus making it an effective and comprehensive assessment tool to use with children who are deaf or hard of hearing (DHH). Because Spanish and English have distinct phonological and grammatical systems, the APT/HI-3 cannot be readily translated into Spanish without compromising the integrity of the test. In other words, test items cannot be directly translated from English to Spanish when assessing Spanish speaking children with hearing loss. Consequently, the auditory and speech perception skills of children who do not speak English cannot be adequately charted or documented with this test. Therefore, an adapted Spanish auditory perception test is necessary for monolingual or bilingual children who speak Spanish.

Nearly 18% of the population in the United States is Hispanic or Latino, and this number is greater in areas like Florida, where the percentage is closer to 25% (Facts, 2017; QuickFacts, 2016). Considering that 27% of children who are DHH in Florida are Hispanic or Latino (Gallaudet, 2011), it is imperative to have a speech perception test that accurately negotiates aspects of Spanish in a format that considers multiple factors in

auditory perception. Many clinicians in South Florida are fluent in Spanish and provide services to clients with speech and language delays or disorders. Some of these clinicians readily treat clients with hearing loss and require a manageable bilingual test battery. Furthermore, with the advent and advancement of cochlear implantation and hearing technology, there has been a corresponding increase in auditory verbal therapy programs dedicated to children with hearing loss. Several individuals across the world have specialized in treating children who are DHH, earning titles like Listening and Spoken Language Specialists (LSLS). Currently, there are over 650 certified LSL professionals practicing in over 30 countries internationally; many of these individuals reside in Hispanic or Latin American countries that require an auditory and speech perception assessment like the APT/HI-3. As hearing technology steadily becomes the norm across the world, the demand for a Spanish auditory/speech perception test will only heighten. The APT/HI-S could have a significant impact on the practice of clinicians who specialize with Spanish-speaking children with hearing loss. There is a pressing need for this product because it is an essential research and clinical tool that has yet to be developed.

Defining Speech Perception and Production

Boothroyd (2001) defines speech perception as “the process by which a perceiver internally generates linguistic structures believed to correspond with those generated by a talker” (p. 78). Simply put, speech perception is the way an individual receives and interprets the acoustic and linguistic signals produced by another individual. It is intimately tied to spoken language and follows a developmental progression of detection,

discrimination, identification, and comprehension (Erber, 1982). Before speech production can take place, an individual must learn how to perceive and process both the segmental (i.e., consonants, vowels) and suprasegmental (i.e., pitch, loudness, stress) features of a given language (Allen, 2003). Allen has referred to this process as the “3 P’s: Perceive, Process, and Produce,” a paradigm that closely aligns itself with Erber’s four levels of listening. In order for an individual to acquire spoken language, he or she must meet the foundational prerequisite of auditory perception.

In a comprehensive review of the literature of speech perception and production, Casserly and Pisoni (2010) delineated the complex theoretical underpinnings and changing viewpoints of speech perception in the face of technological advancements and evidential growth. Where once speech perception was depicted as a straightforward process of simply matching the phonemes of a language to the speech signal, the advent of technologies like the spectrogram revealed that the acoustic waveform is not totally concurrent with “context-invariant segments” (i.e., phonemes), therefore undermining such a simplistic framework (Chomsky & Miller, 1963; Hockett, 1955; Liberman, Cooper, Shankweiler, & Studdert-Kennedy, 1967; Liberman, Harris, Hoffman, & Griffith, 1957; Potter, 1945). In other words, the speech signal is not an alphabet-like string of phonemes but rather a multifaceted code confounded by co-articulatory effects and suprasegmental features (Goldstein & Fowler, 2003; Liberman, 1985).

Several early linguistic researchers and speech scientists were under the false impression that phoneme recognition formed the core of speech perception. Evidence suggests that there is an innate ability to form perceptual categories that are constant and consistent across speakers, which essentially implies that while speech perception relies

on segmental categorization and abstraction of the acoustic signal into meaningful linguistic units, it is not a mere task of phoneme identification (Ganong, 1980; Johnson, 2005; Niedzielski, 1999; Stevens, 2005). In fact, speech perception is multimodal insofar as visual, tactile, and other sensory cues influence the saliency of the linguistic message (Bergeson & Pisoni, 2004; Fowler & Dekle, 1996; Geers & Bremer, 1994; Gregory & Webseter, 1996; Lachs, 2001; McGurk & McDonald, 1976; Rosenblum, 1997). Moreover, the role of experience and episodic memory also contributes to speech perception in terms of a word's frequency and distinctiveness in the lexicon (Goldiamond & Hawkins, 1958; Goldiner, 1998; Howes, 1957; Luce, 2000; Luce & Pisoni, 1998; Nygaard, 1994; Oldfield, 1996; Port, 2007). Although the project at hand is centered on auditory and speech perception skills and their indispensable role in language acquisition, speech perception itself is a kaleidoscopic process composed of numerous elements, audition being but one.

Early Intervention and Speech Perception Skills

The value of speech perception assessment has escalated as researchers and practitioners alike have recognized the importance of early detection and early intervention in newly amplified children with hearing loss. This has been further augmented by the standardization of newborn hearing screenings that have helped identify, refer, and intervene in cases of children with varying degrees of hearing loss (Joint, 2007; Uus & Bamford, 1998). Hearing loss has been said to be present in 1 to 3 per 1000 newborns, making it one of the most common congenital abnormalities in infants (Erenberg, Lemons, Sia, Trunkel, & Ziring, 1999). Fortunately, it has been well documented that early amplification in infants, especially during the first 6 months of

life, can significantly counteract the negative impact hearing loss can have on oral/aural communication skills and can yield language skills that are commensurate to those of children with typical hearing (Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998). When investigating the effects of age at cochlear-implantation, Robbins, Kock, Osberger, Zimmerman-Phillips, and Kishon-Rabin (2004) found that children who are amplified at younger ages can attain auditory skills that more closely resemble those of their non-hearing-impaired peers. Furthermore, cochlear implantation in children younger than 12 months of age has been found to be a feasible and successful course of action so long as increased risk factors are well-managed; this early access to auditory stimuli can ameliorate the auditory delays that prevent age-appropriate levels of communication (Waltzman & Roland, 2005). Once the infant has been successfully amplified or fitted with the proper hearing technology, it is up to speech perception tests to chart the growth of the auditory skills.

Assessment of Speech Perception Skills

Several assessments have been developed to monitor auditory perception skills and overall hearing abilities in children with hearing loss. Current speech perception tests include the Word Intelligibility by Picture Identification (WIPI) (Ross & Lerman, 1970), Pediatric Speech Intelligibility Test (Jerger & Jerger, 1982), Early Speech Perception Test (Geers & Moog, 1990), Chear Auditory Perception Test (CAPT) (Marriage & Moore, 2003), and Words-In-Noise (R. H. Wilson, 2003). Many of these come in the form of parent questionnaires and criteria-referenced rating scales, such as the Infant-Toddler: Meaningful Auditory Integration Scale (IT-MAIS, Zimmerman-Phillips, Robbins, & Osberger, 2000), the Ling Developmental Scales (Ling, 1977), and the

Checklist of Auditory Communication Skills (Franz, Caleffre-Schenck, & Kirk, 2005).

The Checklist of Auditory Communication Skills, for example, examines the functional use of audition and tracks these skills hierarchically. Daniel Ling, a pioneer in speech perception and speech production, developed three assessment protocols: the Phonetic Level Speech Evaluation, the Phonologic Level Speech Evaluation, and the Ling 6-Sound Test. Out of these three assessments, the Ling-6 Sound test remains widely used by audiologists and speech-language pathologists to train infants and children with hearing loss to listen (Ling, 1976). These are but a few examples of assessments that are intended to document speech perception in children with hearing loss.

The APT/HI-3 is another valuable assessment tool that can be used to document the auditory/speech perception skills of children presenting with mild to profound hearing loss (Allen, 2016). The test aims to capture “discrete auditory skills” that are essential when attempting to “perceive, process, and produce” spoken language (Allen, 2016). This criterion referenced test contains 50 subskills that are arranged into eight different areas ranging from basic auditory awareness skills to open-set communicative comprehension skills. The eight major areas of assessment include: Auditory Awareness Tasks, Suprasegmental Aspects of Duration, Intensity, and Pitch, Prosodic Perception Tests, Vowel Perception Tasks, Consonant Perception Tasks, Other Segmental Perception Tasks, Linguistic Perception Tasks, and Communicate Comprehension Tasks. In combination, these sections are meant to represent the spectrum of listening skills a child needs to master to effectively acquire spoken language (Erber, 1982). The APT/HI-3 is a comprehensive and practical tool that can be used in conjunction with other measures to guide the intervention process by facilitating the evaluation, habilitation, and

rehabilitation needs of children who are DHH by identifying specific areas of auditory and speech perception skills that are Developed, Emerging, or Missing (Allen, 2016).

The conditions in which speech perception tests should be administered are debatable. It has been stated that speech perception tests conducted in quiet environments may not reflect everyday performance for children with hearing loss and that a complex background environment may serve as a better predictor of challenges and strengths (Hillock-Dunn, Taylor, Buss, & Leibold, 2015). Nonetheless, children with hearing loss require more favorable hearing conditions and have an overall lower threshold for fatigue (Hick & Tharpe, 2002). It has been recommended that signal-to-noise ratios should exceed +15 dB in classroom settings to maximize hearing experiences and auditory input (American National Standards Institute, 2002; Crandell & Smaldino, 2000; MacKenzie & Airey, 1999; Shield, Greenland, & Dockrell, 2010; Wilson, 2002). As such, many speech perception tests are held in quiet settings that optimize listening and speech recognition skills.

Speech Perception Skills and Language Development

Increased scores on speech perception tests have been shown to be significantly related to improvements in language, speech production, and hearing abilities in children with hearing loss (Blamey et al, 2001). In other words, performance on open-set speech perception tests depend on language and speech production skills that are acquired through time, maturation, and increased auditory experience. As a result, the triadic relationship among speech perception, speech production, and language convolutes open-set measures of auditory perception. Consequently, closed-set discrimination or word-recognition tests have been relied on to demonstrate growth in speech perception skills by

audiologists (Tyler, 1993). Despite a more targeted assessment of hearing abilities, closed-set speech perception tests are still linguistically tied to the language and, unlike open-set speech perception tests, are less representative of natural speech perception skills, such as those required in daily communication (Blamey et al, 2001; Boothroyd, 1995). The distinction between closed-set and open-set tasks that measure speech perception skills is an important factor to consider when measuring auditory perception, especially when reminded of the confounding yet integral role that the developing language of the child plays.

Speech perception and language development cannot be studied in entirely separate categories, for the ability to perceive and process the acoustic signal relies on language experience. Nittrouer and Thunberg (2003) discussed how the perceptual strategies used to derive phonetic structures in children with hearing loss are related to the rich and meaningful exposure to early language experiences. In their study, Nittrouer and Thunberg (2003) emphasized the importance of early language experiences in order to mitigate the detrimental effects hearing loss can have on aural/oral language development in children with hearing, also claiming that performance on speech perception tasks, such as those requiring phonetic awareness, are not solely determined by the extent or acuity of sensory deficits but also by experiential factors, especially in preschool-age children. It appears that the ability to interpret the segmental and suprasegmental features of a language are in part connected to the quality of early language experience (Nittrouer & Thunberg, 2003). This is supported by other findings that emphasize that early cochlear implantation in children with hearing loss is a consistent predictor of greater auditory and language skills (Lu & Qin, 2018), and,

truthfully, such a finding is unsurprising when considering that hearing assistive technologies like cochlear implants grant children the opportunity for auditory access that inevitably strengthens both receptive and expressive language skills. In fact, early phonetic perception in children has been documented to positively influence language acquisition and can serve as a meaningful predictor of language skills at 2-years of age (Tsao, Liu, & Kuhl, 2004). Furthermore, early language experience has also been found to facilitate speech perception and phonological awareness in school-age children with a history of otitis media with effusion (Nittrouer & Thuent Burton, 2005). Thus, it can be stated that the shared role of speech perception and language experience influences language abilities in both preschool- and school-age populations.

Evidently, auditory perception and language experience work in unison to facilitate language acquisition, and the earlier these two are emphasized in a child's developmental path, the greater the outcomes achieved by said child, especially if he or she is presenting with hearing loss. Because auditory perception and language experience coalesce into one goal, namely that of functional and age-appropriate receptive and expressive language skills, it is by no means a stretch of the imagination to state that auditory perception, experience, and overall development is language-specific. This somewhat obvious point must be upheld when attempting to translate or adapt a test from one language to another.

Phonemic Differences between English and Spanish

When considering the phonological system of Spanish and its key distinctions between English at the segmental level, one may commence by comparing the compact vowel system of Spanish to the abundant vowel system of English. Spanish is

characterized by a pentadic vowel system—only five vowel distinctions exist in the language (i.e., high front vowel /i/, mid front vowel /e/, low central vowel /a/, mid back vowel /o/, and high back vowel /u/). Moreover, Spanish’s consonant inventory contains a total of 18 phonemes (i.e., three voiceless stops /p, t, k/, three voiced stops /b, d, g/, five voiceless fricatives /f, s, h, x/, one voiced fricative /v/, one voiceless affricate /tʃ/, three liquids /r, ɾ, l/, and three nasals /m, n, ɲ/) with varying allophonic distinctions across dialects (Martinez-Celdran, 1991; Moreno-Torres, 2014). Overall, the phonetic size or inventory of Spanish is significantly smaller than that of English’s. Given the succinct nature of the vowel inventory in Spanish, one could reasonably argue that vowel saliency is greater in Spanish than it is in English, therefore impacting phoneme perception and production. Although research is scarce, some authors have indicated that an inverse relationship exists between large inventory languages and phoneme recognition (Fledge, 1989; Goldstein & Pollock, 2000; Maddieson, 1986). While this suggestion places Spanish speaking individuals at an advantage in terms of auditory perception skills, the phonotactic constraints of each language must also be weighed. In Spanish, the most frequent syllable structure is CV (55%), lending itself to a multitude of CVCV open-syllable combinations (Gomez-Martinez, 2011; Guerra, 1983). Given its phonotactic principles, the emerging lexicon of a child who speaks Spanish may contain content words that are structurally and motorically more complex in terms of syllable length. These considerations are integral when attempting to document speech perception and production abilities in children.

While there are a few studies that examine the perception and influence of Spanish dialects in Spanish speaking countries (Honsa, 1980; Stockler, 2015) and the role

that dialects play in the phonological analysis of the speech of Spanish-speaking children (Goldstein & Iglesias, 2001), none thoroughly explore how dialectical differences contribute to the validity of the words used in the assessment of speech perception and production abilities in children. Researchers studying dialectical differences in English agree that clinicians must exhibit cultural and dialectical sensitivity when analyzing phonological data (Haynes & Moran, 1989; Seymour & Ralabate, 1985), but the question of how this sensitivity is used to develop tests has not been fully supported. There appears to be an area of absence in the literature that might prove insightful when developing language-specific tests. Seeing as how not even phonemes are universally shared across certain dialects of Spanish, surely the appropriateness and representativeness of target words are variable among different speakers of the Spanish language, especially if there is no “standard” or “general” dialect to go upon. However, there is little to no formal research in this area, which certainly proves to be a problematic point when designing Spanish assessment tools that are meant to target Spanish language skills for a diverse population of Spanish speaking individuals.

Speech perception assessment tools are limited to the English language, and they usually cannot assess a child’s perception of an ethnolinguistically minor home language (i.e., Spanish) without formal and informal procedures to translate or adapt the test (Seal, 2014). The phonetic inventory, phonology, and phonotactic constraints that govern Spanish differ significantly from English, and these disparities cannot be consolidated to fit an English speech-perception test without compromising the integrity of the Spanish language (Cataño, Barlow, & Moyna, 2009). Accordingly, there is a pressing need to have an assessment battery tailored to Spanish phonetics and phonology, one that

effectively and appropriately integrates language-specific features with more general auditory perception elements.

Summary and Rationale

The ability to perceive and encode auditory and speech stimuli has been well documented throughout decades of research, and it has been well established that auditory and speech perception skills rely on a plethora of factors, audition unsurprisingly serving as the foundation for later skills. The role of auditory and speech perception skills has been crucial in studies investigating the effects of early detection and intervention in children with hearing loss. Overall, it is agreed upon that early access to auditory and linguistic stimuli facilitates the development of aural/oral language skills of children who are DHH, therefore making auditory assessment tools particularly crucial in this population. Because languages contain individual phonological and grammatical systems, however, auditory assessment tools cannot be shared from one language to the next. It is evident that linguistic systems like English and Spanish are abundant in differences, most of which cannot be consolidated by a single test. While there are numerous auditory assessment tools available in English, there is a dearth of assessment tools in Spanish, a troubling problem that warrants a solution when considering the expanding Hispanic population of the US. Linguistic disparities among languages cannot be overlooked or minimized when presenting an auditory assessment test, because auditory and speech perception skills are firmly rooted in the language(s) that an individual speaks.

Hispanic and Latino children with hearing loss from the United States and other various countries need to have their auditory/speech perception skills assessed in an

objective and complete manner to better determine habilitative needs. Currently, clinicians who specialize in Spanish-speaking children with hearing loss in the US and abroad lack an accessible and functional assessment tool that captures/follows the progression of auditory skills in a way delineated by the APT/HI-3. The information yielded from the APT/HI-S is intended to allow multiple disciplines, ranging from Speech-Language Pathology to Audiology to Early Childhood Education, to accurately document the auditory and speech perception skills of Spanish speaking children.

Plan of Study and Experimental Questions

The purpose of this study is to provide monolingual and bilingual children who speak Spanish a comprehensive adaptation of a test battery that a) follows a hierarchical progression of auditory/speech perception skills, b) parallels the structure and format of the APT/HI-3, and c) accurately represents Spanish phonology and grammar while taking into account developmentally-appropriate vocabulary. In order to accomplish these points, the APT/HI-S was developed with linguistic sensitivity, validated via survey responses, and administered to children with either typical hearing or hearing loss.

The main question being posed in this research study is whether an adapted Spanish perception test (i.e., APT/HI-S) can serve as a viable assessment tool when administered to a Spanish-English bilingual population with and without hearing loss. It is hypothesized that scores on the APT/HI-S will accurately reflect the speech perception skills of bilingual children. Hence, it is estimated that the APT/HI-S will serve as an appropriate assessment instrument for Spanish speaking children with hearing loss in an area where there is an absence and need for one.

CHAPTER II

METHODS

Research Design

The functionality of the APT/HI-S was determined using a qualitative approach that relied on comparisons and descriptions of relevant information from separate stages of the research project. A total of three phases constituted the study at hand, including an adaptation phase, a validation phase, and an administration phase. These three phases represent the steps that were required in designing, validating, and testing the APT/HI-S. The methods of this current study were reviewed and approved by an institutional review board (IRB) and deemed ethically sound; a copy of the IRB approval letter is provided in Appendix A.

Adaptation Phase

Procedures. First, the APT/HI-3 was adapted to accurately represent Spanish phonology, grammar, and vocabulary. Several test items in the APT/HI-3 present English minimal pairs or triads (i.e., bees vs. bows vs. boys) in a closed-set design. Most test items reinforce auditory skills by having a visual representation of the phonemes being targeted. During the adaptation stage, appropriate minimal pairs or greater involving words, phrases, and sentences were selected in Spanish that closely resemble those existing in the APT/HI-3. In addition, new illustrations that correspond to selected words, phrases, and sentences were designed to offer auditory-visual support during the administration phase. Because Spanish is inherently different from English in terms of its

phonetic inventory (i.e., consonants, monophthongs, and diphthongs) and phonology, the adapted test naturally deviates from the original in certain aspects, such as syllable length and the organization of segmental features. Some English test items were not replicable in Spanish, including items CV3 (i.e., identification of words beginning with consonants differing in voicing: /s/, /z/) and OS1 (i.e., identification of words ending in different blends: /ts/, /nz/). Instead, these items were replaced by target features that were more functional to the language, like CP3 (i.e., Identification of words with medial phonemic differences in place: /n/, /ɲ/) and CM3 (i.e., identification of words with medial phonemic differences in manner: /ɾ/, /r/). Evidently, in order to be compliant to Spanish phonology, contrastive features were presented in medial position of some words rather than in initial position, making certain tests items auditory and motorically more challenging for children to acquire yet nonetheless functional from a Spanish-speaking standpoint. Similarly, because several target phonemes do not appear in triads where all three words are developmentally appropriate for 3-year old children, many phonemes were presented in pairs rather than in groups of three; as a means to balance these reduced receptive fields, additional test items were included in the APT/HI-S to grant children additional auditory opportunities in the assessment process. These changes occurred in the sections of the test that require linguistic specificity. Thus, non-linguistic or pre-linguistic auditory stimuli, such as clapping and babbling, were not changed drastically from those contained in the APT/HI-3. In essence, the adaptation aimed to parallel the APT/HI-3 as closely as possible in spite of necessary changes; any modification was done with the intention of making the test more linguistically suitable for Spanish.

Validation Phase

The validation phase sought input on how representative and appropriate test items were based on the opinions from individuals who are proficient in Spanish and have working knowledge of developing language skills.

Participants. The adapted version of the APT/HI-3 was presented to three separate groups of Spanish-English bilingual individuals. These groups were composed of first- and second-year graduate students in the Speech-Language Pathology (SLP) program at Florida International University (FIU) and working SLPs in Miami, Florida. Listed characteristics of participations in the validation phase are provided in Appendix C. The validation phase encapsulated a total of 61 Spanish-English bilingual participants who were determined to be proficient in their Spanish language skills based on how they ranked themselves on a language proficiency scale entitled the Interagency Language Roundtable (ILR) Speaking Skill Scale (Interagency, 1985), a copy of which is provided in Appendix D. In order for the survey responses to be considered eligible for analysis, individuals had to identify themselves as a 3 or greater on the ILR Speaking Skill Scale, which dictates that individuals demonstrate verbal comprehension and fluency levels of “general professional proficiency (3),” “advanced professional proficiency (4),” or “functionally native proficiency (5)” in Spanish (Interagency, 1985). According to ILR standards, participants in this phase were required to hold a level of Spanish auditory comprehension and verbal proficiency that is considered to be cohesive, accurate, effective, and functional in most contexts, despite minor limitations in understanding and utilizing figurative language or advanced language concepts, minor communicative

breakdowns with repairs, and minor prosodic deviations that may manifest themselves as an accent. In short, as a minimum standard of inclusion, individuals who have “general professional proficiency” speaking skills in a language have the capacity “to speak the language with sufficient structural accuracy and vocabulary to participate effectively in most formal and informal conversations in practical, social and professional topics” (Interagency, 1985).

Ten individuals out of the 61 survey participants were not considered eligible upon examination of survey results due to self-reported limitations in their Spanish language proficiency. Upon categorizing the varying language proficiency levels contained in the 51 eligible surveys, it was revealed that 24 participants had “general professional proficiency” skills; 9 participants had “advanced professional proficiency” skills; and 18 participants had “functionally native proficiency skills.” Given their bilingual status in English and Spanish, these individuals were able to provide valid feedback regarding the linguistic and developmental compliance to Spanish of the test items in question.

Procedures. Following an approximately 15-minute long presentation about auditory perception, the fundamental issue underlying direct translations from one language to another (i.e., English to Spanish), and the alterations that transpired between the APT/HI-3 and APT/HI-S, the graduate students and working professionals were asked to complete a survey inquiring if specific pairings or groupings of words featured in the APT/HI-S were developmentally appropriate for Spanish-speaking 3-year old children. A detailed outline of the presentation and a copy of the surveys with

instructions are provided in Appendix E and F, respectively. Individuals were also given the opportunity to raise any questions pertaining to the topic at hand prior to judging the appropriateness and representativeness of some of the proposed Spanish words that were to appear in the newly adapted test. All individuals were asked to read and sign consent forms prior to the completion of surveys, copies of which have been provided in Appendix B.

The survey responses of the first- and second-year graduate students were analyzed collectively and influenced the word selections available for the final surveyed group composed of working SLPs. In other words, if the graduate students as a collective disagreed with the appropriateness of a word or group of words, then these words were not presented in the survey taken by the working SLPs. Additionally, if students provided word suggestions in write-in spaces included in the survey, then these words were added to the survey for the working SLPs to consider if they were deemed to be appropriate by the researcher.

The pairs and groups of words found in the survey were adapted from linguistically-sensitive sections in the APT/HI-3. These sections include Prosodic Perception Tasks (PP1—PP2), Vowel Perception Tasks (VP4—VP6), Consonant Perception Tasks (CM1—CM3, CV1—CV3, CP1—CP2), and Other Segmental Perception Tasks (OS2, OS3, OS9) of the original test. The minimal pairs, triads, and tetrads under survey were intended to be appropriate across semantic, phonological, and pragmatic levels of preschool age language skills.

Administration Phase

The APT/HI-3 and APT/HI-S were administered by the researcher, who was familiar with the tests and administration procedures, during the final phase of the current project.

Participants. There was a total of four participants in the administration phase of the study who represented both preschool- and school-age language skills and who were divided between children with hearing loss and children with typical hearing. Participants were selected and matched based on age, home languages, severity of the hearing loss, appropriately fit with hearing technology, and their timely enrollment in an early intervention program. Home languages were only to be in English and Spanish, where Spanish occupies at least 25% of weekly exposure and interactions per parental report. Additionally, these children would present no other disabilities. Two of the participants, one with typical hearing and one with hearing loss, had chronological ages of 3:0 to 3:6 years old. Similarly, two other participants had chronological ages of 5:0 to 5:6 years old. Validity testing of the original APT/HI was conducted with children 5-years of age and older; younger populations were not tested, but according to the Examiner's manual of the original APT/HI-3, younger populations can be tested, as well. Therefore, this research study also attempted to capture the functionality and feasibility of an auditory perception test when administered to preschool-age children. Listed characteristics of participations in the administration phase are provided in Appendix C.

One of the 3-year old children was a male with severe sensorineural hearing loss who had received bilateral cochlear implantation and was enrolled in an auditory-verbal therapy program; his home language and main language of input was Spanish, but he also received English input during therapy services. The other 3-year old child was a male with typical hearing who received both English and Spanish input at home; both children had older siblings who were bilingual in both Spanish and English. In reference to the school-age children, one was a 5-year old female with severe sensorineural hearing loss who had received bilateral cochlear implantation and was enrolled in an auditory-verbal therapy program; her home language was Spanish, but she received English input at school and during therapy. Her hearing counterpart was a 5-year old child who spoke three languages (i.e., Spanish, English, and French); the home language was reported to be Spanish, and she received schooling in French and English. All children were judged to be typically developing without concomitant issues other than hearing loss, though formal assessment was not conducted to verify general intelligence and receptive and expressive language levels.

Procedures. The researcher attempted to replicate administration procedures for all four children, but some notable differences were observed. Administration time across participants was approximately an hour for both tests, apart from the 3-year old child with hearing loss who required an hour and a half for completion. Due to time constraints and the cognitive burden of formal assessment for a young child, only the 5-year old female children participated in the non-linguistic portions of the APT/HI-3, which remained relatively unchanged in the adapted version since those sections do not contain significant linguistic specificity. Three of the four children were assessed in their homes

in a quiet environment relatively free from ambient noise; the 5-year old child with hearing loss was assessed in a private clinic in a noise-free environment. All children but one was receptive to testing procedures and demonstrated compliant behaviors throughout the test, thus the facilitating administration process; the three-year old child with hearing loss demonstrated difficulties in attention and compliance 30-minutes into testing procedures, which contributed to additional testing time and negatively impacted his overall score on both tests. The language of administration for the tests varied between Spanish and English. The 5-year old children received instructions in both languages, depending on the assessment they were completing in the moment (i.e., APT/HI-3 was in English, APT/HI-S was in Spanish); however, the 3-year old children received instructions in their dominant language irrespective of the language of test items. For example, despite target items being in Spanish in the APT/HI-S, the 3-year old child with typical hearing received instructions in English for both tests. Conversely, the 3-year old child with hearing loss received instructions in Spanish for both tests regardless of the language of test items. While there were slight modifications to assessment procedures depending on the child, it is the belief of the researcher that these changes did not lessen the validity of either test. The parents of all the participants were asked to read and sign consent forms prior to the administration of the APT/HI-3 and APT/HI-S, a copy of which has been provided in Appendix B; consent forms were available in both English and Spanish, depending on the language preference of the parents.

The chief purpose of the administration phase was to pilot test the APT/HI-S on preschool- and school-age children with and without hearing loss as a means of further

assessing the functionality and feasibility of the Spanish speech perception test. Functionality was determined by how closely scores between the APT/HI-3 and its Spanish counterpart compared. It was estimated that if intra-participant scores presented no significant differences between the APT/HI-3 and the adapted version, then it could be inferred that the APT/HI-S serves as a viable speech perception test for preschool- and school-age children who speak Spanish. If significant disparities were found to exist between scores across participants, it could be postulated that linguistic factors (i.e., lexical knowledge, developmentally-appropriate vocabulary, proficiency levels) played an influential role in the overall performance of the children on the APT/HI-S.

CHAPTER III

RESULTS

The findings obtained from this research project were used to answer the primary question of whether or not an adapted Spanish auditory assessment tool could be viable when administered to Spanish-English bilingual children with typical hearing or with hearing loss. However, before the APT/HI-S could be presented to bilingual children in order to determine its functionality, test items from the APT/HI-3 had to be translated and adapted into Spanish. In addition, specific test items in the APT/HI-S were validated to determine their developmental appropriateness by individuals who were sufficiently proficient in Spanish. Results from the adaption and validation phases were used to strengthen the test content that appears within the APT/HI-S before administering it to the target population.

Adaptation Phase Results

Table 1 below offers a direct comparison of the test items contained in the APT/HI-3 versus test items contained in the APT/HI-S following both the adaptation and validation phases of the APT/HI-S.

Table 1

Test Item Comparison between APT/HI-3 and APT/HI-S

Test Item	APT/HI-3	APT/HI-S
AA1	Clapping, drumming	No change
AA2	/bababa/	/bababa/
AA3	/ba/, /baba/, /bababa/	/ba/, /baba/, /bababa/
DI1 – DI3	/ba/	/ba/
II1 – II3	/ba/	/ba/
PI1 – PI2	/ba/	/ba/

PP1	dog vs hamburger	pez vs caballo
PP2	airplane vs hamburger	leche vs caballo
PP3	Bob fell vs Dan is jumping	Juan ve vs Pedro duerme
PP4	The dog sits vs Dan is jumping	Luis salta vs Pedro duerme
VP1	Phoneme /u/	No change
VP2	Phoneme /ɑ/	Phoneme /a/
VP3	Phoneme /i/	No change
VP4	boys vs bees vs bows	dos vs diez
VP5	boat vs bat vs boot	nieve vs nube
VP6	bikes vs books vs box	manos vs monos vs menos
CM1	rose vs toes vs nose	mar vs par vs dar
CM2	moo vs shoe vs two	tirar vs mirar vs virar
CM3	rat vs bat vs hat	caro vs carro
CM4	No CM4	casa vs cara vs cama
CV1	bear vs pear	besa vs pesa
CV2	goat vs coat	goma vs coma
CV3	zoo vs Sue	día vs tía
CP1	boat vs goat	bota vs gota
CP2	moo vs new	macho vs nacho
CP3	No CP3	una vs uña
OS1	cats vs cans	Not replicated
OS2	tie vs time	media vs medias (OS1)
OS3	pig vs pigs	lobo vs globo (OS2)
OS4	Phoneme /m/	Phoneme /n/ (OS3)
OS5	Phoneme /ch/	Phoneme /l/ (OS4)
OS6	The red box vs The blue car vs The green shoe	La caja roja vs La vaca blanca vs La bota negra (OS5)
OS7	The red box vs The blue box vs the green box	La caja roja vs La caja azul vs La caja verde (OS6)
OS8	The red box vs The red socks vs The red fox	El taco rojo vs El saco rojo vs El flaco rojo (OS7)
OS9	wing vs string vs king vs swing	pez vs mes vs tres vs vez (OS8)
LP1	The girl is riding on a horse.	La niña monta el caballo.
LP2	The boy is chasing a brown dog.	El niño sigue el perro.
LP3	The brown dog is chasing a cat.	El perro sigue el gato.
LP4	The boy and girl are watching television.	Los niños miran la tele.
LP5	The boy is wearing a red shirt.	Los tomates dulces son rojos.
LP6	The man and woman are cooking.	La madre prepara la comida.
CC1	Do you like ice cream?	¿Te gusta el helado?
CC2	Do you like hot dogs or hamburgers?	¿Te gusta la hamburguesa o la pizza?
CC3	What is Mommy's name?	¿Como se llama tu mama?
CC4	What do you eat for lunch?	¿Qué comes para el almuerzo?

CC5	What is your favorite fruit?	¿Cuál es tu fruta favorita?
CC6	How old are you?	¿Cuántos años tienes?

Validation Phase Results

Test Items in Surveys. The test items featured in the surveys were scrutinized by participants in order to eliminate or minimize words, word pairs, or word groups that might be inappropriate for 3-year old children; however, in order to effectively measure specific test items (i.e., voiced and voiceless pairs), not all words or word groupings were discarded despite low agreement levels across participants. A total of 62 words were presented in the surveys, and 16 of those words were met with average agreement levels below 80% by one or more of the groups that were surveyed. For the reasons mentioned above, however, certain word pairings or groupings were kept through the administration phase despite generally low agreement among survey participants. Out of the 62 words surveyed, 39 of the words were included in the administration phase of the research project, one of which was considered to be developmentally inappropriate for 3-year old children due to its conjugation (i.e., “coma (eat)”) and one of which was altered to reflect a more basic semantic concept (i.e., “peso (money)” to “pesa (weight)”). It should be reiterated that only words in specific sections of the APT/HI-S were surveyed; phrases, sentences, and questions in prior or further sections of the test were not surveyed. What follows is a breakdown of each word pair or group that underwent the validation process and notes that further explain the rationale behind preserving, discarding, and adding certain test items.

Items Targeting Prosodic Perception. When targeting a minimal pair differing in syllable length (2 syllables vs. 3 syllables) (i.e., “leche (milk) vs caballo (horse)”), all participants agreed that “leche” and “caballo” are developmentally appropriate words for 3-year-old children.

Items Targeting Vowel Perception. When targeting a minimal triad with differences in the initial vowel /a, e, o/ (i.e., “manos (hands) vs menos (less than) vs monos (monkeys)”), most participants agreed that “manos,” “menos,” and “monos” are developmentally appropriate words for 3-year-old children. In an additional triad that was surveyed targeting a minimal triad with differences in the initial vowel /je, u, a/ (i.e., “nave (vessel) vs nieve (snow) vs nube (cloud)”), most participants considered “nave” to be developmentally inappropriate for 3-year-old children. Due to the low agreement percentage of “nave,” it was discontinued from being surveyed during final presentation of surveys. Most participants agreed that “nieve” and “nube” are developmentally appropriate words for 3-year-old children, and these words were kept through the administration phase as a minimal pair instead of a minimal triad.

When targeting minimal triad differing in vowel /a, je, o/ (i.e., “das” (give) vs diez (ten) vs dos (two)”), most participants considered “dos” and “diez” to be developmentally appropriate words for 3-year-old children. Many individuals considered “das” to be developmentally inappropriate for 3-year-old children, and therefore, it was not used in the administration phase. Instead, “dos” and “diez” were presented as a minimal pair. Moreover, when targeting a minimal triad differing in vowel /i, je, a/ (i.e., “mil (thousand) vs miel (honey) vs mal (bad)”), most participants considered “mil” to be

developmentally inappropriate words for 3-year-old children. Due to the low agreement percentage of “mil,” minimal triad was discontinued from being surveyed during final presentation of surveys and was not carried over the administration phase. Similarly, when targeting a minimal triad differing in vowel /je, e, a/ (i.e., “pies (feet) vs pes (fish) vs paz (peace)”), most participants considered “paz” to be developmentally inappropriate for 3-year-old children. Due to the low agreement percentage of “paz,” minimal triad was discontinued from being surveyed during final presentation of surveys and, the minimal triad was not featured in the administration phase.

Items Targeting Consonant Perception. When targeting a minimal triad with initial phonemic differences involving manner of articulation (i.e., “maíz (corn) vs país (country) vs raíz (root)”), most participants considered “raíz” to be developmentally inappropriate for 3-year-old children. Due to the low agreement percentage of “raíz,” the minimal triad was discontinued from being surveyed during final presentation of surveys. Instead, a different minimal triad was used in its place (i.e. “dar (to give) vs mar (sea) vs par (pair)”). While most participants agreed that the words were developmentally appropriate for 3-year-old children, it was noted that “dar” and “par” share the same manner of articulation, therefore the original test objective was not being targeted; however, due to relatively high agreement levels, the minimal triad was kept, and the overall objective of the test item was changed to be in compliance with the words. Additionally, when targeting another minimal triad with phonemic differences involving manner of articulation (i.e., “girar (to rotate) vs mirar (to look) vs tirar (to throw)”), most participants considered “girar” to be developmentally inappropriate for 3-year-old children. Due to the low agreement percentage of “girar,” test item was discontinued

from being surveyed during final presentation of surveys and the word “virar (to turn)” was surveyed in its place, which acquired more general acceptance. When targeting a minimal pair with medial phonemic differences involving manner of articulation /r, r/ (i.e., “caro (expensive) vs. carro (car)”), most participants agreed that “caro” and “carro” are developmentally appropriate words for 3-year-old children, although a few participants felt “caro” was developmentally inappropriate. One participant suggested “pera (pear)” and “perra (dog),” yet these words were not used in the administration phase. Furthermore, when targeting a minimal triad with initial differences in manner of articulation (i.e., “diente (tooth) vs miente (lies) vs siente (feels)”), most participants considered “miente” to be developmentally inappropriate for 3-year-old children. Due to the low agreement percentage of “miente,” minimal triad was discontinued from being surveyed during final presentation of surveys and was not used in the APT/HI-S.

When targeting minimal pair with initial phonemic differences of nasal phonemes /n, m/ (i.e., “nata (cream) vs mata (plant)”), most participants considered “nata” to be developmentally inappropriate for 3-year-old children. Due to the low agreement percentage of “nata,” the minimal pair was discontinued from being surveyed during final presentation of surveys. Instead, minimal pairs of “nacho (nacho)” and “macho (man)” were provided. Most participants agreed that “nacho” and “macho” are developmentally appropriate words for 3-year-old children, though some individuals felt the words were dialectical and, therefore, inappropriate. A few participants felt the words were developmentally inappropriate. However, these words were kept through the administration phase despite some of the reservations expressed by the survey

participants due to a lack of developmentally appropriate minimal pairs that use the phonemes in question.

When targeting a minimal pair with initial phonemic differences in voiced/voiceless bilabial stops /p, b/ (i.e., “beso (kiss) vs peso (money)”), several participants considered “peso” to be dialectical and, therefore, inappropriate for 3-year-old children. In order to amend this word, the final phoneme in both words was changed to /a/, thus changing the meaning of money or currency in the word “peso” to a weighing scale. It was felt that this word was more visually salient and appropriate for 3-year old children, although it was not verified with survey participants prior to its use in the administration phase. When targeting a minimal pair with initial phonemic differences in voiced/voiceless alveolar stops /d, t/ (i.e., “día (day) vs tía (aunt)”), most participants considered “día” and “tía” to be developmentally appropriate words for 3-year-old children and were kept through the administration phase.

When targeting minimal pair with initial phonemic differences of voiced/voiceless velar stops /k, g/ (i.e., “coma (eat) vs goma (eraser)”), many participants felt that the conjugation for “coma” was not developmentally appropriate for 3-year-old children and that the definition of “goma” was dialectical and, therefore, inappropriate. However, this word pair was kept through the administration phase due to a lack of developmentally appropriate minimal pairs that test velar stops in Spanish despite the phonemes’ frequent appearance in the language.

When targeting a minimal triad with initial differences in placement of articulation (i.e., “pinta (paints) vs quinta (fifth) vs tinta (ink)”), most participants

considered “tinta” and “quinta” to be developmentally inappropriate for 3-year-old children. Several participants suggested the word “cinta (bow)” as an alternative, although it does not differ in placement of articulation. Nonetheless, it was included during final presentation of surveys, and it was deemed to be developmentally appropriate for 3-year-old children. However, “pinta” and “cinta” were not included in the administration phase of the project because other word options were available. For instance, when targeting a minimal triad with medial differences in manner of articulation (i.e., “casa (house) vs cara (face) vs cana (white hair)”), all participants considered “casa” and “cara” to be developmentally appropriate for 3-year-old children, but many participants felt that “cana” was developmentally inappropriate. Due to the low agreement percentage of “cana,” it was discontinued from being surveyed during final presentation of surveys. Several participants suggested the words “capa (hat)” and “cama (bed)” as alternatives; these options were included during final presentation of surveys, and “cama” was deemed developmentally appropriate for 3-year-old children. Therefore, “casa,” “cara,” and “cama” were presented in the administration phase of the research project. Additionally, a minimal pair targeting medial differences in nasal phoneme /n, ɲ/ (i.e., “una (one) vs uña (nail)”) was presented. This minimal pair was suggested by a student following survey presentation to the graduate second-year students. These options were included during final presentation of surveys and were deemed developmentally appropriate for 3-year-old children. Moreover, when targeting a minimal pair with initial phonemic differences in place of articulation /b, g/ (i.e., “bota (boot) vs gota (drop)”), most participants considered “bota” and “gota” to be developmentally appropriate words for 3-year-old children and were used in the subsequent administration phase.

Items Targeting Other Segmental Perception. When targeting minimal pair with/without initial consonant blends (i.e., “lobo (wolf) vs globo (balloon)”), most participants agreed that “lobo” and “globo” are developmentally appropriate words for 3-year-old children. These words were well-received and kept through the administration phase of the research project. When targeting a minimal pair ending with different final phonemes (i.e., “media (sock) vs medias (socks)”), most participants considered “media” to be a developmentally appropriate word for 3-year-old children. Because “media” and “medias” share the same semantic concept and solely differ by the inflectional morpheme plural -s, “medias” was not surveyed. When targeting a minimal tetrad with differences in the frequency of the initial consonant (i.e., “pez (fish) vs tres (three) vs mes (month) vs vez (sees)”), most participants agreed that “pez,” “tres,” “vez,” and “mes” are developmentally appropriate words for 3-year-old children, although a few participants felt “mes” was developmentally inappropriate. This tetrad was kept through the administration phase of the project despite some disagreement.

Table 2 provided below depicts the words that were presented across all three survey groups along with test objectives and agreement percentages for individual words.

Table 2

Surveys Results for APT/HI-S

Test Item	First Year Students: 25	Second Year Students: 21	Speech Pathologists: 5	Results: Agreement %
Objective: Targeting minimal triad with initial phonemic differences involving manner of articulation.				
Maíz	0	2	N/A	96%
País	7	6	N/A	75%
Raíz	23	19	N/A	9%
Objective: Targeting minimal triad with initial phonemic differences involving manner of articulation.				

Dar	0	2	0	96%
Mar	0	2	0	96%
Par	1	3	1	90%
Objective: Targeting minimal triad with initial phonemic differences involving manner of articulation.				
Girar	15	16	N/A	32%
Mirar	0	0	0	100%
Tirar	0	0	0	100%
Virar	3	3	3	82%
Objective: Targeting minimal pair with initial phonemic differences of voiced/voiceless velar stops /k, g/.				
Coma	4	8	1	75%
Goma	1	3	2	88%
Objective: Targeting minimal pair with initial phonemic differences of nasal phonemes /n, m/.				
Nata	22	14	N/A	29%
Mata	0	0	N/A	100%
Objective: Targeting minimal pair with initial phonemic differences of nasal phonemes /n, m/.				
Nacho	5	3	1	82%
Macho	3	4	1	84%
Objective: Targeting minimal pair with/without initial consonant blend.				
Lobo	0	1	0	98%
Globo	1	1	0	96%
Objective: Targeting minimal tetrad with initial differences in the frequency of the consonant.				
Pez	0	0	0	100%
Tres	0	0	0	100%
Vez	0	1	1	96%
Mes	4	1	1	88%
Objective: Targeting minimal pair with medial phonemic differences involving manner of articulation /r, r/.				
Caro	3	4	2	82%
Carro	2	0	0	96%
Objectives: Targeting minimal triad with differences in the initial vowel /a, e, o/.				
Manos	0	0	0	100%
Menos	0	4	0	92%
Monos	0	0	0	100%
Objectives: Targeting minimal triad with differences in the initial vowel /je, u, a/.				
Nieve	2	1	0	94%
Nube	2	1	0	94%
Nave	13	9	N/A	57%
Objective: Targeting minimal triad with initial differences in placement of articulation.				
Pinta	1	3	1	90%

Tinta	3	8	1	76%
Quinta	12	11	2	51%
Cinta	N/A	N/A	0	100%
Objective: Targeting minimal triad with medial differences in manner of articulation.				
Casa	0	0	0	100%
Cana	12	10	N/A	57%
Cara	0	0	0	100%
Capa	N/A	N/A	2	60%
Cama	N/A	N/A	0	100%
Objective: Targeting minimal pair with medial differences in nasal phoneme /n, ɲ/.				
Una	N/A	N/A	0	100%
Uña	N/A	N/A	0	100%
Objective: Targeting minimal pair differing in syllable length (2 syllables vs. 3 syllables)				
Leche	0	0	0	100%
Caballo	0	0	0	100%
Objective: Targeting minimal triad differing in vowel /a, je, o/.				
Das	6	6	3	71%
Diez	1	1	0	96%
Dos	0	0	0	100%
Objective: Targeting minimal triad differing in vowel /i, je, a/.				
Mil	20	20	N/A	22%
Miel	3	7	N/A	80%
Mal	1	1	N/A	96%
Objective: Targeting minimal pair with initial phonemic differences in voiced/voiceless bilabial stops /p, b/.				
Peso	6	8	2	69%
Beso	0	0	0	100%
Objective: Targeting minimal pair with initial phonemic differences in voiced/voiceless alveolar stops /d, t/.				
Día	1	1	0	96%
Tía	0	0	0	100%
Objective: Targeting minimal pair with initial phonemic differences in place of articulation /b, g/.				
Bota	3	4	0	86%
Gota	0	7	1	84%
Objective: Targeting minimal pair ending with different final phonemes.				
Media	1	1	0	96%
Medias	N/A	N/A	N/A	N/A
Objective: Targeting minimal triad differing in vowel /je, e, a/.				
Pies	0	1	N/A	98%
Pes	0	0	0	100%
Paz	9	18	N/A	47%
Objective: Targeting minimal triad with initial differences in manner of articulation.				

Miente	13	18	N/A	39%
Diente	0	0	N/A	100%
Siente	6	8	N/A	73%

Administration Phase Results

Following the adaptation and validation phases of the research project, both the APT/HI-3 and APT/HI-S were administered to four children as a means to assess the functionality of the Spanish auditory perception test and to determine if significant differences were present in performance between both languages as indicated by the percentage of Developed, Emerging, and Missing scores and clinical impressions. Two of the children that were tested were 3-years old, representing preschool-age performance; two other children were 5-years old, representing school-age performance. The preschool-age children were matched by age, gender, and languages spoken (i.e., Spanish and English), and the school-aged children were matched according to the same parameters, as well.

Some discrepancies and similarities were noted between English and Spanish scoring for the 3-year old child with hearing loss. As per the results of both the APT/HI-3 and APT/HI-S, overall skills that were considered developed were greater in Spanish than they were in English (37% > 24%, respectively). During the assessment process, the 3-year old child with hearing loss responded in Spanish to test stimuli and used Spanish rather than English during spontaneous conversation. Additionally, the child required numerous verbal and visual prompts to repeat words upon auditory presentation from the researcher, and these prompts were more frequent during the administration of the

APT/HI-3. Similarly, the child would readily respond to English questions in Spanish in both assessment procedures and in natural contexts. Both tests indicated that the 3-year old child with hearing loss had a high percentage of Missing skills (i.e., APT/HI-3 yielded 60% Missing skills, APT/HI-S yielded 54% Missing skills); these congruent results are promising indicators of the validity of the APT/HI-S. Despite these results, however, it should be noted that the 3-year old child demonstrated significant difficulties tolerating testing procedures and required substantial redirecting and behavioral management; neither the scores on the APT/HI-3 nor the APT/HI-S may accurately reflect the child's functional auditory perception skills given his resistance to the administration procedure. Table 3 provided below demonstrates the percentages of Developed, Emerging, and Missing scores for the 3-year old child with hearing loss across test sections in the APT/HI-3 and APT/HI-S.

Table 3

Assessment Results for 3-year Old Child with Hearing Loss

Assessments:	APT/HI-3			APT/HI-S		
Test Section Scoring:	D	E	M	D	E	M
Prosodic Perception Tasks	100%	0%	0%	50%	0%	50%
Vowel Perception Tasks	0%	17%	83%	17%	17%	66%
Consonant Manner Tasks	0%	33%	67%	50%	0%	50%
Consonant Voicing Tasks	0%	33%	67%	33%	0%	67%
Consonant Placement Tasks	0%	50%	50%	67%	0%	33%
Other Suprasegmental Tasks	22%	0%	78%	12%	25%	63%
Linguistic Perception Tasks	0%	0%	100%	0%	33%	67%
Communicative Comprehension	67%	N/A	33%	67%	N/A	33%
Note: Scores of Developed (D), Emerging (E), and Missing (M) are assigned for each test item across all test sections and an average percentage score for each section is provided above. This is repeated in Tables 4 through 7.						

In contrast, the 3-year old child with typical hearing displayed auditory perception skills that were significantly greater in English than in Spanish. His mother corroborated these results by stating that his stronger language is English, and he usually responds in English even when confronted with Spanish. Even though he used English exclusively during spontaneous conversation, he repeated stimuli in Spanish following auditory presentation from the researcher during administration of the APT/HI-S. Language differences were evident during the Linguistic Perception Tasks, which required the child to repeat words verbatim. During the English assessment, the child displayed 83% skills that were considered Developed, such percentage score signifying that he was repeating English words accurately. On the contrary, his Developed score for the APT/HI-S for the same section was only 16%, which more than likely represents a discrepancy in language proficiency rather than auditory abilities. In fact, the 3-year old child with typical hearing had misarticulated speech marked by stopping in both languages, but in Spanish, he displayed a higher frequency of syllable and word deletion during the repetition tasks. The child's behavior was noncontributory to performance, as he was engaged and cooperative throughout the visit; however, because the APT/HI-S was administered second, his overall lower scores on the APT/HI-S may also indicate increased fatigue and distractibility, though this was not evident during the assessment process. Table 4 provided below demonstrates the percentages of Developed, Emerging, and Missing scores for the 3-year old child with typical hearing across test sections in the APT/HI-3 and APT/HI-S.

Table 4

Assessment Results for 3-year Old with Typical Hearing

Assessments:	APT/HI-3			APT/HI-S		
Test Section Scoring:	D	E	M	D	E	M
Prosodic Perception Tasks	100%	0%	0%	75%	0%	25%
Vowel Perception Tasks	33%	0%	67%	50%	0%	50%
Consonant Manner Tasks	100%	0%	0%	25%	50%	25%
Consonant Voicing Tasks	67%	0%	33%	33%	33%	33%
Consonant Placement Tasks	100%	0%	0%	33%	0%	67%
Other Suprasegmental Tasks	44%	11%	45%	76%	12%	12%
Linguistic Perception Tasks	83%	17%	0%	16%	33%	51%
Communicative Comprehension	100%	N/A	0%	100%	N/A	0%

In reference to the 5-year old child with hearing loss, she displayed similar skills between both tests, with greater auditory perception abilities found in the APT/HI-3 instead of the APT/HI-S (75% > 64%, respectively). During the interactions with the researcher, it was noted that she preferred to respond in English; most, if not at all, spontaneous interactions were marked to be in English. Although the home language was Spanish in this case, the language of schooling and therapy was English. When analyzing individual sections of both tests, the greatest source of disparity was found in mixed Consonant Perception tasks, such as those involving identification of consonant manner, voicing, and placement; however, she did not necessarily present greater skills across all these tasks in one language versus the other.

The 5-year old child with hearing loss presented phonological processes in her speech pattern that negatively impacted her intelligibility, weak-syllable deletion being one of the most pronounced. This is evident in her high percentage of Missing scores in

the Linguistic Perception Tasks in both languages, although Emerging skills were marked to be greater in English. Additionally, Communicative Comprehension was stronger in English, as evidenced by her inappropriate or incomplete semantic responses to Spanish questions despite appropriate and complete communicative comprehension skills in English. Again, while behavioral compliance was not a remote issue during the assessment process, the APT/HI-S was administered following the administration of the APT/HI-3, which may have affected the child's performance. Table 5 provided below demonstrates the percentages of Developed, Emerging, and Missing scores for the 5-year old child with hearing loss across test sections in the APT/HI-3 and APT/HI-S.

Table 5

Assessment Results for 5-year Old Child with Hearing Loss

Assessments:	APT/HI-3			APT/HI-S		
Test Section Scoring:	D	E	M	D	E	M
Auditory Awareness Tasks	67%	0%	33%	N/A	N/A	N/A
Duration Identification Tasks	100%	0%	0%	N/A	N/A	N/A
Intensity Identification Tasks	0%	33%	67%	N/A	N/A	N/A
Pitch Identification Tasks	100%	0%	0%	N/A	N/A	N/A
Prosodic Perception Tasks	100%	0%	0%	100%	0%	0%
Vowel Perception Tasks	100%	0%	0%	100%	0%	0%
Consonant Manner Tasks	67%	33%	0%	100%	0%	0%
Consonant Voicing Tasks	67%	0%	33%	33%	0%	67%
Consonant Placement Tasks	100%	0%	0%	33%	33%	33%
Other Suprasegmental Tasks	67%	0%	33%	62%	0%	38%
Linguistic Perception Tasks	33%	33%	33%	33%	33%	33%
Communicative Comprehension	100%	N/A	0%	50%	N/A	50%

The 5-year old child with typical hearing presented Developed scores of 100% across all tasks in both English and Spanish tests. Her main language of interaction was English, and she would respond to the researcher in English even when addressed in Spanish. However, despite her preference for English, she displayed equal auditory perception skills in both languages. Nonetheless, these results do not suggest that she has equal language abilities in English and Spanish. For example, the child asked a few times what a word in Spanish meant following visual and auditory presentation from the researcher (i.e., “What’s a nacho?”, “What is goma?”) and would also ask the researcher to repeat novel or unfamiliar words; even though she did not have the lexical or semantic concept, she was able to respond to questions appropriately because of the primarily auditory nature of the assessment. Her speech was intelligible in both languages, and phonological processes were not apparent during the visit. Overall, her equal performance across tasks in both assessments is highly encouraging and further confirms the functionality of the APT/HI-S as an auditory perception instrument. Table 6 provided below demonstrates the percentages of Developed, Emerging, and Missing scores for the 5-year old child with typical across test sections in the APT/HI-3 and APT/HI-S.

Table 6

Assessment Results for 5-year Old Child with Typical Hearing

Assessments:	APT/HI-3			APT/HI-S		
Test Section Scoring:	D	E	M	D	E	M
Auditory Awareness Tasks	100%	0%	0%	N/A	N/A	N/A
Duration Identification Tasks	100%	0%	0%	N/A	N/A	N/A
Intensity Identification Tasks	100%	0%	0%	N/A	N/A	N/A
Pitch Identification Tasks	100%	0%	0%	N/A	N/A	N/A
Prosodic Perception Tasks	100%	0%	0%	100%	0%	0%

Vowel Perception Tasks	100%	0%	0%	100%	0%	0%
Consonant Manner Tasks	100%	0%	0%	100%	0%	0%
Consonant Voicing Tasks	100%	0%	0%	100%	0%	0%
Consonant Placement Tasks	100%	0%	0%	100%	0%	0%
Other Suprasegmental Tasks	100%	0%	0%	100%	0%	0%
Linguistic Perception Tasks	100%	0%	0%	100%	0%	0%
Communicative Comprehension	100%	N/A	0%	100%	N/A	0%

Table 7 provided below represents the average of Developed, Emerging, and Missing scores in the APT/HI-3 and APT/HI-S for all four children. Evidently, 2 out of the 4 children earned greater Developed scores in the APT/HI-3 than the APT/HI-S, specifically the 3-year old child with typical hearing and the 5-year old child with hearing loss. The 3-year old child with hearing loss demonstrated greater strengths in the APT/HI-S as indicated by a higher percentage of Developed scores. Lastly, the 5-year old child with typical hearing presented with equal scores on both the APT/HI-3 and APT/HI-S. The 3-year old child with hearing loss yielded the lowest Developed scores and highest Missing scores, whereas the 5-year old child with typical hearing was the only child to achieve Developed 100% scores on both tests. These results indicate variable performance levels among most of the children between the APT/HI-3 and APT/HI-S. A discussion of the variable performance among the children follows.

Table 7

Overall Assessment Results Per Child

Assessment:	APT/HI-3			APT/HI-S		
Test Section Scoring:	D	E	M	D	E	M

3-year old child (hearing loss)	24%	16%	60%	37%	9%	54%
3-year old child (typical hearing)	78%	4%	18%	51%	16%	33%
5-year old child (hearing loss)	75%	11%	14%	64%	8%	28%
5-year old child (typical hearing)	100%	0%	0%	100%	0%	0%

CHAPTER IV

DISCUSSION

The fundamental purpose of this multi-phased research project was to establish if an adapted Spanish auditory assessment tool could prove viable when administered to Spanish-English bilingual children with and without hearing loss. As a means to answer this question, the APT/HI-S was adapted from the APT/HI-3, a comprehensive speech tool that targets the identification, discrimination, identification, and comprehension of speech sounds at the word, phrase, and sentence level. Before the APT/HI-S could be administered to children, the phonological and grammatical differences between English and Spanish had to be examined in order to make appropriate changes from one test to the next. The changes or adaptations were then validated by Spanish-English bilingual individuals to determine if they were developmentally appropriate and representative of Spanish. Following the validation of test items, the APT/HI-3 and APT/HI-S were administered to four children who were bilingual in English and Spanish to compare through qualitative measures if significant differences existed between performances on both tests. Discussion points relevant to the results from the adaptation, validation, and administration phases of the project are as follow.

Adaptation Phase

As previously indicated, the adaptation phase of the research project consisted of making phonemic, semantic, and contextual changes from the APT/HI-3 to the APT/HI-S while altogether preserving the auditory integrity of the test items. Because Spanish and English contain separate phonological systems that are governed by distinct rules and

phonology (Martinez-Celdran, 1991; Moreno-Torres, 2014), the adapted test items attempted to uphold the intent of the APT/HI-3 but were necessarily different to comply with the phono-syntactic structures and patterns that are known to Spanish. Most test items could not be directly translated from English to Spanish, because a direct translation would have violated the purpose of the target selections by way of changing phonemes and presenting pairs and groups of words that were no longer appropriately contrastive. In other words, the auditory information in most test items would have compromised through direct translation procedures.

The APT/HI-S features the auditory elements of the original test in a format that is theoretically viable for monolingual and bilingual children who speak Spanish. However, it should be clarified that because the phonology and lexicon of Spanish do not readily lend themselves to minimal pairs that are developmentally appropriate for 3-year old children, it was a challenge to propose word pairs/groups that so neatly provide contrastive features in the way the APT/HI-3 does. Many of the changes consisted of replacing phonemes and lengthening monosyllabic words to disyllabic words that followed a CVCV format, which is consistent with previous research that mentions the prevalence of such syllable structures in Spanish (Gomez-Martinez, 2011; Guerra, 1983). An example of a notable deviation that occurred between the APT-HI-3 and APT/HI-S is the omission of voiced and voiceless alveolar fricatives. The APT/HI-3 targets the discrimination of voiced and voiceless alveolar fricatives /s, z/ in the words “Sue” and “zoo,” but because Spanish lacks /z/ in its phonetic inventory, it would have been inappropriate to test for the discriminatory abilities of the two sounds. Accordingly, this specific test item was replaced for a more practical distinction that occurs in the Spanish

language, namely discriminating between tapped and trilled /r, r/ in medial position of words (“caro” vs. “carro”). In this case, phonemic, syllabic, and semantic changes took place between one test item in English to Spanish. Overall, the changes that transpired from APT/HI-3 to APT/HI-S were purpose-driven and deemed to be necessary in order to produce an assessment tool that authentically captures what it means to be a Spanish speaking individual from phonological, lexical, and syntactic perspectives.

Validation Phase

Dialectical and Cultural Differences. The validation phase focused on determining if word pairings and groupings featured in the APT/HI-S were developmentally appropriate for 3-year old children. Clearly, this is a problematic question to answer, because the receptive and expressive lexicon of any 3-year old child is deeply connected to cultural and individual experiences. Although the Spanish speaking individuals surveyed during the validation phase of this research project deemed certain words to be developmentally inappropriate based on their own clinical and language experiences, these opinions are confounded by varying cultural and dialectal backgrounds. Spanish is not a uniform language; it is shaped by the region from where its speakers inhabit (Honsa, 1980; Stockler, 2015). Simply put, the dialects of Spanish can influence whether a word is developmentally appropriate for a 3-year old child. For instance, although a word might be feasible for a Cuban Spanish speaker, it may no longer be appropriate for a Nicaraguan Spanish speaker. These dialectical differences among Spanish speakers may have played a role during the validation phase, because the individuals who were surveyed undoubtedly stemmed in one way or another from

different countries and regions. As a result, test items were unlikely to receive unanimous agreement among survey participants if the words were not dialectically shared.

However, considering that most of the test items that were kept through the administration phase of the research project were met with agreement levels of 80% or greater, it can be inferred that the majority of the test items in the APT/HI-S are not merely developmentally appropriate for 3-year old children but also dialectically shared among Spanish speakers. Unfortunately, there is little to no formal research on how dialectical differences among Spanish-speaking countries contribute to the acquisition of an early lexical system in children, so the extent to which cultural/dialectical differences influenced word perceptions in the validation phase of the research project cannot be fully determined.

Test Item Inclusion. Given the strict phonotactic constraints of Spanish and overall functionally restricted lexicon of a 3-year old child, it is highly unlikely to come across words that are developmentally appropriate, minimally contrastive, and that resemble or parallel objectives in the original test. Therefore, certain word pairs or groups were preserved in the APT/HI-S if a more appropriate alternative could not be found. Because the APT/HI-3 is an assessment tool that primarily relies on auditory perception skills, it was estimated that the children in the administration phase of the project would have the capacity to distinguish between phonemes in unfamiliar words given adequate visual and auditory exposure prior to the administration of a test item, as this resembles a dynamic assessment approach. Results derived from the 5-year old child with typical hearing reflected this assumption, because although she was unaware of the meaning behind select words in the APT/HI-S, she was nonetheless able to discriminate between

the target phonemes following exposure to a trial item with visual and auditory cues with 100% accuracy. However, to expect such results from a 3-year old child or from a child with limited auditory experiences is idealistic, and this serves as a point worth rectifying in future studies involving the APT/HI-S. It has been well documented that language skills (i.e., verbal output, auditory comprehension) and auditory experience are rooted in auditory perception skills (Blamey et al, 2001; Nittrouer & Thunete Burton, 2003), so accordingly, even though a child might have the capacity to learn within testing procedures after trial exposures to new stimuli, his or her performance will still depend on communicative experiences and receptive/expressive language skills.

Administration Phase

Role of Language and Auditory Experience. Despite discrepancies among individual scores, the results from the administration phase ultimately reveal that the APT/HI-S is a potentially functional assessment tool for auditory perception skills in children who speak Spanish. Scores from the preschool-age and school-age children suggest that language proficiency is highly involved in the assessment of auditory and speech perception skills, as supported by previous researchers (Blamey et al, 2001; Nittrouer & Thunete Burton, 2003). Across all children, regardless of age and hearing status, language played a central role when determining perceptual skill levels. In the case of the 3-year old child with hearing loss whose main language was Spanish, his score on the APT/HI-S was greater than his score on the APT/HI-3; this was true despite behavioral factors that might have negatively impacted his performance on both Spanish and English tests. The 3-year old child with hearing loss also supported this finding by

demonstrating a near absence of expressive language skills in English during spontaneous conversation and unstructured tasks. This may reflect the fact that the child's home language and more frequent language of input was Spanish rather than English. It was evident that the child's dominant language was Spanish despite being bilingual and demonstrating an understanding of English words, phrases, and sentences via completion of test items.

Conversely, in the remaining children, it was evident that their preference for English hindered their performance on the APT/HI-S at least to some degree, and this was clearly reflected in the 3-year old child with typical hearing. The 3-year old child with typical hearing presented a significant disparity between developed English and Spanish skills (78% vs 51%, respectively); these results do not necessarily suggest that the APT/HI-S was unable to capture accurate speech perception skills, but rather they suggest that both assessment tools are intimately related to language skills of a child. During interactions with the researcher, the 3-year old child with typical hearing did not use Spanish and demonstrated overall weaker oral language skills in Spanish during repetition tasks. Like his age-matched counterpart, the 3-year old child with typical hearing demonstrated an inclination towards one particular language, as indicated by a near total use of English during spontaneous conversation.

Regarding the school-age children, both children chose to interact with the researcher in English despite the researcher's use of Spanish or English. However, scores for both the APT/HI-3 and APT/HI-S were similar; while the 5-year old child with hearing loss performed slightly better in the APT/HI-3, the disparity between her scores

were not as drastic as in the cases of the 3-year old children. Although Spanish was the home language, it is likely that a shift in dominant language had occurred, given that English is the majority language in the United States, and that the 5-year old child with hearing loss had greater language abilities in English rather than in Spanish in this structured context. Finally, the 5-year old child with typical hearing presented equal scores across all tasks even though Spanish was her less dominant language; however, she was more prone to ask the researcher to repeat himself and inquire about test items when Spanish was being tested. It can be stated that language proficiency of the preschool-age children influenced assessment results far more than the language proficiency of the school-age children, who at this point had acquired sufficient language skills in both languages, despite favoring English in communicative interactions with the researcher.

Given that language proficiency influenced auditory perception skills during the assessment procedures, it is clear that there is pressing need for effective and comprehensive language-specific auditory and speech perception tests. These results illustrate how language is highly integrated and inextricably tied to auditory perception and how language proficiency levels may impact overall performance on such assessments. Additionally, these findings support previous literature that states increased scores on speech perception tests are closely aligned with greater skills in language proficiency, speech production, and hearing abilities in children with hearing loss (Blamey, 2001), for it was the children with higher Developed scores on both the APT/HI-3 and APT/HI-S that demonstrated better expressive and receptive language skills during communicative exchanges with the researcher.

Unsurprisingly, the 5-year old children collectively presented with greater percentages of Developed scores in both the APT/HI-3 and APT/HI-S given that they were older and had likely acquired more auditory experience. However, the 3-year old child with typical hearing presented with overall greater Developed scores on the APT/HI-3 than the 5-year old child with hearing loss. This might also reflect differences in auditory experience, because while the 5-year old child with hearing loss was older, the 3-year old child with typical hearing had access to rich, quality auditory exposure since birth, thus affecting his performance on both auditory perception tests. These findings support previous studies that have emphasized the importance of early auditory exposure and experience in shaping and predicting language skills in children with and without hearing loss (Lu & Quin, 2018; Nittrouer & Thunete Burton, 2003; Nittrouer & Thunete Burton, 2005; Tsao, Liu, & Kuhl, 2004). It was evident that the children's familiarity with a language impacted their performance on both the APT/HI-3 and APT/HI-S in this study.

Open-Set versus Closed-Set Tasks. In accordance with previous literature that presents the weaknesses of closed-set auditory discrimination tasks and other traditional audiological approaches (Blamey et al, 2001; Boothroyd, 1995; Tyler, 1993), all of the children demonstrated increased scores on the Communicative Comprehension subsection of the APT/HI-3 or APT/HI-S compared to the preceding sections of Other Suprasegmental Perception tasks and Linguistic Perception tasks, which are closed-set designed questions with greater receptive fields as opposed to open-set conversational questions. The Communication Comprehension tasks were more representative of natural communication skills, as they were questions the children have likely heard or have been

asked before. The target questions are characteristic of common topics of conversation a preschool- or school-age child would be engaged in. As a result, the children performed better on open-set questions that more closely mirrored stimuli they are likely to hear with regularity. This point illustrates that an auditory perception tool like the APT/HI-3 or the APT/HI-S, despite being comprehensive in nature, should be used in conjunction with other formal and informal assessment procedures to fully capture the perceptive and productive abilities of children with and without hearing loss.

Limitations

Survey Limitations. The validation phase of the research project contained a few noteworthy limitations. As a result of self-reported language proficiency levels, there may exist an inconsistency with self-reported and actual levels of Spanish proficiency among survey participants. Moreover, although survey participants represented a range of Spanish dialects and cultures, the surveys did not inquire about the dialect of Spanish spoken, which would have potentially revealed what words were particularly favored or disagreed upon by one or more dialectical groups. An additional limitation during the validation phase is that not all words, phrases, and sentences found in the APT/HI-S were surveyed; this is because unexamined words were not bound by the same contrastive restrictions as the test items in question. Regardless, a comprehensive questioning of all test items might have resulted in useful information.

Language Limitations. Although preschool- and school-age children in the study were matched on gender, age, and bilingual status, the participants were not balanced bilinguals and displayed varying levels of language proficiency. Further information on

bilingual status and overall language proficiency would have reduced confounding variables during the administration process. Additionally, these children were assumed to be typically developing in all other facets, but this information was not verified via formal testing. Language assessment of both languages in combination with auditory perception assessment would have provided stronger indication of how language affects auditory/speech perception skills in children. This serves as an area requiring further investigation in order to build upon the results of current qualitative study.

Design Limitations. Because of the qualitative nature of this research project, statistical analysis of the data could not be conducted. In its place, the results are presented through descriptions and comparisons of the information. A larger study with more participants would allow computational analysis of test results on both assessment tools to determine areas of significant differences in participant performance. Nonetheless, because the current research project represents the conceptualization and creation of the APT/HI-S rather than clinical trials of an assessment tool, it serves as foundational knowledge for future research. While greater participants numbers would have revealed additional information, such a research design was beyond the scope of the present research objectives.

Implications for Further Research

Given the results of this research project, there are areas of interest that beckon further investigation. For one, there is a clear need to understand how dialectical and cultural differences among Spanish speakers influence their interpretation of the appropriateness of linguistic stimuli in assessment tools such as the APT/HI-S. Spanish is

variable among regions and countries, and this variability lends itself to a multi-dialectical and multicultural language with specific differences among words used with and around children. Even in this small-scale study, it is likely that the role of dialect shaped how individuals perceived words. Unfortunately, formal studies on this topic are nearly absent in the literature. It would certainly be illuminating to determine the extent to which a Spanish dialect can impact the functional lexicon of preschool- and school-age children, as this line of research would assist in making assessment tools that are inevitably more effective and sensitive when assessing areas in the Spanish language.

Another area of research that should be further explored is specific to the APT/HI-S. Now that the APT/HI-S has been developed and has proven viable from an administrative standpoint, it is imperative to administer this assessment tool on a far larger scale to more accurately determine its areas of strengths and weaknesses as well as to gain a more thorough insight on how well Spanish-speaking children perform on this criterion-reference assessment tool. In short, the APT/HI-S requires additional research opportunities in order to establish its validity and reliability among different children and other researchers. While this initial research project is full of promise in terms of the functionality of the APT/HI-S, there is a plethora of unanswered questions eagerly awaiting to be unearthed.

CHAPTER V

SUMMARY AND CONCLUSIONS

The fundamental objective of this research project was to propose an assessment tool that can be utilized to capture the auditory perception skills of monolingual and bilingual children who speak Spanish, specifically those presenting with hearing loss. To meet this objective, the APT/HI-3 was used as a model for an adapted Spanish version, namely the APT/HI-S. This research project entailed the translation and adaptation of test items from English to Spanish, the creation of new visual stimuli to aid in auditory and visual reinforcement of target words, the validation of target words in Spanish among three separate panels of Spanish-English bilingual graduate students and speech-language pathologists, and, lastly, the administration of both the APT/HI-3 and APT/HI-S to preschool- and school-age children with and without hearing loss who were bilingual in Spanish and English. Such a process aided in the development of a Spanish assessment tool that is ultimately considered viable and functional for Spanish speaking children with hearing loss.

Results from the project suggest that varying language proficiency levels may have impacted how well each child performed on the APT/HI-3 and APT/HI-S. Overall, neither test proved totally better nor worse regarding the areas they measured. Two out of the four children (i.e., the 3-year old child with typical hearing and 5-year old child with hearing loss) presented with greater Developed scores on the APT/HI-3, whereas one child (i.e., the 3-year old child with hearing loss) presented with greater Developed scores on the APT/HI-S. Moreover, the 5-year old child with typical hearing presented with

equal scores on both the APT/HI-3 and APT/HI-S, though a preference for English was noted during the administration process. Unsurprisingly, performance on each test depended on how proficient the child was in the language being assessed. Despite all children being bilingual in Spanish and English, they did not have equal proficiency levels between the languages being explored. All of the children, with the exception of the 3-year old child with hearing loss, appeared to have greater language proficiency levels in the ethnolinguistic majority language of English, thus facilitating their performance on the APT/HI-3 to some degree. Although formal assessment was not conducted to determine language proficiency levels of the children in Spanish and English, informal observation during assessment procedures made indicated that the children had a strong preference for one language or another.

As a general conclusion, it can be gathered that the APT/HI-S was able to capture the auditory and speech perception abilities of children to at least some degree, thus making it a viable auditory assessment tool. However, such perceptual abilities were connected to and confounded by the children's knowledge of and proficiency in English and Spanish. The administration results reinforced the connection between speech perception and expressive language skills, further justifying the need to have an assessment tool that is language sensitive and not a mere translation from another language. Thus, it appears that the APT/HI-S is a promising assessment that can be used to document auditory/speech perception skills in Spanish speaking children; further research is warranted to appreciate the value of this Spanish auditory perception test.

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APPENDIX A – IRB Approval Letter

Office of Research Integrity
Research Compliance, MARC 414

MEMORANDUM

To: Dr. Alliete Alfano
CC: File
From: Maria Melendez-Vargas, MIBA, IRB Coordinator
Date: December 21, 2017
Protocol Title: “A Spanish Adaptation of an Auditory Perception Test”

The Social and Behavioral Institutional Review Board of Florida International University has approved your study for the use of human subjects via the **Expedited Review** process. Your study was found to be in compliance with this institution’s Federal Wide Assurance (00000060).

IRB Protocol Approval #:	IRB-17-0405	IRB Approval Date:	11/12/17
TOPAZ Reference #:	106241	IRB Expiration Date:	11/12/18

As a requirement of IRB Approval you are required to:

- 1) Submit an IRB Amendment Form for all proposed additions or changes in the procedures involving human subjects. All additions and changes must be reviewed and approved by the IRB prior to implementation.
- 2) Promptly submit an IRB Event Report Form for every serious or unusual or unanticipated adverse event, problems with the rights or welfare of the human subjects, and/or deviations from the approved protocol.
- 3) Utilize copies of the date stamped consent document(s) for obtaining consent from subjects (unless waived by the IRB). Signed consent documents must be retained for at least three years after the completion of the study.
- 4) **Receive annual review and re-approval of your study prior to your IRB expiration date.** Submit the IRB Renewal Form at least 30 days in advance of the study’s expiration date.

- 5) Submit an IRB Project Completion Report Form when the study is finished or discontinued.

Special Conditions: N/A.

For further information, you may visit the IRB website at <http://research.fiu.edu/irb>.

MMV/em

APPENDIX B – Samples of All Participant Consent Forms

ADULT CONSENT TO PARTICIPATE IN A RESEARCH STUDY

A Spanish Adaptation of an Auditory Perception Test

PURPOSE OF THE STUDY

The purpose of this study is to assess the capability of a newly adapted Spanish speech-perception test to capture and chart the progress a child's auditory perception skills. In order for this to be completed, the test will require validation from a group of individuals knowledgeable about basic Spanish phonology and form.

NUMBER OF STUDY PARTICIPANTS

There will be approximately 30 participants that will help validate the assessment.

DURATION OF THE STUDY

Your involvement in the validation procedure will require an hour of your time.

PROCEDURES

A presentation about a Spanish adaptation of an auditory perception test will be held, during which you will complete a survey inquiring about the assessment's valid and appropriate management of the Spanish language. Survey responses will be anonymous.

RISKS AND/OR DISCOMFORTS

There are no known risks for participating in this study.

BENEFITS

This study will aid in creating a Spanish auditory-perception test for monolingual or bilingual Spanish-Speaking children and adolescents with hearing loss. This information can be used by audiologists, speech-language pathologists, educators, and other professionals who work with children who are bilingual Spanish-English, as well.

ALTERNATIVES

There are no known alternatives available to you other than not taking part in this study.

CONFIDENTIALITY

Identifying information will not be collected and will not be disclosed, except as may be required by law. Any data that is presented will not include any identifying information.

COMPENSATION & COSTS

You will not receive any payments for your participation. You will not be responsible for any costs to participate in this study.

RIGHT TO DECLINE OR WITHDRAW

You are free to refuse to participate in this research project or to withdraw your consent and discontinue participation in the project at any time without penalty or loss of benefits.

to which you are otherwise entitled. Your participation will not affect your relationship with the institution(s) involved in this research project.

RESEARCHER CONTACT INFORMATION

If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact Dr. Alliete Alfano, primary investigator, at FIU in room AHC3-437, (305) 348-0362, aalfano@fiu.edu, or Daniel Gonzalez, research assistant, at (786) 566-0643, dgonz281@fiu.edu.

IRB CONTACT INFORMATION

If you would like to talk with someone about your rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this consent form and agree to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. I understand that I will be given a copy of this form for my records.

Signature of Participant

Date

Printed Name of Participant

CONSENTIMIENTO DE ADULTOS PARA PARTICIPAR EN UN ESTUDIO DE INVESTIGACIÓN

Una Adaptación en Español de un Prueba Auditiva

Propósito

El objetivo de este estudio es para evaluar como una prueba de la percepción del habla captura y documenta el progreso de las habilidades de la percepción auditiva de un niño. Esta prueba ha sido adaptada para español. Para que esta prueba sea completada, necesitamos validar el examen con un grupo de participantes con conocimiento básico de la fonología de español.

Número de participantes

Si usted acepta participar en este estudio de investigación, será uno de aproximadamente 30 individuales participando.

Duración del estudio

Su participación en la validación de la prueba requerirá una hora de su tiempo.

Procedimientos

Una presentación de una adaptación en español de una prueba auditiva será presentada, durante usted tendrá la oportunidad de completar un cuestionario sobre el uso de español de la prueba. Respuestas del cuestionario serán anónimas.

Riesgos o molestias

No hay riesgos conocidos para participar en este estudio de investigación.

Beneficios

Este estudio de investigación asistirá con el desarrollo de una prueba de percepción auditiva para niños monolingües o bilingües que hablan español. Esta información también podrá ser utilizada por audiólogos, terapeutas del habla y lenguaje, educadores, y otros profesionales que trabajan con niños bilingües que hablan español y inglés.

Alternativas

Usted tiene la alternativa de no participar en este estudio. No hay otras alternativas aparte de ser parte de este estudio.

Confidencialidad y privacidad

Información de identidad no será colectada y no será revelada, en excepción con lo que requiere la ley. Cualquier dato que estará presentado no tendrá información de identidad.

Pago por participación y costos

No vas a recibir ningún pago por su participación. No hay costos para usted por formar parte de este estudio de investigación.

Derecho a retirarse

Su participación es voluntaria, lo que significa que puede elegir si desea participar en este estudio o no. No le pasará nada malo a usted si decides no terminar el estudio. Los investigadores tienen el derecho de decidir retirarle si piensan que es mejor.

Información de contacto de los investigadores

Contestaremos cualquier pregunta que tenga acerca del estudio, y puede llamar la Dra. Alliete Alfano, investigadora principal, en FIU en la oficina AHC3-437, 305-348-0362, aalfano@fiu.edu o a Daniel Gonzalez, asistente de estudios, en (786) 566-0653, dgonz281@fiu.edu.

Información de contacto de la oficina de investigaciones

Si tiene preguntas con respecto a su participación en este estudio de investigación, o si tiene alguna pregunta acerca de sus derechos como sujeto de investigación, debe hablar con FIU Office of Research Integrity, por teléfono al 305-348-2494 o correo electrónico al ori@fiu.edu.

Acuerdo del participante

Yo acepto participar en este estudio de investigación como me describieron. Esto significa que he leído el formulario de consentimiento, mis preguntas han sido respondidas y he decidido participar como voluntario. Yo entiendo que recibirá una copia de este formulario de consentimiento para mis archivos.

Firma del participante

Fecha

Nombre del participante
(en letra de imprenta)

ADULT CONSENT TO PARTICIPATE IN A RESEARCH STUDY

A Spanish Adaptation of an Auditory Perception Test

PURPOSE OF THE STUDY

You are being asked to take part in a research study. The purpose of this study is to assess the capability of a newly adapted Spanish speech-perception test to capture and chart the progress of your child's auditory perception skills.

NUMBER OF STUDY PARTICIPANTS

If you agree to participate in this study, you will be one of 4 parents involved in this research study.

DURATION OF THE STUDY

You and your child's participation will require a total of 2 visits in your home during a period of 5 months. Each visit will last around 1 hour.

PROCEDURES

If you participate in this study, we will ask you to do the following things:

1. Fill out an intake form about your child regarding his/her birth history, medical history, language exposure, educational status, and other relevant information to the study. This will occur during the first home visit.
2. Have your child be assessed and re-assessed a total of two times.

RISKS AND/OR DISCOMFORTS

There are no known risks for participating in this study.

BENEFITS

The following benefits may be associated with your participation in this study: your child will have his/her auditory perception skills documented.

ALTERNATIVES

There are no known alternatives available to you other than not taking part in this study. However, any significant new findings developed during the course of the research which may relate to your willingness to continue participation will be provided to you.

CONFIDENTIALITY

The records of this study will be kept private and will be protected to the fullest extent provided by law. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only the researcher team will have access to the records. However, your records may be reviewed for audit purposes by authorized University or other agents who will be bound by the same provisions of confidentiality.

COMPENSATION & COSTS

You will not receive any payments for your participation. You will not be responsible for any costs to participate in this study.

RIGHT TO DECLINE OR WITHDRAW

Your participation in this study is voluntary. You are free to participate in the study or withdraw your consent at any time during the study. Your withdrawal or lack of participation will not affect any benefits to which you are otherwise entitled. The investigator reserves the right to remove you from the study without your consent at such time that they feel it is in the best interest.

RESEARCHER CONTACT INFORMATION

If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact Dr. Alliete Alfano, primary investigator, at FIU in room AHC3-437, (305) 348-0362, aalfano@fiu.edu, or Daniel Gonzalez, research assistant, at (786) 566-0643, dgonz281@fiu.edu.

IRB CONTACT INFORMATION

If you would like to talk with someone about your rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this consent form and agree to allow my child to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. I understand that I will be given a copy of this form for my records.

Signature of Participant

Date

Printed Name of Participant

Signature of Participant

Date

CONSENTIMIENTO DE ADULTOS PARA PARTICIPAR EN UN ESTUDIO DE INVESTIGACIÓN

Una Adaptación en Español de un Prueba Auditiva

Propósito

Le estamos solicitando su participación en este estudio de investigación. El objetivo de este estudio es para evaluar como una prueba de la percepción del habla captura y documenta el progreso de las habilidades de la percepción auditiva de su hijo(a). Esta prueba ha sido adaptada para español.

Número de participantes

Si usted acepta participar en este estudio de investigación, será uno de 4 padres participando.

Duración del estudio

La participación suya y de su hijo(a) requiere 2 visitas a su hogar en un periodo de 5 meses. Cada visita durará alrededor de 1 hora.

Procedimientos

Si usted acepta participar en este estudio de investigación, requeriremos nos ayude en la siguiente manera:

1. Se le pedirá que llene formas para su hijo(a) sobre el historial de nacimiento, historial médico, el conocimiento de lenguajes, el estado educacional, y cualquier información relacionada al estudio de investigación.
2. Se le pedirá que su hijo(a) este evaluado y reevaluado 2 veces en total.

Riesgos o molestias

No hay riesgos conocidos para participar en este estudio de investigación.

Beneficios

Los beneficios siguientes están asociados con su participación: las habilidades perceptivas de su hijo(a) estarán documentadas.

Alternativas

Usted y los miembros de su hogar tienen la alternativa de no participar en este estudio. No hay otros alternativas aparte de ser parte de este estudio.

Confidencialidad y privacidad

La ley federal requiere que FIU proteja la privacidad de cualquier información médica que lo identifique. En cualquier estudio que publicaremos, no incluyéremos información que le será posible identificar al sujeto. Documentos de estudio serán guardados en manera segura y solo el equipo de investigación tendrá acceso a los documentos. Sus expedientes también podrían ser revisados para fines de auditoría por parte de empleados autorizados de la Universidad u otros agentes que estarán obligados a regirse por las mismas disposiciones de confidencialidad.

Pago por participación y costos

Usted no recibirá ningún pago por su participación. No hay costos para usted por formar parte de este estudio de investigación.

Derecho a retirarse

La participación suya es voluntaria, lo que significa que puede elegir si desea participar en este estudio o no. Mientras usted y los miembros de su hogar estén siendo observados y entrevistados, usted puede decidir parar en cualquier momento. No le pasará nada malo a usted ni a los miembros de su hogar si usted decide no terminar el estudio. Los investigadores tienen el derecho decidir retirarle si piensan que es mejor.

Información de contacto de los investigadores

Contestaremos cualquier pregunta que tenga acerca del estudio, y puede llamar la Dra. Alliete Alfano, investigadora principal, en FIU en la oficina AHC3-437, 305-348-0362, aalfano@fiu.edu o a Daniel Gonzalez, asistente de estudios, en (786) 566-0653, dgonz281@fiu.edu.

Información de contacto de la oficina de investigaciones

Si tiene preguntas con respecto a su participación en este estudio de investigación, o si tiene alguna pregunta acerca de sus derechos como sujeto de investigación, debe hablar con FIU Office of Research Integrity, por teléfono al 305-348-2494 o correo electrónico al ori@fiu.edu.

Acuerdo del participante

Yo acepto participar en este estudio de investigación como me describieron. Esto significa que he leído el formulario de consentimiento, mis preguntas han sido respondidas y he decidido participar como voluntario. Yo entiendo que recibirá una copia de este formulario de consentimiento para mis archivos.

Firma del participante

Fecha

Nombre del participante
(en letra de imprenta)

PARENTAL CONSENT TO PARTICIPATE IN A RESEARCH STUDY

A Spanish Adaptation of an Auditory Perception Test

PURPOSE OF THE STUDY

You are being asked to give your permission for your child to be in a research study. The purpose of this study is to assess the capability of a newly adapted Spanish speech-perception test to capture and chart the progress of your child's auditory perception skills.

NUMBER OF STUDY PARTICIPANTS

If you agree to allow your child to participate in this study, he/she will be one of 4 people in this research study.

DURATION OF THE STUDY

Your child's participation will require a total of 2 visits in your home during a period of 5 months. Each visit will last around 1 hour.

PROCEDURES

If your child participates in this study, we will ask your child to do the following things:

3. He/she will be asked to sit through a 30-minute assessment that will require him/her to answer questions involving detection, discrimination, identification, and comprehension tasks of listening.
4. He/she will be re-assessed 5 months afterwards to evaluate growth of auditory perception skills and will be asked to sit through the same 30-minute assessment once again.

RISKS AND/OR DISCOMFORTS

There are no known risks for participating in this study.

BENEFITS

The following benefits may be associated with your child's participation in this study: your child will have his/her auditory perception skills documented.

ALTERNATIVES

There are no known alternatives available to your child other than not taking part in this study. However, any significant new findings developed during the course of the research which may relate to your child's willingness to continue participation will be provided to you.

CONFIDENTIALITY

The records of this study will be kept private and will be protected to the fullest extent provided by law. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only the researcher team will have access to the records. However, your records may be reviewed for audit purposes by authorized University or other agents who will be bound by the same provisions of confidentiality.

COMPENSATION & COSTS

Your child will not receive any payments for his/her participation. Your child will not be responsible for any costs to participate in this study.

RIGHT TO DECLINE OR WITHDRAW

Your child's participation in this study is voluntary. Your child is free to participate in the study or withdraw his/her consent at any time during the study. Your child's withdrawal or lack of participation will not affect any benefits to which he/she is otherwise entitled. The investigator reserves the right to remove your child from the study without your consent at such time that they feel it is in the best interest.

RESEARCHER CONTACT INFORMATION

If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact Daniel Gonzalez, primary investigator, at (786) 566-0643, dgonz281@fiu.edu, or Dr. Alliete Alfano, supervising professor, at FIU in room AHC3-437, (305) 348-0362, aalfano@fiu.edu.

IRB CONTACT INFORMATION

If you would like to talk with someone about your child's rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this consent form and agree to allow my child to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. I understand that I will be given a copy of this form for my records.

Signature of Parent/Guardian

Date

Printed Name of Parent/ Guardian

Printed Name of Child Participant

Signature of Person Obtaining Consent

Date

CONSENTIMIENTO DE LOS PADRES PARA PARTICIPAR EN UN ESTUDIO DE INVESTIGACIÓN

Una Adaptación en Español de un Prueba Auditiva

Propósito

Le estamos solicitando que su hijo(a) participe en este estudio de investigación. El objetivo de este estudio es para evaluar como una prueba de la percepción del habla captura y documenta el progreso de las habilidades de la percepción auditiva de su hijo(a). Esta prueba ha sido adaptada para español.

Número de participantes

Si usted acepta que su hijo(a) participe en este estudio de investigación, será uno de 4 niños participando.

Duración del estudio

La participación de su hijo(a) requiere 2 visitas a su hogar en un periodo de 5 meses. Cada visita durará alrededor de 1 hora.

Procedimientos

Si usted acepta que su hijo(a) participe en este estudio de investigación, requeriremos que su hijo(a) nos ayude en la siguiente manera:

1. Se le pedirá a su hijo(a) que se presente para una evaluación que durará 30 minutos. Esta prueba requerirá que su hijo(a) responda preguntas involucrando componentes de detección, discriminación, identificación, y comprensión de la percepción auditiva.
2. Se le pedirá a su hijo(a) que se presente para una reevaluación 5 meses después para evaluar el progreso de las habilidades perceptivas. Su hijo(a) tendrá que participar en la misma prueba otra vez.

Riesgos o molestias

No hay riesgos conocidos para participar en este estudio de investigación.

Beneficios

Los beneficios siguientes están asociados con la participación de su hijo(a): las habilidades perceptivas de su hijo(a) estarán documentadas.

Alternativas

Usted y los miembros de su hogar tienen la alternativa de no participar en este estudio. No hay otros alternativas aparte de ser parte de este estudio.

Confidencialidad y privacidad

La ley federal requiere que FIU proteja la privacidad de cualquier información médica que lo identifique. En cualquier estudio que publicaremos, no incluyéremos información que le será posible identificar al sujeto. Documentos de estudio serán guardados en manera segura y solo el equipo de investigación tendrá acceso a los documentos. Sus

expedientes también podrían ser revisados para fines de auditoría por parte de empleados autorizados de la Universidad o otros agentes que estarán obligados a regirse por las mismas disposiciones de confidencialidad.

Pago por participación y costos

Su hijo(a) no recibirá ningún pago por su participación. No hay costos para usted por formar parte de este estudio de investigación.

Derecho a retirarse

La participación de su hijo(a) es voluntaria, lo que significa que puede elegir si desea participar en este estudio o no. Mientras usted y los miembros de su hogar estén siendo observados y entrevistados, usted puede decidir parar en cualquier momento. No le pasará nada malo a usted ni a los miembros de su hogar si usted decide no terminar el estudio. Los investigadores tienen el derecho decidir retirarle si piensan que es mejor.

Información de contacto de los investigadores

Contestaremos cualquier pregunta que tenga acerca del estudio, y puede llamar la Dra. Alliete Alfano, investigadora principal, en FIU en la oficina AHC3-437, 305-348-0362, aalfano@fiu.edu o a Daniel Gonzalez, asistente de estudios, en (786) 566-0653, dgonz281@fiu.edu.

Información de contacto de la oficina de investigaciones

Si tiene preguntas con respecto a su participación en este estudio de investigación, o si tiene alguna pregunta acerca de sus derechos como sujeto de investigación, debe hablar con FIU Office of Research Integrity, por teléfono al 305-348-2494 o correo electrónico al ori@fiu.edu.

Acuerdo del participante

Yo acepto que mi hijo(a) participa en este estudio de investigación como me describieron. Esto significa que he leído el formulario de consentimiento, mis preguntas han sido respondidas y he decidido participar como voluntario. Yo entiendo que recibirá una copia de este formulario de consentimiento para mis archivos.

Firma del padre del sujeto

Fecha

Nombre del sujeto (en letra de imprenta)
(en letra de imprenta)

Nombre del padre del sujeto

Firma de la persona que obtiene el consentimiento informado

Fecha

APPENDIX C – Listed Characteristics of Participants

Listed Characteristics of Participants in Validation Phase:

- Spanish and English bilingual
- Obtained or in the process of obtaining graduate level degree in Speech-Language Pathology
- 59 females; 2 males
- Total of 61 participants

Listed Characteristics of Participants in Administration Phase:

- Spanish and English bilingual
- Spanish encompasses 25% of weekly exposure and interactions per parental report
- 2 children with severe sensorineural hearing loss fitted with cochlear implants and enrolled in an auditory-verbal therapy program
- 2 children with typical hearing
- Chronological ages 3:0 to 3:6
- Chronological ages 5:0 to 5:6
- No other known or reported disabilities or impairments
- Total of 4 participants

APPENDIX D – Interagency Language Roundtable (ILR) Speaking Scale

Speaking 0 (No Proficiency) Unable to function in the spoken language. Oral production is limited to occasional isolated words. Has essentially no communicative ability.

Speaking 1 (Elementary Proficiency) Able to satisfy minimum courtesy requirements and maintain very simple face-to-face conversations on familiar topics. A native speaker must often use slowed speech, repetition, paraphrase, or a combination of these to be understood by this individual. Similarly, the native speaker must strain and employ real-world knowledge to understand even simple statements/questions from this individual. This speaker has a functional, but limited proficiency. Misunderstandings are frequent, but the individual is able to ask for help and to verify comprehension of native speech in face-to-face interaction. The individual is unable to produce continuous discourse except with rehearsed material

Speaking 2 (Limited Working Proficiency) Able to satisfy routine social demands and limited work requirements. Can handle routine work-related interactions that are limited in scope. In more complex and sophisticated work-related tasks, language usage generally disturbs the native speaker. Can handle with confidence, but not with facility, most normal, high-frequency social conversational situations including extensive, but casual conversations about current events, as well as work, family, and autobiographical information. The individual can get the gist of most everyday conversations but has some difficulty understanding native speakers in situations that require specialized or sophisticated knowledge. The individual's utterances are minimally cohesive. Linguistic structure is usually not very elaborate and not thoroughly controlled; errors are frequent. Vocabulary use is appropriate for high-frequency utterances, but unusual or imprecise elsewhere.

Speaking 3 (General Professional Proficiency) Able to speak the language with sufficient structural accuracy and vocabulary to participate effectively in most formal and informal conversations in practical, social and professional topics. Nevertheless, the individual's limitations generally restrict the professional contexts of language use to matters of shared knowledge and/or international convention. Discourse is cohesive. The individual uses the language acceptably, but with some noticeable imperfections; yet, errors virtually never interfere with understanding and rarely disturb the native speaker. The individual can effectively combine structure and vocabulary to convey his/her meaning accurately. The individual speaks readily and fills pauses suitably. In face-to-face conversation with natives speaking the standard dialect at a normal rate of speech, comprehension is quite complete. Although cultural references, proverbs and the implications of nuances and idiom may not be fully understood, the individual can easily repair the conversation. Pronunciation may be obviously foreign. Individual sounds are accurate: but stress, intonation and pitch control may be faulty.

Speaking 4 (Advanced Professional Proficiency) Able to use the language fluently and accurately on all levels normally pertinent to professional needs. The individual's language usage and ability to function are fully successful. Organizes discourse well, using appropriate rhetorical speech devices, native cultural references and understanding. Language ability only rarely hinders him/her in performing any task requiring language; yet, the individual would seldom be perceived as a native. Speaks effortlessly and smoothly and is able to use the language with a high degree of effectiveness, reliability and precision for all representational purposes within the range of personal and professional experience and scope of responsibilities. Can serve as an informal interpreter in a range of unpredictable circumstances. Can perform extensive, sophisticated language tasks, encompassing most matters of interest to well-educated native speakers, including tasks which do not bear directly on a professional specialty.

Speaking 5 (Functionally Native Proficiency) Speaking proficiency is functionally equivalent to that of a highly articulate well-educated native speaker and reflects the cultural standards of the country where the language is natively spoken. The individual uses the language with complete flexibility and intuition, so that speech on all levels is fully accepted by well-educated native speakers in all of its features, including breadth of vocabulary and idiom, colloquialisms and pertinent cultural references. Pronunciation is typically consistent with that of well-educated native speakers of a non-stigmatized dialect.

APPENDIX E - Outline of Survey Presentation and Instructions

WHAT IS AN AUDITORY PERCEPTION TEST?

An auditory perception test is an assessment tool that measures the ability of individuals to perceive both nonlinguistic and linguistic auditory stimuli. These tests are essential when documenting the auditory and speech perception skills of individuals who are deaf or hard of hearing (DHH) and are utilizing some form of hearing assistive technology (i.e. hearing aids, cochlear implants).

Many auditory perception tests follow a developmental progression of detection, discrimination, identification, and comprehension.

Auditory perception tests may test these hearing skills by assessing whether a child can detect contrastive differences between minimal pairs.

What is the APT/HI?

The **Auditory Perception Test for the Hearing Impaired, Third Edition (APT/HI-3)** (Allen, 2015) serves as the primary resource for the following adaptation.

The APT/HI is an auditory perception test used to monitor and document the auditory and speech perception skills of children with hearing loss.

The APT/HI was designed to test children who are monolingual English-speakers.

Because Spanish and English have distinct phonological and grammatical systems, the APT/HI cannot be readily translated into Spanish without compromising the integrity of the test.

OUR GOAL:

Our goal is to adapt the APT/HI in order to make it viable for monolingual or bilingual children who speak Spanish.

This requires changes across **phonetic, syllabic, and semantic** levels of test items.

It is crucial to keep in mind that: **ADAPTATION ≠ TRANSLATION**

Because English and Spanish are linguistically unique, it is impossible to translate test items from English to Spanish without invalidating the test.

FOR EXAMPLE:

Objective of the Test Item: Targeting minimal groups with initial phonemic differences involving manner of articulation.

- Shoe → /ʃ u/ ✓
- Two → /tu/ ✓
- Moo → /mu/ ✓

Objective of the Test Item: Target minimal groups with initial phonemic differences involving manner of articulation.

- Shoe → /ʃ u/ ✓ Zapato → /sapato/ ✗
- Two → /tu/ ✓ Dos → /dos/ ✗
- Moo → /mu/ ✓ Moo → /mu/ ✗

Objective of the Test Item: Target minimal groups with initial phonemic differences involving manner of articulation.

- Shoe → /ʃ u/ ✓ Maíz → /mais/ ✓
- Two → /tu/ ✓ País → /pais/ ✓
- Moo → /mu/ ✓ Raíz → /rais/ ✓

YOUR ROLE:

Your role as individuals who speak both English and Spanish is to help determine if the words we have selected are appropriate for typically developing children 3-years of age and older.

Ask yourself: would a typically developing three-year old child recognize this vocabulary word? If not, does a more appropriate word choice exist?

THANK YOU FOR YOUR PARTICIPATION!

APPENDIX F - Survey Sample for Validation

Survey for Validation of A Spanish Adaptation of an Auditory Perception Test

Alliete Alfano, Ph.D. & Daniel Gonzalez, B.A.

Introduction. The Auditory Perception Test for the Hearing Impaired, 3rd Edition (APT/HI-3) serves as the primary resource for the following adaptation. Differences have been made across content, phoneme, and syllable levels throughout the test. We are requesting your opinion on the appropriateness of the following Spanish words. Provided below are the original test items in English and their adapted version in Spanish. Please mark if you agree or disagree with the selection. If you believe there is a more appropriate selection for a particular test item, a write-in space has been provided for you.

1. How fluent would you say you are in Spanish? Check the corresponding bubble.

- ☐ 0 - No proficiency
- ☐ 1 – Elementary Proficiency
- ☐ 2 – Limited Working Proficiency
- ☐ 3 – General Professional Proficiency
- ☐ 4 – Advanced Professional Proficiency
- ☐ 5 – Functionally Native Proficiency

2. Are the following words appropriate for Spanish-speaking 3-year old children?

Targeting minimal groups with initial phonemic differences involving manner of articulation.

- Shoe → Maíz (*Corn*)
- Two → País (*Country*)
- Moo → Raíz (*Root*)

Yes: ____ No: ____ Other option(s):

3. Are the following words appropriate for Spanish-speaking 3-year old children?

Targeting minimal groups with initial phonemic differences involving manner of articulation.

- Shoe → Dar (*Give*)
- Two → Mar (*Sea*)
- Moo → Par (*Pair*)

Yes: ____ No: ____ Other option(s):

4. Are the following words appropriate for Spanish-speaking 3-year old children?

Targeting minimal groups with initial phonemic differences involving manner of articulation.

- Hat → Girar (To Spin)
- Bat → Mirar (To Look)
- Rat → Tirar (To Throw)

Yes: ____ No: ____ Other option(s):

5. Are the following words appropriate for Spanish-speaking 3-year old children?

Targeting minimal pairs with initial phonemic differences of voiced/voiceless velar stops /k, g/.

- Coat → Coma (*Eat*)
- Goat → Goma (*Eraser*)

Yes: ____ No: ____ Other option(s):

6. Are the following words appropriate for Spanish-speaking 3-year old children?

Targeting minimal pairs with initial phonemic differences of nasal phonemes /n, m/.

- New → Nata (*Cream*)
- Moo → Mata (*Plant*)

Yes: ____ No: ____ Other option(s):

7. Are the following words appropriate for Spanish-speaking 3-year old children?

Targeting minimal pairs with initial phonemic differences of nasal phonemes /n, m/.

- New → Nacho (*Nacho*)
- Moo → Macho (*Male*)

Yes: ____ No: ____ Other option(s):

8. Are the following words appropriate for Spanish-speaking 3-year old children?

Targeting minimal pairs with initial consonant blends.

- Pigs → Globo (*Balloon*)
- Pig → Lobo (*Wolf*)

Yes: ____ No: ____ Other option(s):

9. Are the following words appropriate for Spanish-speaking 3-year old children?

Targeting minimal groups with initial differences in the frequency of the consonant.

- Wing → Pez (*Fish*)
- String → Tres (*Three*)
- Swing → Vez (*See*)
- King → Mes (*Month*)

Yes: ____ No: ____ Other option(s): _____

10. Are the following words appropriate for Spanish-speaking preschool-age children?
Check the corresponding bubble.

- Caballo (*Horse*) (Yes) (No)
- Leche (*Milk*) (Yes) (No)
- Pies (*Feet*) (Yes) (No)
- Paz (*Peace*) (Yes) (No)
- Mal (*Bad*) (Yes) (No)
- Miel (*Honey*) (Yes) (No)
- Mil (*Thousand*) (Yes) (No)
- Dos (*Two*) (Yes) (No)
- Diez (*Ten*) (Yes) (No)
- Das (*Give*) (Yes) (No)
- Miente (*Lies*) (Yes) (No)
- Diente (*Tooth*) (Yes) (No)
- Siente (*Feels*) (Yes) (No)
- Beso (*Kiss*) (Yes) (No)
- Peso (*Dollar*) (Yes) (No)
- Día (*Day*) (Yes) (No)
- Tía (*Aunt*) (Yes) (No)
- Bota (*Boot*) (Yes) (No)
- Gota (*Drop*) (Yes) (No)
- Media (*Sock*) (Yes) (No)

11. How would you rate the representativeness of the words for Spanish phonology overall? Please check the corresponding bubble.

(Excellent) ____ (Good) ____ (Fair) ____ (Poor) ____

Thank you for your participation!