EVALUATING THE BILINGUAL ADVANTAGE IN CHILDREN WITH HEARING LOSS

By

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A Thesis for the Degree
Master of Science

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Chapter I

Literature Review

Introduction

Over the years, studies have broadly confirmed the idea that bilingualism affects children's metalinguistic development (Bialystok, 2003). Metalinguistic development relates to the ability to think and talk about language separate from meaning (e.g., recognizing that words themselves are not inherently meaningful but instead represent an idea; Pratt & Grieve, 1984). Bialystok and Ryan originally proposed two key factors of metalinguistic awareness: executive control and formal language knowledge (Friesen & Bialystok, 2012). Executive control success, in this case is dependent on an individual's ability to separate the phonological structure from the meaning of a word and intentionally focus solely on the phonological structure and linguistic features of that word when needed (Friesen & Bialystok, 2012). Bilingualism inherently supports this notion of executive control via recognition that language is arbitrary: one language has a specific word to represent an object whereas another language uses a different word to represent the same object. Early on, dual-language learners recognize that objects have more than one label, which promotes an accelerated ability to separate word meaning from its linguistic features. In short, the arbitrariness of language that bilingual learners acquire results in greater metalinguistic skills.

On the other hand, children with hearing loss routinely demonstrate poorer phonological awareness skills than do children with normal hearing, despite technological advances in amplification devices (Ambrose et al., 2012). Pilot studies have also indicated that a bilingual advantage may be present in children with hearing loss

(Lund, Werfel, Schuele, 2014). However, minimal definitive evidence regarding the extent and impact on spoken language outcomes in bilingual children with hearing loss is currently available (Kyle and Harris, 2011; Nott et al., 2009). Incidence of bilingual individuals receiving amplification continues to increase, and the prevalence of hearing loss in children from Spanish-speaking families is higher than in other population groups (Mehra, Eavey, & Keamy, 2009 as cited in Bunta et. al, 2016). It is essential to understand language learning patterns in spoken-language bilingual children with hearing loss because findings could provide critical information regarding ways to best educate bilingual children with hearing loss to subsidize their academic success and foster their reaching the level of their age-matched peers.

Phonological Awareness

Phonological awareness is a metalinguistic skill that refers to the ability to analyze and manipulate sounds within a word. For example, phonological awareness allows someone to recognize that the word "box" has four sounds and that "box" has the same first sound as "bat." Phonological awareness predicts academic achievement and literacy success according to The National Reading Panel (NRP) (National Institute of Child Health and Human Development, 2000). Correspondingly, children who struggle to grasp phonological awareness also struggle when learning to read. These struggles create a literacy gap in schools that eventually causes students to be classified early on as low-ability or high-performing in the classroom (McClary & Lund, 2016). Therefore, it is crucial to understand how phonological awareness is acquired, and best taught, in order

to bridge the gap and allow the students identified as low-ability to have academic success.

Results confirming the presence of a bilingual advantage in phonological awareness over the skills of monolingual children have varied. In a meta-analysis of 38 studies measuring phonological awareness in bilingual children, bilingualism seemed to confer an advantage in phonological awareness performance for many children (but not all; Branum-Martin, et al., 2012). A study by Bialystok (2003) evaluated that phonological awareness in bilingual and monolingual children between kindergarten and 2nd grade may provide an explanation for variability in bilingual phonological outcomes. Even though the overall results of the study indicated that bilingualism may not provide an advantage in metalinguistic tasks (Bialystok, 2003), data did show that being bilingual in certain languages that have similar phonological structures and orthographic systems (e.g., Spanish and English) may provide an advantage when learning to read English. However, other research indicates that executive function and general metalinguistic ability are higher in children who are bilingual, and that an advantage is not language-specific (Friesen & Bialystok, 2012). Thus, if a study finds a bilingual advantage in phonological awareness for children who speak orthographically and phonetically similar languages (e.g., Spanish and English), the results of the study could be attributed either to a language-specific advantage or to a global executive function advantage.

A Spanish-English bilingual advantage that is specific to phonological awareness could be supported by the Lexical Restructuring Model of phonological awareness development (Walley, et al., 2003). The Lexical Restructuring Model states that as children learn increasing numbers of similar words (i.e., words like *cat, hat, bat, cap,*

can), children begin to attend to the phoneme components of that word. Similar words that vary by one phoneme from other words are considered dense words. Words that are not like other words are considered sparse (e.g., the word *orange* is not like other words in the English language). Because Spanish and English have many phonemic overlaps, a child learning both languages may begin attending to the phoneme components of English very early in development, because words in the languages sound similar.

Executive Functioning

On the other hand, children who are bilingual may pay attention to the phoneme components of words attributable to their frequent application of executive control when managing two languages (Friesen & Bialystok, 2012). Dual language learning has allowed those children to recognize that language is arbitrary, and therefore can be analyzed separate from meaning. Children who are bilingual sometimes show advantages in other metalinguistic tasks. For example, studies by Bialystok (1986), Cummins (1978), and Ianco-Worrall (1972) found that bilingual children demonstrate more successful performance on Piaget's sun/moon task than monolingual children. This task requires children to recognize the arbitrariness of language by testing their ability to switch the labels of two known objects. For example, if the sun was called the "moon" and the moon was called the "sun," the child would acknowledge that the sun would be the object that comes out at night. After identifying the task objective, the child is asked three key questions to demonstrate understanding of the label switch: if it is possible to change the names, what the child would call the object in the sky when he or she goes to bed, and what the sky would look like when he or she goes to bed. The children are expected to

answer that it is possible that the sun would be the object in the sky at night, and the sky is dark when they go to bed at night. Eviatar and Ibrahim found that bilingual children were not only more successful at solving Piaget's problem, but additionally were able to more rapidly conclude that the sky remained dark at night when the "sun" was out (Mehmedbegovic & Bak 2017) reported. Inhibition is a critical component of executive functioning as it allows individuals to react methodically and intentionally when suppressing conditioned behaviors (Luria, 1961). Acknowledging the arbitrariness of language has been identified as a prerequisite and metalinguistic-ability predictor, and bilingual children have shown to be more successful at solving problems that require greater involvement of executive control (Bialystok, 1986).

Hearing Loss

Children with hearing loss present an interesting population for testing this idea, as they routinely demonstrate lower phonological awareness skills than do children with normal hearing (Ambrose et al., 2012). Additionally, children with hearing loss also often have in-tact nonverbal cognitive skills (Khan, Edwards, & Langdon, 2005). The Lexical Restructuring Model suggests the limited vocabulary of children with hearing loss may contribute to weaker phonological awareness skills for other reasons than simply impaired speech perception (Lund, Werfel, & Schuele, 2014). Furthermore, the model hypothesizes that phonological awareness and vocabulary knowledge are directly correlated, indicating that as these continually grow and improve children begin to develop the ability to restructure word representations (Walley, et al., 2003). However, if it can be proved that bilingualism could give children with disabilities an advantage (and

be a protective factor), it could provide preliminary, critical information regarding ways to best educate bilingual children with hearing loss and foster them in reaching the level of their age-matched peers.

Although the cause of a bilingual advantage in children with normal hearing is somewhat debated, the advantage itself has been documented many times. However, very little work has speculated about the effects of disability, like hearing loss, on a bilingual advantage. In fact, bilingual parents of children with disabilities are often advised to speak to a child in only one language, to help the child avoid language confusion (Bunta & Douglas, 2013). Among others, this recommendation is problematic for socio-cultural and emotional attachment reasons. Factors that have been widely recognized as best practice for spoken language outcomes in bilingual children with hearing loss include early identification of hearing loss and consistent use of amplification. Through consistent use of amplification, children with hearing loss are able to receive accurate auditory input that will help them in developing language skills that mimic their adult and peer models. With that, better speech and language outcomes are dependent on the amount of language exposure. Statistically significant information has been found supporting dual language input in bilingual children with hearing loss compared to those who only received English language input (Bunta et. al, 2016). The same study revealed that age of amplification in bilingual children with hearing loss has shown to be greater than monolingual children, “a factor that is unequivocally correlated with poorer speech and language outcomes for all children.” These findings support the idea that dual language support can enhance total communication skills on the basis that these children need more, not less, language input; and subsequently, that parents should speak to their

children in whatever language is most appropriate for family functioning (Gent, et al., 2012). However, other reasons to encourage bilingualism should also be explored. If, for example, bilingualism provides cognitive advantages over monolingualism, bilingualism might actually be a protective factor for language development in the face of disability.

Conclusion

The purpose of this study is to evaluate whether the presence of a bilingual advantage exists in bilingual children with hearing loss compared to their monolingual peers, and identify if the perceived advantage is attributed to phonological awareness or executive functioning. This will be achieved through analyzing performance on a variety of linguistic and non-linguistic tasks.

Chapter II

Purpose

The objective of this study is to evaluate a theory that identifies a phonological awareness advantage in normal hearing, bilingual children compared to their monolingual peers, and this theory's consistency when applied to children with hearing loss. There are two possible explanations of a phonological awareness advantage for children who are bilingual: that the advantage is specific to phonological awareness as a result of learning phonologically similar languages (e.g., Branum-Martin et al., 2012) or that the advantage is a consequence of globally improved executive function tasks (e.g., Bialystok, 2003). This study set out to evaluate: (a) whether a phonological awareness advantage exists for children with hearing loss who are bilingual, (b) whether a general executive functioning advantage exists for children with hearing loss who are bilingual and (c) how other factors like home literacy environment or socioeconomic status might contribute to a perceived advantage. Results from the present study will serve as preliminary evidence to a better understanding of the presence of a bilingual advantage in children with hearing loss, and help elucidate the mechanism of that advantage.

Research Questions

Extant research has frequently demonstrated an advantage in bilingual children with normal hearing that has been attributed to either phonological awareness or general executive functioning. However, very little work has speculated about the effects of disability, like hearing loss, on a bilingual advantage. Specific research questions for this study are as follows:

1. Does a phonological awareness advantage exist for bilingual children with hearing loss?
2. Does a general executive functioning advantage exist for bilingual children with hearing loss?
3. Do other factors like home literacy environment or socioeconomic status contribute to a perceived advantage?

Chapter 3

Methodology

Participants

Five children, four English-speaking monolingual and one Spanish-English bilingual, with varying degrees of hearing loss between the ages 4;0 and 7;11 participated in the study. Inclusionary criteria for participation included: child was between the ages of 4;0-7;11 years, child was either monolingual English-speaking or bilingual Spanish-English speaking, had no known diagnosis that could affect cognitive or language impairment (e.g., Autism Spectrum Disorder, Down Syndrome), no known severe visual impairments, and a diagnosed hearing loss as evidenced by audiological records. Basic auditory skills and consistent use of amplification device was also required for successful participation in study procedures. This information was obtained through parent report and audiological records. Age of identification of hearing loss and use of amplification among participants varied, and was subsequently used as covariates in the analysis. Additionally, the age range for this study was determined due to the fact that 4;0-7;11 is the general age in which typically developing, normal hearing children begin to learn phonological awareness as an early-literacy skill. Further participant demographic information is displayed in the table on the following page.

Table 1

Participant Demographic Information

Participant	**Age**	**ML/BL**	**Degree of HL**	**UN/BI**	**Race**	**Ethnicity**	**Age ID**	**Age Amp**	**Parental Education levels**
1	7;11	ML	Profound	BI	White	Not Hispanic or Latino	10.5mo	12mo	Bachelor's, PharmD
2	4;6	ML	Mod-severe	BI	White	Not Hispanic or Latino	3;6	3;7	Bachelor's, Bachelor's
3	4;11	ML	Total (Profound)	BI	White	Not Hispanic or Latino	9mo	12mo	Bachelor's, GED
4	6;1	BL	Moderate	BI	White	Hispanic or Latino	0mo (newborn)	24mo	High school, High school
5	7;11	ML	R severe, L mild/mod	BI	White	Not Hispanic or Latino	0mo (newborn)	30mo	Master's, Associate's

Note. ML/BL: Monolingual/Bilingual. UN/BI: Unilateral/Bilateral. Age ID: Age of Identification of hearing loss. Age Amp: Age when received amplification.

Participants were recruited from various settings. Recruitment forms were sent to private clinics, forwarded to Texas Hands and Voices non-profit organization, distributed in local public elementary schools, and posted on parent Facebook groups, all of which specifically serve or relate to children with hearing loss.

It is important to note that more than five bilingual families who were willing to participate were excluded from study participation based on the aforementioned inclusion/ exclusionary criteria. Specifically, these children did not meet inclusionary criteria regarding (a) basic auditory skills, (b) consistent use of hearing aid(s) or cochlear implant(s), or (c) not having other diagnosed disabilities. Further investigation and insights regarding this trend are hypothesized in the discussion. Similar trends were not discovered for monolingual participants: all who expressed interest in participation were able to participate if they chose to.

Children who met inclusionary criteria and whose parents returned signed consent documents were included for testing. Participants eligible for bilingual testing were

initially identified from the parent's indication of bilingual status on the language exposure survey. A language sample following the Hadley language sample protocol was conducted in Spanish during testing to ensure bilingual status and appropriate level of proficiency for study procedures. The language sample was recorded with each child to further validate bilingual status from parent survey.

Procedures

Testing took place at Miller Speech and Hearing Clinic at Texas Christian University or at an agreed upon location (i.e., child's home), dependent on participant availability and access to reliable transportation. Participants interacted one-on-one with the researcher to complete study procedures. The table below summarizes the task protocol completed during testing as well as the corresponding approximated times of completion for this study.

Task	Estimated time required
Receptive vocabulary: ROWPVT (SBE version for bilingual participants)	10-15 minutes
Language Sample	10 minutes
CTOPP Memory for Digits Subtest	5 minutes
Bilingual Advantage phonological/phonemic awareness tasks: Sound Identification Sound Blending	10-15 minutes
Bilingual Advantage executive function tasks: Sun/moon problem Dimensional Change Card Sort Simon Task	 10 minutes 10 minutes 5 minutes
	Total time: 1-1.5 hours

Participants' parents were also given a home literacy questionnaire (Boudreau, 2005) that they could complete prior to or during the study visit (See Appendix). This

questionnaire allowed for investigation as to whether factors such as home literacy environment or socioeconomic status contribute to a perceived advantage. Questions were related to the following topics: book reading, response to print, language awareness, interest in letters, and writing. Answers were provided in a scale format to maintain consistency across participants. The primary continuum provided ranged from never/rarely to several times per day/very frequently. Book reading questions indirectly asked about the presence or frequency of a routine as well as how the child generally responds during book reading activities. Response to print included questions regarding the child's level of interest in words and reading materials both inside and outside of their immediate environment. Language awareness contained questions about rhyming and if their child demonstrates ability to do so independently. Finally, questions in the writing section inquired about their child's ability to draw, write, and spell. Participant responses are displayed in the Results portion of this thesis.

Descriptive Measures

All participants completed the Receptive One Word Picture Vocabulary Test (ROWPVT-4) and were given the monolingual or bilingual edition based on group placement (Brownwell, 2010). The bilingual edition accounts for the child's dual language knowledge of English and Spanish and permits responses in either language. The test is normed on a bilingual population with varying levels of proficiency.

A brief language sample was also obtained following the Hadley language sample protocol (See Appendix). Directions were provided in English or Spanish, as needed for each participant. Participants were encouraged to converse in their preferred language.

This task allowed the participant and researcher to build rapport in an informal setting, and also provide crucial information that could ensure appropriate language proficiency and knowledge for study tasks. All other tasks listed in the task protocol table above were administered in English.

The Comprehensive Test of Phonological Processing (CTOPP-2; Wagner, R.K. et al, 2013) Memory for Digits subtest was administered to obtain a working memory measure. This subtest assesses the child's ability to accurately repeat numbers.

As a final descriptive measure, all participants completed a Forty-Word Knowledge assessment. Words selected for this task were ones that could easily be represented by age appropriate pictures. This preliminary measure served to evaluate and ensure the child's expressive knowledge of the words to be used in the phonological and phonemic awareness tasks. It was anticipated that participants would have prior knowledge of most, if not all, words included as they were age-appropriate for individuals ages 4;0-7;11 (Storkel & Hoover, 2011). Words were chosen and equally categorized into four neighborhood density groups relative to English and Spanish: (1) high density in relation to English, high density in relation to Spanish (HDE/HDS), (2) high density in relation to English, low density in relation to Spanish (HDE/LDS), (3) low density in relation to English, high density in relation to Spanish (LDE/HDS), and (4) low density in relation to English, low density in relation to Spanish (LDE/LDS). All words were English words and the phonetic transcription determined word density in each language. High-density Spanish words are English words that are phonemically similar to Spanish words, and high-density English words are English words that do not also follow a phonemic pattern in Spanish. Individual word density and the final word list

used for this study were determined using BuscaPalabras database and previous studies who performed a similar task (Davis & Perea, 2005; McClary & Lund, 2016). This is illustrated with examples in the chart below.

	High-density relative to English	**Low-density relative to English**
High-density relative to Spanish	10 words Example: "*pan"*	10 words Example: "*baby"*
Low-density relative to Spanish	10 words Example: "snack"	10 words Example: "girl"

Bilingual Advantage Phonological Awareness Tasks

The remaining phonological/phonemic awareness and executive functioning measures serve to evaluate the presence of a bilingual advantage among participants in tasks ordered from most to least linguistic: phonological awareness Sound Identification task, phonemic awareness Sound Blending task, Piaget's Sun/Moon task, Dimensional Change Card Sort, and Simon Task (See Appendix for all task protocols). During Sound Identification task, the examiner verbally provided a target word and asked the child to say the first sound in that target word. For example, "what's the first sound you hear in the word 'dog?'" and the child would answer by saying /d/. Next, the Sound Blending task required the child to identify the full word when provided the individual sounds that make up the word. For example, "'/d/ /a/ /g/. What word does that make?'" and the child would correctly answer by saying "dog." Articulation errors were also recorded and taken into account during these tasks. The following table demonstrates the word density distribution across phonological and phonemic awareness tasks.

	High-density English/ high-density Spanish	High-density English/ low-density Spanish	Low-density English/ high-density Spanish	Low-density English/ low-density Spanish	**Total trials by task**
Sound Identification	5 trials	5 trials	5 trials	5 trials	**20 trials**
Sound Blending	5 trials	5 trials	5 trials	5 trials	**20 trials**
Total Trials by Word Type	**10 words**	**10 words**	**10 words**	**10 words**	**40 total words/trials**

Bilingual Advantage Executive Function Tasks

Piaget's Sun/Moon task assesses executive function by the ability to think about language arbitrarily, separating phonological structure from word meaning. Participants responded to three sets of three specific questions after being instructed that the names of two known objects have been switched. First, "sun" and "moon" labels were switched, then "cat" and "dog" labels, and finally "pen" and "paper" labels. The examiner said to the child, "Let's say we were making up names for things, and we decided to call the sun the moon and the moon the sun. Could we do that if we wanted?" After the child responded, the examiner asked why the names could or could not be changed, depending on the child's answer. Participant explanations were recorded for reliability purposes. Participants who responded that the names could not be changed were persuaded otherwise to believe it could be possible considering everyone in the world would agree and that we are only changing the names, not any aspect of the physical object itself. Once this understanding was established, the examiner said to the child, "If everyone decided to call the sun the moon and the moon the sun, what will you call the thing in the sky when you go to bed at night?" Children who responded incorrectly (moon) were guided through the thought process to the correct answer (sun). Finally, the examiner

said, “Describe what will the sky look like when you go to bed.” See appendix for specific scoring instructions.


Following a similar question sequence from the first sun and moon scenario, the examiner asked if it would be possible to switch the names of cats and dogs, and why. Upon agreement, the examiner showed the child a picture and asked what the animal is called and what sound it would make. The same procedure was followed when the child was shown a picture of a dog.


The third and final scenario assessed the child’s ability to switch the names of pen and paper. The same procedure was followed. First, the examiner asked if it is possible to switch the names and why, then asked the child the name of the object, and finally function of the object.


The Dimensional Change Card Sort (Zelazo et al., 1996) is a nonverbal executive function task that consists of three phases that require a high level of control (See Appendix for full protocol and scoring instructions). A set of cards was used that pictured a circle or square that was either blue or purple. In the first phase, the participant was shown where to place both the blue and purple cards, and the participant was instructed to sort 10 cards based on color following those instructions. In the second phase, the same target cards were used, but the instructions asked the child to sort based on shape

(regardless of color). This task required the participant to more intentionally respond by ignoring the original rule, to sort by color, and reconsider how to sort the cards based on the new instruction, to sort by shape. Again, the child was shown where to place the cards prior to each phase, and was given 10 cards to sort. The third phase is the knowledge-action phase, which incorporated instructions from the two previous phases. The investigator said to the child, "Remember, in the color (or shape) game, the purple ones went here and the blue ones went here. Where do the blue ones go in the color game?" Upon child response, the investigator asked, "Where do the purple ones go in the color game?" The examiner instructed the child, "Play the color (or shape) game. Where does this card go?" The child sorted 3 cards during this phase.

Finally, the child completed the Simon Task (Morton & Harper, 2007), a brief computer-based bilingual advantage executive functioning task. Using E-Prime Software, a colored square was displayed in either the bottom right or left corner of the screen. Participants were instructed to press the red computer key when a red square presented on the screen, and to press the green computer key when they saw a green square. Participants were also instructed to react as quickly as possible. Some trials presented the colored square on the side of the screen that corresponded with the side of the response computer key (e.g. red square on the side of the red computer key). The other half of the trials did the opposite and presented the colored square on the opposite side of the corresponding colored computer key. The child was allowed a practice trial in order to fully understand the task instructions.

Data Collection

Two trained examiners administered the tasks for this study. During testing, the participant was seated across the table from a single examiner. The second examiner would either quietly prep the next activity in order to maintain child interest and steady pace of the session or score for real-time reliability. All sessions were video recorded, and the examiner not performing the current task would also re-position the camera as needed. All tasks had designated scoring sheets for ease and consistency in scoring and performing reliability. See Appendix for scoring sheets.

Data Analysis

For comparisons within this study, the authors planned to use parametric or nonparametric statistics to analyze the data as appropriate. However, challenges to recruiting the bilingual comparison group limited the ability to apply inferential statistics to this data. Therefore, only descriptive data were derived for participants.

Reliability

Third party research assistants were trained to perform reliability scoring on all tasks within this study. They did this by reviewing video recordings and scoring 100% of tasks. Scoring reliability was calculated through point-by-point comparison. Reliability was at 100%, and original examiner scoring was used for analysis.

Chapter IV

Results

Participants completed three descriptive tasks, two tasks that assessed phonological awareness, and three tasks that assessed executive function with varying levels of linguistic demand. Results for each participant are displayed in the graph below. Child 4 was the sole bilingual participant in this study.

Table 2

Study Results Across Participants

Child	ROWPVT	Auditory Memory	Identification	Blending	Sun/Moon	Card Sort
Child 1	134	19	47/48	23/ 48	6/ 9	80%
Child 2	109	17	43/48	5/ 48	6/ 9	100%
Child 3	100	4	0/48	2/ 48	1/ 9	60%
Child 4	94	10	42/48	1/ 48	6/ 9	100%
Child 5	104	14	45/48	17/48	7/9	100%

Note. ROWPVT Standard Scores were reported, and Auditory Memory (CTOPP subtest) Raw Scores were reported.

All participants, regardless of group, performed within the expected normal range (85-115) for their age according to the respective ROWPVT-4 manuals. Due to group placement, the bilingual participant completed the Spanish-English bilingual version of the ROWPVT-4.

Auditory Memory was assessed using the Memory for Digits subtest of the The Comprehensive Test of Phonological Processing (CTOPP-2; Wagner, R.K. et al, 2013). Child 1 was a consistent high performer in descriptive and phonological awareness based tasks. Child 3 performed the lowest with a raw score of 4. Our bilingual participant

received a score of 10. It should be noted that all numbers were verbally provided in English, and that they tend to follow similar English phonological structures.

The Sound Identification task assessed the child's ability to identify the first sound in a target word. The highest score, again, was from Child 1, and Child 3 scored the lowest. Our bilingual participant performed similarly to other monolingual participants with the exception of Child 3. Further investigation regarding phonological awareness skills in both monolingual and bilingual children with hearing loss, assuming bilingual participants perform similar to Child 4 in this study, could reveal that bilingualism could be a protection for children with hearing loss and allow them to perform at least at the same level as their monolingual peers. Evidence of this with a larger participant pool could further prove that learning two languages does not negatively impact phonological awareness as an early literacy skill, and discredit the myth within the healthcare profession that bilingual parents of children with disabilities should speak to their child in only one language, as these parents are often advised to do to avoid language confusion (Bunta & Douglas, 2013).

The Sound Blending task required the child to identify the full word when provided the individual sounds that make up the target word. This Sound Blending task proved difficult for the majority of participants in this study. Child 1, again, scored the highest, but our bilingual participant scored the lowest in this study. Additionally, this task is notoriously proven difficult for children with hearing loss in other related studies. Further investigation regarding trend results of this task should be further investigated and compared to the performance of children with normal hearing.

Piaget's Sun/Moon task assessed executive function by the ability to think about language arbitrarily, separating phonological structure from word meaning. Child 5 scored this highest, and Child 3 scored the lowest. Child 2 was the only participant who initially responded "yes" that the names of items could be changed. Most other participants responded correctly according to task protocol instructions after further instruction and rationale behind changing the names of objects in this task. Future research with a larger participant pool could reveal more conclusive results that could better validate a bilingual advantage attributable to executive function, or provide greater evidence that an advantage could be more attributable to phonological awareness.

The Dimensional Change Card Sort (Zelazo et al., 1996) was a nonverbal executive function task that consisted of three phases that required a high level of control through changing instructions through three trials of card sorting tasks. Child 5 scored with highest and Child 3 scored the lowest. The bilingual participant scored within the average of the monolingual group members. Child 2, 4 (bilingual participant), and 5 accurately responded during final trial, the one requiring the highest level of control. Again, further investigation has the potential to reveal positive results regarding a bilingual advantage attributable to executive functioning considering bilingual participant results from the two executive functioning tasks in this study. However, further research is needed to demonstrate conclusive results.

The Simon Task (Morton & Harper, 2007) was a brief computer-based bilingual advantage executive functioning task that assessed the child's ability to exhibit control in pressing the button that corresponded with the color of the square regardless of the side in which the square was presented on the screen. Result revealed that this task proved

extremely challenging for all participants, regardless of group. Due to high inconsistencies of data, we are unable to draw conclusive results. However, it should be noted that participant behavioral responses varied during the task. Participants were instructed to perform the task as quickly as possible, and participants would occasionally react (frequency varied among participants) after realization of providing an incorrect response. It was noted that the bilingual participant most frequently reacted when pressing the colored button that did not correspond with the color of the square presented. The child demonstrated this behavior through verbalizations immediately following response submission (pressing the button).

Participants were never made aware of the accuracy of their responses from the researcher or computer software. Behavior following self-perceived incorrect responses may imply that the bilingual participant demonstrated the greatest awareness of correct responses, even though implementing the high level of control needed was difficult during trials. In comparison, monolingual participants less frequently demonstrated behavioral responses after pressing the incorrect button, potentially implying less awareness of mistakes and less ability to exhibit the same level of control as our bilingual participant. However, further investigation needs to be conducted to confirm hypothesized implications.

Participants' parents completed a home literacy survey in order to investigate whether factors such as home literacy environment or socioeconomic status contribute to a perceived advantage. Questions were related to the following topics: book reading, response to print, language awareness, interest in letters, and writing. Responses across participants are displayed below. Each column indicates an individual participant's

responses; however, it should be noted that demographic information was removed in order to maintain participant confidentiality.

Reading Books					
Does your child ask you to read to him/her?	Several times per day	On occasion	Daily	Daily	Daily
How often do you read to your child?	Daily	Weekly	Daily	Weekly	Daily
Hours per week?	7-10	5-6	6	1	5
Designated time?	Every night before bed & when requested throughout the day	No	Yes	None	Yes
Number of books per sitting?	2-5	3-4	5	2	3-4
Independently talk or point our pictures when reading?	Very frequently during story	Very frequently during story	Very frequently during story	Frequently	Very frequently
Ask questions about characters or events during story reading?	A few times per story	Very frequently during story	Very frequently during story	Frequently	A few times per story
Pretend to read story?	Daily	Never (can read independently)	Daily	Frequently	Several times per week
Specific books?	Any book	N/A	Books with pictures& words on same page	*Goldilocks*, *3 Pigs*	Picture books
Favorite books?	*Curious George*, *Rescue Bots*, *Skippyjon Gones*	*Land of Stories* Series, any chapter book	*Arthur*	Books with horses, letter books	*Junie B. Jones*
Does your child make up stories and tell them?	Daily	Never/Rarely	Daily	Daily	Daily
Does your child fill in words or lines from a story when reading?	Very frequently during story	Very frequently during story	Has but rarely	Frequently	A few times per story
Do you attempt to teach name of alphabet letters or alphabet sounds when reading?	Very frequently during story	Not Currently	Very frequently during story	Frequently	A few times per story
Compared to other activities, how would you rate your child's interest in books?	5-Favorite activity	5-Favorite Activity	4	5-Favorite activity	4
Response to print					
Do you point out signs & words to your child?	Daily	Daily	Daily	Sometimes	Weekly

Interest in adult reading materials?	On occasion	Several times per day	On occasion	Sometimes	Daily
Ask for help in reading words?	Daily	Several times per day-can read most herself	Daily	Frequently	Daily
Identify words in environment?	Several times per day	Several times per day	Daily	Frequently	Daily
When does this occur?	Anything he recognizes words	All times	In stores	Restaurants, games	Frequently
Which signs or words does your child know?	Target, Cheddar Bunnies, Chick Fil A	Almost anything she sees	Food and stores we frequent	Variety	Several
Read words by sight?	Knows several words	Knows many words	Knows several words	Knows a few words	Knows many words
Language Awareness					
Do you play rhyming games?	Weekly	Occasionally	Has but rarely	Not currently	Occasionally
Can your child rhyme words?	Usually	Yes	No	No	Yes
Does your child try and play rhyming games?	Occasionally	Weekly	Not currently	Not currently	Occasionally
Produce rhymes independently?	Weekly	Several times per day	Never/Rarely	Never	Weekly
Does your child notice and say something when they hear words that rhyme?	Frequently	Frequently	Not currently	Not currently	Occasionally
Does your child tell nursery rhymes?	Has but rarely	Occasionally	Not currently	Frequently	Weekly
Which do they know?	Jack & Jill	Most/All	N/A	Lola the cow, the wheels on the bus	
Sing simple songs?	Daily	Several times per day	On occasion	Daily	Several times per day
Which ones do they know?	Jesus Loves Me, Twinkle Twinkle Little Star	Most/All	Birthday	Bachata, Diner, Adios Amor	Old McDonald, This Old Man
Interest in letters					
Does your child name letters of the alphabet?	Daily	Several times per day	Daily	Several times per day	Several times per day
How many do they know?	All	All	All	Almost all	All
Does your child attempt to make sounds for alphabet letters?	Very frequently	Very frequently	Frequently	Frequently	Very frequently
How many do they know?	All	All	Not given	Almost all	All
Can your child identify some letters of the alphabet?	Very frequently	Very frequently	Very frequently	Frequently	Very frequently

Which letters do they know?	All	All		Almost all	All
Writing					
Does your child draw?	Daily	Several times per day	Daily	Several times per day	Several times per day
Does your child write letters?	Weekly	Several times per day	Daily	Several times per day	Several times per day
Does your child ask you to write for them?	Weekly	Never/Rarely	Daily	Occasionally	Several times per day
Does your child ask you how to spell items?	Weekly	On occasion	On occasion	Several times per day	Several times per day
Does your child write words?	Weekly	Daily	Occasionally	Frequently/Daily	Daily

Due to the nature of a questionnaire and limited participant pool, interpretations of responses would be purely speculative. However, it is important to note response comparisons between monolingual participants and the bilingual participant. For example, the bilingual participant reported significantly less reading time (hours) compared to monolingual participants. The bilingual participant reported 1 hour per week and monolingual responses ranged from 5-10 hours per week. Again, due to the preliminary nature of this data we are unable to draw conclusive evidence, however this should be an area of further investigation in future research. The bilingual participant also reported fewer number of books read per sitting and slightly less frequent occurrence of independently talking or pointing to pictures when reading compared to monolingual peers. It was also reported that the child knew "almost all" letters of the alphabet, but all monolingual participants reported knowledge of all letters of the alphabet.

In analyzing results from the home literacy questionnaire, quantitative results from descriptive measures and bilingual advantage tasks should also be heavily considered. The relationship between these measures should be analyzed in further research with larger participant pools that could better represent a population. It is important to highlight that the bilingual participant may have demonstrated promising

results for a bilingual advantage in various tasks, but further investigation should be conducted regarding how factors such as socioeconomic status and home literacy environment potentially contribute to the perceived advantage.

Chapter V

Discussion

This study evaluated a theory that identifies a phonological awareness and an executive functioning advantage in normal hearing, Spanish-English bilingual children compared to their monolingual peers, and this theory's consistency when applied to children with hearing loss. Advantages in the areas of phonological awareness, executive function, and other factors like home literacy environment or socioeconomic status were evaluated. Unfortunately, participant recruitment and ultimate number of total participants prevented this study from revealing concrete conclusions regarding the presence of a bilingual advantage. Due to the fact that one bilingual participant is included in the present study, we are unable to make generalizations, however, the results can service as preliminary data to encourage future research.

Although we are unable to draw concrete conclusions, our bilingual participant's performance indicates promising preliminary data for future research regarding a bilingual advantage in children with hearing loss. ROWPVT-4 scores revealed the bilingual participant, Child 4, scored the lowest. However, considering the range of normal, it should be noted that the child's score in no way reflects poorly on his receptive language abilities. If anything, assuming further research would confirm similar scores from other bilingual children, it could reveal that being a dual language learner does not negatively affect receptive word knowledge. Rather, that being bilingual could help children with hearing loss perform at a similar level to their age-matched peers on comparable tasks. Due to the preliminary nature of this data, this is purely speculative with prediction that future studies would confirm these results. It is also important to

note that ROWPVT-4 scores between monolingual and bilingual group participants should be interpreted separately because norms for each version of the test are based on separate populations (Bedore & Peña, 2008). Compared monolingual and bilingual participant results from our bilingual participant compared to monolingual participants revealed that Sound Identification, Sound Blending, and Dimensional Card Sort tasks may be most promising in terms of tasks that could elucidate a bilingual advantage. The phonological awareness tasks (Sound Identification and Sound Blending) could further prove that learning two languages does not negatively impact phonological awareness as an early literacy skill, and invalidate the myth that bilingual parents of children with disabilities should avoid confusing their child by speaking only one language. In return, this finding will encourage these families to speak both languages.

However, performance of the bilingual participant in all tasks indicate the need for further research on this topic. If bilingual children's performance on phonological awareness and/or executive function tasks in future studies mimic that of Child 4 in this study on a larger scale, it could indicate either the potential of or reveal a bilingual advantage associated with a particular skill. As a result, if it can be proved that bilingualism could give children with disabilities an advantage (and be a protective factor), it could provide critical information regarding ways to best educate bilingual children with hearing loss and foster them in reaching the level of their age-matched peers. Results could serve as evidence to a better understanding of the presence of a bilingual advantage in children with hearing loss, and help elucidate the mechanism of that advantage. This study provides preliminary information promising for future investigation.

The preliminary nature of this data does not allow us to draw many concrete conclusions. However, findings indicate that any future study of a bilingual advantage in children with hearing loss will need to take into account the degree of hearing loss and device used, age of the child, proficiency in each language, as well as socioeconomic status and environmental variables. Although there have been reported findings of a bilingual advantage, particularly attributable to executive functioning, there have also been several published investigations that have failed to replicate this advantage (Dick et al., 2018). Factors such as publication bias have come into question, however, as it relates to this study, an importance should also be placed on sample size. The majority of current research includes small sample sizes, and a larger sample size would be beneficial in identifying the presence of a bilingual advantage and allow for more accurate controls of the previously mentioned factors, such as age and socioeconomic status.

Influence of Practice Patterns on Recruitment

Although this study sought to answer a specific question about group performance on experimental tasks, it provided an answer to question that was not originally asked. Recruitment for this study was unexpectedly difficult as a result of practice patterns in the area where this study was conducted. At least five bilingual families were unable to participate because their child's speech perception abilities were insufficient to complete the tasks of the study. Those practice patterns may reflect the way intervention is provided to these families.

All participants who were excluded received services beginning at a relatively late age (age three and older) and many were in primarily sign language based interventions.

Of those, only one parent was actively developing sign language skills. It is important to note that these findings were only observed among potential bilingual participants, and not observed within the monolingual English speaking group during recruitment.

Late identification and service provision are problematic for language development in children with hearing loss, and age of amplification is a prominent predictor of spoken language outcomes (Connor et al., 2006). These factors are important because they can ultimately affect a child both academically and socially. Connor et al. 2006 also cited that in children who received cochlear implants at a younger age, positive effects were observed in speech perception (Manrique et al., 2004), speech production (Tye-Murray et al., 1995), vocabulary (Connor et al., 2000), grammar (Nikolopoulos et al., 2004), and reading comprehension (Connor & Zwolan, 2004). Studies have shown that children who received cochlear implants before 2.5 years of age exhibited a significant increase, particularly in consonant-production and vocabulary growth, in comparison to those who received later implantation (Connor et al., 2006). Receptive vocabulary growth curves for children who received amplification early imitated those of children with normal hearing sensitivity. Results suggested that although there is growth in consonant production and vocabulary for children who received cochlear implants after 2.5 to 3.5 years of age, there is however notably slower growth for these children. There is a direct correspondence between age of amplification and length of use because the earlier a child receives amplification will have had greater opportunities for use of their amplification device compared to their same-aged peers, and subsequently receive increased auditory input (Connor et al, 2006). Various theories as to why earlier amplification has yielded these positive results on speech and language have been

hypothesized, such as neurodevelopmental plasticity (Sharma, 2002), sensitive periods (Locke, 1997), and how parents talk to their babies (Hart et al., 1995), but overarching results remain consistent. Early language opportunities appear to have a significant impact on language development. Implications from Connor et al. (2006) related to this study indicate that access to early linguistically rich environments, appropriate amplification, and ongoing hearing screenings following newborn hearing screenings could strengthen speech and language development as well as later academic success.

There has been extensive debate about the effects of sign language use with children who have hearing loss (e.g., Geers et al., 2017; Hall et al., 2019). The use of sign language in the families considered for this study did not limit their ability to participate. Instead, lack of auditory skills combined with lack of any language skills (sign or spoken) eliminated children from consideration for participation. Sign language, for these families, was introduced by early intervention care providers and/or the school system without a clear plan for how the family would implement sign language within the home.

This finding that many Spanish-speaking families within the geographic area of this study could not participate is pressing to address for many reasons. First, it indicates a service provision discrepancy among monolingual and bilingual/Spanish-English speaking groups that may cause these bilingual children to be further delayed in terms of their auditory and spoken language skills. It is crucial for children with hearing loss to receive appropriate auditory input and develop both auditory and spoken language skills as soon as possible (Niparko, 2010). Second, sign language in U.S. school systems is based on English language knowledge. This means that Spanish-speaking families who were enrolled in sign language based interventions, specifically in the region in which

this study was conducted, were instructed to first learn English and then learn sign language in order to communicate with their child. Instructing a parent to learn another language, let alone two languages, to communicate with their child is problematic for socio-cultural and emotional attachment reasons. Parents should speak to their children in whatever language is appropriate for family functioning (Gent, T., et al., 2012). However, further areas of research should explore additional reasons to encourage bilingualism. This will be further explained in the "Implications and Future Directions" portion of this thesis. Individually, studies have examined the effects of bilingualism on language development, while others have investigated the effects of hearing loss on language development. However, research has yet to be conducted regarding how hearing loss in the bilingual population affects language. In both topics, too many factors contribute to the complexity of language development to assume that there could be a seamless transfer of skills. From both a clinical and research perspective, understanding of this idea is crucial.

Implications and Future Directions

This study serves to provide preliminary findings to promote future research. The primary limitation in gaining conclusive results related to the original research questions proposed in this study were in regard to the number of participants. A larger sample size overall would allow for a more complete assessment in determining and evaluating the presence of a bilingual advantage in children with hearing loss, including if the advantage could be attributable to a specific factor (i.e. phonological awareness, executive functioning, or environmental factors). It would additionally be helpful for future studies

to be conducted in an area with increased access to bilingual Spanish-English families, and particularly families who have children with hearing loss. Investigation of this topic is crucial when considering the rapid growth of the bilingual student population in U.S. schools, and subsequently the number of bilingual children with hearing loss.

Further research in children with normal hearing targeting identification of the hypothesized variables, phonological awareness advantage, executive functioning advantage, as well as home literacy and socioeconomic status environmental variables, would best help this study to narrow which factors most specifically allow for a bilingual advantage. Additionally, to draw concrete conclusions regarding the presence of a bilingual advantage in children with hearing loss, further data collection, specifically among Spanish-English bilingual children, needs to be conducted.

Finally, it may be beneficial to investigate the differences in service provision among monolingual and bilingual families observed in the area in which this study was conducted, considering many bilingual children were unable to participate due to history of sign language based interventions as opposed to spoken language. Findings could alter practice patterns, and provide educators, parents, and health professionals the awareness and knowledge needed to best serve bilingual children with hearing loss.

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Appendices

Appendix A

Adapted Hadley Protocol

English script	**Spanish script**
We're going to talk for a while. I'll ask you some questions about your family and things you like to do, so I can get to know you better. You can ask me questions too.	Vamos a hablar por un rato. Te voy a hacer algunas preguntas sobre tu familia y las cosas que te gustan hacer para conocerte mejor. Me puedes hacer preguntas a mi también.
If child is bilingual: You can talk to me in English or Spanish.	*Si el niño sea bilingüe:* Me puedes hablar en inglés o español.
Topic 1 – Family	**Tema 1 – Familia**
Do you have any brothers or sisters? What are their names? How old are they?	¿Tienes hermanos o hermanas? ¿Cómo se llaman? ¿Cuántos años tienen?
Tell me about what you like to do with your brother or sister.	Dime qué te gusta hacer con tus hermanos.
Topic 2 – School	**Tema 2 – Escuela**
What is your favorite thing about being in school?	¿Cuál es tu parte favorita de estar en escuela?
If needed, prompt by talking about a favorite field trip or time in school.	*Si es necesario, cuéntale al niño/a una breve historia sobre tu paseo o evento favorito de la escuela.*
Did you get to go on any field trips this year? (zoo, iMax movie) Tell me about it.	¿Fuiste a algún paseo este año con tu clase? (zoológico, película de iMax) Cuéntame sobre eso.
Topic 3 – Entertainment	**Tema 3 – Entretenimiento**
I like to read books and watch movies. This year I read a book about _____ *and I saw the movie* _____.	*A mi me gusta leer libros y ver películas. Este año yo leí un libro acerca de* _____ *y vi la película* _____.
Do you have a favorite book? What is it about? Tell me what happens in that story.	¿Tienes un libro favorito? ¿De qué se trata? Dime que pasa en el cuento.
Do you have a favorite movie? What is it about? Tell me what happens in that movie.	¿Tienes una película favorita? ¿De qué se trata? Dime que pasa en la película.

Appendix B

Word Knowledge Assessment Administration &Score Sheet

Target:	**Known? y/n:**	**Prompt:**	**2nd prompt:**
Shoe		What is this?	You wear it on your foot. (point to your shoe, if needed)
Boat		What's this?	
Pizza		What's this?	
Girl		She's not a boy, she's a…	
Nose		What is this?	You smell with your… (point to your nose, if needed)
Duck		What's this?	This animal makes the sound, "quack quack"
Photo		He is taking a…	
Frog		What kind of animal is this?	This animal makes the sound, "ribbit ribbit"
Bear		What is this?	
Sock		What's this?	Before you put on a shoe, you put on a…
Soda		What is this a picture of?	Coke and sprites are types of…
Balloon		What is this called?	
Ten		What number is this?	7, 8, 9…
Ear		What's this?	You listen with your… (point to your ear)
Zero		What number is this?	
Table		What's this?	What is this called? (point to the table underneath the computer)
Pillow		What is this? (point to the pillow)	It's something you put your head on every night when you go to bed.
Sing		What are they doing?	
Hero		These are all super…	
Paper		This is a piece of…	
Mama		Who is she?	She's not a dad, she's a… Some kids call they're dad "dada," and they're mom…
Hot		He is not cold, he is…	

Chin		What's this? (point to the chin the arrow is pointing to)	What is this called (point to your chin) below your mouth?
Milk		This is a glass of…	
Four		What number is this?	1, 2, 3… what comes next?
Night		The moon comes out during the…	
Coffee		What's this?	In the morning, parents usually have a cup of…
Apple		What's this?	
Toes		What are these called? (point to all the toes)	On your feet you have…
Cake		What's this?	At a birthday, you eat…
Lava		What's this that erupts from the volcano? (point to the lava)	It's known to be really hot
Horse		What kind of animal is this?	
Bowl		What is this?	You eat soup and cereal out of a…
Cat		What kind of animal is this?	
Pasta		What's this?	Another name for spaghetti is…
Chicken		What kind of animal is this?	
Mail		This is a big pile of…	When you send letters, you send them in the…
Dog		What kind of animal is this?	
Plane		What's this?	
Monkey		What kind of animal is this?	
Car		What's this?	You drive a…
Sun		What's this?	In the sky, during the day, you see the…
Cheetah		What kind of animal is this?	
Stairs		What are these?	You can walk up a flight of…
Fan		What's this?	If you're hot, you can turn on the…
Red		What color is this square? (point to the square)	
Arrow		What is this thing called? (point to the arrow)	
Tiger		What kind of animal is this?	

Appendix C

Sound Identification Administration & Score Sheet

Examiner: For each prompt, ask the child, "*What's the first sound you hear in the word _____?"*

Example item: Elephant

Examiner: "*What's the first sound you hear in the word elephant?*"

Word:	Response:	Word:	Response:	Word:	Response:
Shoe /ʃ/		**Pillow** /p/		**Bowl** /b/	
Boat **/b/**		**Sing** /s/		**Cat** /k/	
Pizza **/p/**		**Hero** /h/		**Pasta** /p/	
Girl **/g/**		**Paper** /p/		**Chicken** /tʃ/	
Nose **/n/**		**Mama** /m/		**Mail** /m/	
Duck **/d/**		**Hot** /h/		**Dog** /d/	
Photo **/f/**		**Chin** /tʃ/		**Plane** /p/	
Frog **/f/**		**Milk** /m/		**Monkey** /m/	
Bear **/b/**		**Four** /f/		**Car** /k/	
Sock **/s/**		**Night** /n/		**Sun** /s/	
Soda **/s/**		**Coffee** /k/		**Cheetah** /tʃ/	
Balloon /b/		**Apple** /æ/		**Stairs** /s/	
Ten **/t/**		**Toes** /t/		**Fan** /f/	
Ear **/i/**		**Cake** /k/		**Red** /r/	
Zero **/z/**		**Lava** /l/		**Arrow** /æ/ or /ɛ/	
Table **/t/**		**Horse** /h/		**Tiger** /t/	

Appendix D

Sound Blending Task Administration & Score Sheet

Examiner: "*You are going to hear some sounds, and I want you to tell me what word those sounds make together."*

Example: *"/m/ /ae/ /n/. What word do those sounds make together? /m/ /ae/ /n/. That sounds like 'man!'"*

Word:	Response:	Word:	Response:	Word:	Response:
Four		**Car**		**Sock**	
Night		**Sun**		**Bear**	
Coffee		**Cheetah**		**Soda**	
Apple		**Stairs**		**Balloon**	
Toes		**Fan**		**Ten**	
Cake		**Red**		**Ear**	
Lava		**Arrow**		**Zero**	
Horse		**Tiger**		**Table**	
Bowl		**Shoe**		**Pillow**	
Cat		**Boat**		**Sing**	
Pasta		**Pizza**		**Hero**	
Chicken		**Girl**		**Paper**	
Mail		**Nose**		**Mama**	
Dog		**Duck**		**Hot**	
Plane		**Photo**		**Chin**	
Monkey		**Frog**		**Milk**	

Appendix E

Dimensional Card Sort Score Sheet

Reminders:

- Change the cue cards accordingly for each round.
- During the rounds, do not provide any feedback to the child regarding accuracy of categorizations.
- If the child makes a mistake during round 1 or 2, after the round, correct him/her and by pulling out the card and saying, "*Remember, in the (COLOR/SHAPE) game, the _____ ones go here [point] and the _____ ones go here [point]. So where should this card go?"*

(1) Color Game

Examiner: "*Now we're going to play a few card games! The first game is the color game. We're going to sort the cards based on color. I'm going to hand you each card one at a time, and you'll put the purple cards here [*point to area on the table] *and the blue cards here* [point to another spot on the table]. *You ready? Let's play the color game.*"

Accuracy	Description/notes, if needed

(2) Shape Game

Examiner: "*Now we're going to play a similar game, but the rules will change a little bit. We're going to play the shape game, okay? Now, let's sort the cards based on shape. The circles will go here (*indicate where by pointing to a spot on the table*), and the squares will go here* (indicate where by pointing to another spot on the table). *Are you ready? Let's play the shape game.*"

Accuracy	Description/notes, if needed

(3) Color/Shape Game

Examiner: "*Now we're going to play one final round. This is our final card game! It'll be a little tricky, so listen to my instructions carefully. We're going to play both the shape and color game in this game. Remember, in the color game the purple cards went here* (indicate where)*, and the blue cards went here (*indicate where)*. Also remember, in the shape game the circle cards went here* (indicate where) *and the square cards went here (*indicate where)*. Can you show me where the purple cards go in the color game?"*

Examiner: With each card you present say, "*Now let's play the (COLOR/SHAPE) game."*

Color game	Shape game	Color game

Appendix F

Sun/Moon Task Score Sheet

Sun/Moon

Prompt	**Score/Response**
"*We're going to play a pretend game now! Let's say we were making up names for things, and we decided to call the sun the moon and the moon the sun. Could we do that if we wanted?"* Target: yes	
"Good thinking! Why do you think the names could be changed?	

If child says no.

"*Good thinking! Let's pretend, though, that <u>everyone</u> in the world got together and decided to change the names. If everyone in the world agreed that the sun would now be called the moon, then the names could be changed. Right?*"

Response (+/-): _____

"So now that we're calling this (point to the sun) the moon, and this (point to the moon) the sun. Why do you think we can change the names?"

Response: -

_____

"*If everyone decided to call the sun the moon and call the moon the sun, what will you call the thing in the sky when you go to bed at night?*" Target: sun	

If child answers "moon."

"*Hmm, let's think about this. We just agreed to call this* (point to moon) *the sun, and this* (point to the sun) *the moon, right? So at night, what would we call the object in the sky?"*

If child still answers incorrectly.

"You're close. Let's try again and listen very carefully. If we just decided that this (point to the moon) *would now be called the sun, the object in the sky at night is now called the sun, not the moon. Because we changed the names, remember?*"

"*Now, describe what will the sky look like when you go to bed.*" Target: dark	

If child answers "bright," "sunny," etc.

"Remember, we only changed the name of the object in the sky. Everything stayed the same, except we're calling them different names. So if everything stayed the same except their names, it would be dark outside at night, right? We're just pretending to call this (point to the moon) *the sun. Does that make sense?"*

Cat/Dog

Prompt	Score/Response
"We're still playing our pretend game. Let's say we were making up names for things, and we decided to now call a dog a cat, and call a cat a dog. So this (point to the dog) *is now called a cat, and this* (point to the cat) *we're now going to call a dog. Could we do that if we wanted?"* Target: yes	
"Good thinking! Why do you think the names could be changed?	

If child says no.

"*Remember, we're pretending that <u>everyone</u> in the world got together and decided to change the names to call this* (point to the dog) *a cat, and decided to call this* (point to the cat) *a dog. So if everyone in the world agreed for us to change the names, then a dog could now be called a cat. Right?*"

Response (+/-): _____

"*Now, what are we calling this (point to the dog)?"* Target: cat	

If child answers, "dog."

"*Remember, we're pretending that everyone in the world agreed to change the names. If everyone called this* (point to the dog) *a cat, and if everyone called this* (point to the cat) *a dog, then this animal here* (point to dog again) *would be called a cat, right? Does that make sense?*

"Now, what sound does this animal (point to the cat) *make?"* Target: meow	

If the child answers <u>"woof" or "wuau."</u>

*"Remember, we only changed the name of the animal. Everything else about the animal stayed the same. So if everything stayed the same except their names, this animal (*point to the cat) *would still make a 'meow' sound, right? We're just pretending to call it (*point to the cat) *a dog, but it still acts like a cat. Does that make sense?"*

Pen/Paper

Prompt	Score/Response
"*We're still playing our pretend game just like we've been doing. Now Let's say we were making up names for things, and we decided to call paper pen, and call pen paper. So this* (point to the paper) *is*	

now called a pen, and this (point to the pen) *we're now going to call paper. Could we do that if we wanted?"* Target: yes	
"Good thinking! Why do you think the names could be changed?	

If child says no.

Remember, we're pretending that <u>everyone</u> in the world got together and decided to change the names to call this (point to the paper) *a pen, and decided to call this* (point to the pen) *paper. So if everyone in the world agreed for us to change the names, then paper (point to paper card) could now be called a pen. Right?*"

"*Now, what are we calling this (point to the pen)?"* Target: paper	

If child answers, "pen."

"*Remember, we're pretending that everyone in the world agreed to change the names of these two things (point to each paper and pen card). If everyone called this* (point to the paper) *a pen, and if everyone called this* (point to the pen) *paper, then this here* (point to the paper again) *would be called a pen, right? Does that make sense?*

"Now, what do we use this for (point to the pen)*?"* Target: To write/draw/color/similar responses	

If the child answers <u>"we write on it," or similar responses indicating the child is talking about paper</u>.

*"Remember, we only changed the name. Everything else about each of these, and what we use them for stayed the same. So if everything stayed the same except their names, this (*point to the pen) *would still be used to write. It could also be used to draw, is that right? This* (point to paper) *is still something you write or draw on. We're just pretending to call it (*point to the pen) paper*, but it still works like a pen. Does that make sense?"*

ABSTRACT

EVALUATING THE BILINGUAL ADVANTAGE IN CHILDREN WITH HEARING LOSS

By Jordan Zatopek, M.S., 2019
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This study evaluated a theory that identifies a phonological awareness advantage in normal hearing, Spanish-English bilingual children compared to their monolingual peers, and this theory's consistency when applied to children with hearing loss. There are two possible explanations of a phonological awareness advantage for bilingual children: that the advantage is specific to phonological awareness as a result of learning phonologically similar languages (e.g., Branum-Martin et al., 2012) or that the advantage is a consequence of globally improved executive function tasks (e.g., Bialystok, 2003). This study evaluated: (a) whether a phonological awareness advantage exists for bilingual children with hearing loss, (b) whether a general executive functioning advantage exists for bilingual children with hearing loss and (c) how other factors like home literacy environment or socioeconomic status might contribute to a perceived advantage. Monolingual and bilingual participants (ages 4-7 years) participated in a variety of phonological awareness and executive function tasks. Although this study sought to answer a specific question regarding group performance on experimental tasks, it provided an answer to a question that was not originally asked. Participant recruitment revealed that practice patterns may reflect a discrepancy in intervention provided to these families in the area in which this study was conducted. Results serve as preliminary evidence for future research to lead to a better understanding of the presence of a bilingual advantage in children with hearing loss, and help elucidate the mechanism of that advantage. This could ultimately provide critical information regarding ways to best educate bilingual children with hearing loss to subsidize their academic success in reaching the level of their peers.