BILINGUAL AAC INTERVENTION:

A CASE STUDY

by

CAMILLE ANN STEWART

B.A./B.S. University of Oregon, Robert D. Clark Honors College, 2014

A thesis submitted to the

Faculty of the Graduate School of the

University of Colorado in partial fulfillment

of the requirement for the degree of

M.A. Speech Language Pathology

Department of Speech Language and Hearing Sciences

2017

Signature Page

This thesis entitled:

Bilingual AAC Intervention: A Case Study

written by Camille Ann Stewart

has been approved for the Department of Speech Language and Hearing Sciences

Christina Meyers, PhD, CCC-SLP

Pui Fong Kan, PhD, CCC-SLP

Sherri Tennant, M.S., CCC-SLP

Date 3/24/2017

The final copy of this thesis has been examined by the signatories, and we find that both the content and the form meet acceptable presentation standards of scholarly work in the above mentioned discipline.

IRB protocol # 16-067

Abstract

Stewart, Camille Ann (M.A., Speech Language Pathology, Speech Language and Hearing Sciences)

Bilingual AAC Intervention: A Case Study

Thesis directed by Christina Meyers, Ph.D. CCC-SLP

Main Argument: The research question is: "How does the introduction of an AAC system and intervention in a bilingual child's home language affect his use of AAC? (a) What is its effect on the child's use of the AAC system to produce functional communication in the home setting? and (b) What is its effect on the family's interaction with the child and the AAC system?".

Procedures: This study documented data from intervention sessions with an adolescent with Down Syndrome who uses TouchChat in Spanish at home and in English at school. Intervention data was collected during each therapy session over a total of ten individual one-hour therapy sessions. Data was recorded on (a) the use of the AAC device for functional communication in Spanish at home and (b) the number of negative behaviors exhibited during a session (ie. kicking, hitting, throwing items, running/inattention to task), (c) home practice with device, and (c) parent knowledge of device.

Results: Results show a potential transfer of linguistic and operational use from one language to another, or language transfer from L2 to L1. They also could indicate a connection and transfer of his receptive language L1 skills over to expressive L1 skills when using the AAC device. The main finding of this study is that the provision of therapy in Spanish, the home language of the participant and a language mutually spoken by the participant and SLP, seemed to constitute an effective and culturally and linguistically appropriate intervention for this participant. However, this was a case study of one individual, therefore more research is needed before conclusions can be made about bilingual AAC vocabularies and language intervention for individuals with complex communication needs.

Acknowledgements

Thank you to the many people who have helped me along the way including my amazing clinical supervisor and wonderful thesis committee! I am also grateful to the study's participant and his family for being so hardworking and such great participants!

Table of Contents

TABLES

Tables

FIGURES

Figures

Introduction

Case Study

FD is a 13-year-old male with a diagnosis of Down Syndrome and a suspected diagnosis of autism. FD presents with delays across all developmental milestones. At school, he attends a regular classroom <40% of the school day. FD currently communicates using negative behaviors when faced with an unappealing task. His methods of protest include kicking, hitting, throwing items and running. In order to attain a want or need, FD gets the item himself, uses an American Sign Language (ASL) sign, or vocalizes loudly to gain attention of those around him.

Per family report, FD uses approximately 20-30 ASL signs to communicate and will vocalize to gain a listener's attention. According to FD's family, he understands and follows directions given in both Spanish and English. Spanish is the only language spoken in the home. FD's parents speak Spanish fluently and have basic English language skills. FD's two older siblings are bilingual in Spanish and English. At school, English is the language used in the classroom, but Spanish is mainly used by the students outside of the classroom.

Prior to beginning this study, FD was receiving private speech-language therapy using his AAC device twice weekly in English and one session a week at school in English. FD's school reports that FD has successfully used his device to read sight words in a book, communicate his wants and needs at school and make some social comments in the school setting with teacher support. His school reports that FD does not participate in many interactions with peers. FD's family reports that currently FD demonstrates a strong interest in his iPad and enjoys exploring the buttons on TouchChat but is not using it for functional or intentional communication at home and that he is not using his device at the level reported by his school.

Given the discrepancy between FD's use of his communication device at home and at school, researchers wanted to examine the effects of providing family education and speech and language therapy services in Spanish, as well as a Spanish AAC vocabulary set, on FD's use of the AAC device at home.

Background

According to the U.S. Census, over 20% of people living in the United States speak a language other than English at home (US Census Bureau, 2014). Given this large number of bilinguals in the U.S. population, many Speech Language Pathologists (SLP) find themselves working with children on their caseload who speak a different language (Jordaan, 2008). In accordance with the Individuals with Disabilities Education Act (IDEA) Part B, The American Speech-Language and Hearing Association (ASHA) recommends that these children receive evaluations and be provided with services in their native language (ASHA, 2010). Professionals working with this population, however, face many challenges in providing services to children with such a variety of linguistic backgrounds (Soto & Yu, 2014). Professionals working with children with complex communication needs face even more challenges when trying to provide not only appropriate intervention, but appropriate communication systems to these bilingual children.

To better understand and provide services to this growing bilingual population, researchers are calling for further investigation regarding the most effective strategies to improve communication of children who use alternative and augmentative communication (AAC) and live in bilingual communities (Soto & Yu, 2014). Many authors recommend using single-subject experiments and clinical case studies to learn more about bilingual (Ratner, 2006; Thordardottir, 2010) and AAC intervention (Bridges, 2004; McEwen & Karlan, 1990), as these studies can then

guide the formulation of research questions for larger and more controlled research studies (Thordardottir, 2010). This case study is intended as a beginning step towards further understanding of the issue of provision of services to AAC users living in a bilingual environment.

Bilingualism

Bilingualism is defined as the ability to communicate in more than one language. Bilingualism is a complicated issue in that each bilingual individual is different. Bilingualism can be considered a continuum of language skills in which there is a cross-language relationship that can change because of factors including time, exposure, communication partners, etc. (Kohnert, 2010).

Bilingualism can be divided into two different types: simultaneous bilingualism and sequential bilingualism (Kohnert, 2010). Simultaneous bilinguals learn both languages at the same time, from infancy. Sequential bilinguals learn their first language (L1) from birth, while the second language (L2) is introduced later, after the child is at least 3 years of age. For many bilinguals, the L2 will be considered a majority language, or language spoken by most of the population, and the L1 will be the minority. Often, as a child increasingly experiences the majority language through things such as school and community participation, there is a shift to greater proficiency in the majority L2 during middle childhood (Eilers & Oller, 2003; Francis 2005; Jia et al., 2002; Jia et al. 2006; Kan & Kohnert, 2005; Kohnert & Bates, 2002). During this transition, the L1 can become vulnerable and at risk for attrition (de Hower 2007; Gathercole & Thomas, 2009; Pearson, 2007).

It is proposed that a "Cross Language Correspondence" exists between the two languages (Kohnert, 2010). This correspondence exists at both a surface and deeper level. The surface level

refers to the obvious shared characteristics of the two languages including cognates and shared phonemes. The deeper level is considered the general and conceptual processing mechanisms that are used in both languages. The relationship of these deeper level processing mechanisms to each language have become clear through studies demonstrating the advantages bilinguals have on cognitive tasks (Bialysok, 2007), as well as the weaknesses that bilingual children with Specific Language Impairment (SLI) have consistent across both languages. It is clear there is a deeper connection linking the languages spoken by bilinguals, that is rooted in cognition.

This deeper link can also be seen in the codeswitching used by fluent bilingual individuals. Codeswitching is defined as changing languages during a phrase or a sentence. Codeswitching requires extensive knowledge of each language in order to follow grammatical and sociocultural rules when switching between the two (Paradis et al., 2011). Codeswitching is a natural part of a bilingual child's development. Even children with SLI have been shown to be capable of codeswitching appropriately, despite their language difficulties (Gutiérrez-Clellen et al., 2009). Therefore, it is important that bilingual children using AAC devices are provided with with the capability to codeswitch on their AAC systems so they can develop language just like their bilingual counterparts.

Bilingualism and Children with Language Learning Difficulties

Over the years it has become clear that using both languages during intervention with a bilingual child with a language impairment is beneficial, rather than detrimental (Fredman, 2006; Jordaan, 2008; Kohnert, 2008; Kayser, 1995; Kayser, 2008; Restrepo et al. 2010; Seung et al. 2006; Tysbinaand & Eriks-Brophy, 2010). However, there are many ways to approach this intervention and the inclusion of both languages. Given the variability of bilingual language speakers, there is no "one-size fits all" solution for intervention. Rather, one must consider the

client's natural language environments and when and where each language is being used. The two over-arching approaches to bilingual intervention, include the Cross-Linguistic Approach and the Bilingual Approach (Kohnert, 2010).

The Cross-Linguistic Approach consists of targeting different communicative functions or linguistic features of each language. Language and vocabulary typically used in the L1 (i.e., home vocabulary) is targeted during intervention in the L1. Language and vocabulary typically used in the L2 (i.e., school vocabulary) is targeted during intervention in the L2. This approach has been proven successful in increasing skills in both languages in several different environments including introduction of intervention in the L1 followed by intervention in L2 (Perozzi & Sanchez, 1992; Seung et al., 2006) or with therapy provided by the SLP in the L2 and by the parents in the L1 (Tsybinaand & Eriks-Brophy, 2010). However, achieving success using parents to treat in the L1 highly depends on the parent's level of involvement and commitment to the treatment (Thordardottir, et al., 2015).

The Bilingual Approach focuses on the cognitive processing and mediated skills that underlie both languages. This approach directly trains the common aspects of both languages (ie. form, content and use) and uses a metalinguistic approach to contrast the languages and encourage a generalization of language skills across contexts. Intervention using the Bilingual Approach has also shown success and an increase in skills in both languages (Thordardottir et al., 1997).

Regardless of whether a Cross-Linguistic or Bilingual Approach is used, using an L1 in intervention appears to assist with acquisition of the L2 for children with a language impairment, consistent with the Language Interdependence Hypothesis (Gutierrez-Clellen, 1999; Jordan, 2008; Perozzi & Sanchez, 1992). Providing intervention in a child's L1 allows the child to

communicate more effectively at home. Improvement in this communication in settings that are important to the child in turn then results in improved language skills (Thordardottir, 2010). A continued focus on the L1 also helps prevent attrition as the child increasingly uses the L2, or majority language (de Houwer, 2007; Gathercole & Thomas, 2009; Pearson, 2007).

Bilingualism and Children with Down Syndrome

While the empirical base on bilingual intervention is slowly growing, there is still little evidence on intervention for bilingual children with Down Syndrome. A group comparison study of monolingual and bilingual children with Down Syndrome in comparison to their monolingual and bilingual typically-developing peers, found that there were very variable language profiles among bilingual individuals with Down Syndrome. However, the overall findings were that children with Down Syndrome do not differ in L1 skills whether they are monolingual or bilingual, demonstrating that it is not detrimental for children with Down Syndrome to be bilingual. Given this evidence, it is important to provide support for these individuals in both their L1 and L2 languages (Kay-Raining Bird et al., 2005). These findings were replicated in a case study examining a bilingual child with Down Syndrome who demonstrated that learning a second language had no detrimental effects on language learning or literacy (Burgoyne et al., 2016). Another study, examining dizygotic twins with Down Syndrome, found that these twins codeswitched between British Sign Language (BSL) and spoken language according to their listeners (Woll & Grove, 1996).

Bilingual AAC Intervention

According to the sociocultural theory of learning, a child's participation in daily life activities and interactions is dependent on his or her access to the languages that facilitate participation (Soto & Yu, 2014). This theory is the foundation for providing bilingual AAC

intervention. If a child does not understand the language or have access to a way to communicate in that language (ie. AAC system), he or she will not be able to interact with others in that environment. This lack of a communication system and language knowledge of the surrounding environment can result in even more detrimental effects for a child with Complex Communication Needs (CCN). Family members often find it difficult to include a child in their conversations and to maintain relationships with the child if he or she does not speak the same language (Wong-Fillmore, 2000). Additionally, family members express frustration at the fact that their child's AAC system does not include their home language and a familiar vocabulary that is relevant and functional in the home (McCord & Soto, 2004; Pickl, 2011). In a group discussion with Mexican-American parents of children with CCN, parents expressed a desire for (a) devices in Spanish, (b) help learning how to use and program their child's device, (c) intervention with a focus on functional home tasks (Huer et al., 2001). The exclusion of family members from communicating with their child with CCN is problematic not only because of the divide in communication when the device is in an unfamiliar language, but it also results in no practice using the device at home, an essential part of a child's growth using the device (Starble et al., 2005).

Given the lack of evidence for how to approach bilingual AAC intervention, experts suggest drawing from the principles of bilingual intervention for children with language disorders. These principles include (a) working with family and community members and having them provide indirect intervention as communication partners while the SLP provides direct systematic teaching of the AAC system and language (Kent-Walsh & McNaughton, 2005; Kohnert, 2010), (b) understanding and supporting the acquisition of L2, and (c) understanding

that L2 learning is built on a strong L1 foundation in addition to the child's culture (Soto & Yu, 2014).

Intervention. The most effective way to provide bilingual intervention is to include the families in intervention and assessment whenever possible. For AAC, this means designing AAC systems that include the family's cultural values and linguistic practices. It also means asking parents for their input. This input is extremely valuable in determining which communicative situations should be targeted during therapy (Soto & Yu, 2014).

The two languages targeted during intervention can differ dramatically, especially in grammar. For bilingual intervention, these different grammars can require different teaching strategies and intervention materials (Yong, 2006). Intervention for each language will not be identical, as the two languages are not identical. It is important to adapt intervention sessions according to the targeted language rather than simply translating.

Communication system. A bilingual AAC system should reflect the way an individual learns and uses each language in different environments. In order to create a system that is appropriate for each environment, an SLP must understand the underlying structure of the target language (Yong, 2006). A vocabulary in one language cannot simply be a translation of the vocabulary in the other. Each language has different aspects of form, content and use that must be addressed within the AAC system. Core vocabulary, or the most frequently used words in a language, should be programmed into the device but will not be the same across languages (Robillard, et al., 2014). Therefore, different core vocabulary pages may look very different, but still serve the same important purpose of allowing for a variety of communicative functions. The vocabulary that is chosen should be functional and culturally valued (Andres, 2006) so that it can be used to communicate efficiently and frequently.

Each language may require different modalities, layouts, grammar and representations (Baker & Chang, 2006, Nakamura et al., 2006) and displays that are culturally appropriate. This may include using different glosses, designs, colors and referents for each language in the communication system (Andres, 2006). It is also important to consider that different grammars may require different motor planning for access (Yong, 2006) so systems need to be set up to adapt to these differences. For example, Spanish systems will need to provide six different conjugation options for a present tense verb, while an English system will only need to provide three different conjugation options. Therefore, learning the motor plan for one conjugation in one language, may be completely different from the other. The device should also be programmed to allow for easy codeswitching (Soto & Yu, 2014), such as simply touching a button that changes the language and layout. This means that a bilingual voice must also be available so that when codeswitching does occur, it is comprehensible to those around. Proficient bilingual listeners (L1 Spanish, L2 English) have been shown to have difficulty understanding a synthetic English voice for English AAC systems (Axmear et al., 2005). Therefore, it is especially important to provide AAC users who will be in a bilingual environment with a bilingual device to facilitate comprehension of the synthetic voice.

While a couple of studies have addressed recommendations for working with bilingual AAC users, clearly much more work in this area is needed to better understand how to provide services and AAC systems to these individuals.

Research Questions

Given the dearth of evidence for bilingual AAC intervention, more research is needed to examine how individuals with CCN are affected by a bilingual environment and how

intervention should be approached with these individuals. The aim of this study is to document the effects of providing therapy in Spanish, in addition to already existing English therapy, to a child with Down Syndrome and suspected autism, in order to answer the following research questions.

1. How does the introduction of an AAC system and intervention in a bilingual child's home language affect his use of AAC?

a. What is its effect on the child's use of the AAC system to produce functional communication in the home setting?

b. What is its effect on the family's interaction with the child and the AAC system?

Research Methodology

Participant.

FD is a 13-year-old male with a diagnosis of Down Syndrome and a suspected diagnosis of autism. FD was selected for this study after an initial interview with his family as a part of the researcher's clinical caseload. Following this interview, baseline data was recorded.

Role of the researcher.

The student researcher conducted therapy sessions under the supervision of an ASHA-certified SLP and collected qualitative and quantitative data throughout the study. Supervision was provided both directly and indirectly (ie. advice will be provided on lesson plans and data collection, but the supervisor will not be present in person during the therapy session).

Study procedures.

TouchChat. FD received a school iPad with TouchChat two years prior to the beginning of the study, and received his own personal iPad with TouchChat one year prior to the study.

Before this study, a Spanish vocabulary was provided on FD's AAC device but was not utilized. The family did not receive education on how to use the device in Spanish. During the first intervention session, a Spanish speaking voice was downloaded.

FD's TouchChat Spanish vocabulary runs on an individualized version of WordPower 48 Español (see appendix A). The home page, and several frequently used pages, were edited to reduce the number of buttons to 42 in order to reduce the amount of stemming that occurs when using the WordPower 48 Vocabulary, as reported by the therapists working with FD in English. The page was created by hiding the buttons on the page that seemed less relevant for FD at the time. His home screen features core words with a top row dedicated to categories (ie. gente/people, preguntas/questions, lugares/places, etc.). Additional edits to certain vocabulary items and pages were made in order to make the system more personalized to FD (e.g. a personal page was added on the home page).

The English vocabulary page runs on WordPower 42. It follows a similar layout to the Spanish vocabulary set but does not have any hidden buttons.

FD uses the Spanish male voice "Antonio" with his Spanish vocabulary set and the English male voice "Ryan" with his English vocabulary set. Switching between the two languages became more simple with an update of TouchChat that occurred following the baseline data collection period. In order to switch between the two languages before the update, one must make the app editable, then choose the vocabulary set and then choose the voice. Once these steps are taken, the app can be used correctly in the chosen language. The participant's family was provided verbal, written and visual instructions on how to change between the Spanish vocabulary set and Spanish-speaking voice and English vocabulary set and voice. Following the TouchChat app update, a switch to the other language could be made possible by

making the app editable, going into the settings and loading the vocabulary profile of the other language. This allowed both the vocabulary set and the voice to be changed in one step.

Intervention.

Cross-Linguistic Approach. Intervention utilized a Cross-Linguistic approach (see Background). Following the Cross-Linguistic approach, therapy was provided twice weekly in English (with an additional therapy session in English once school started during week 9 of the study), in addition to the Spanish intervention sessions. Spanish intervention sessions focused on home vocabulary and targeted communicative functions specified by FD's mother and sister. English sessions continued to be provided by FD's previous providers. The student researcher was in contact with these providers but did not have input on the content or methods used during the English speech-language intervention sessions. English sessions targeted communication functions and behaviors that are more helpful in the school setting such as using the AAC system to facilitate transitions (between activities and locations), counting, and literacy skills.

Sociocultural Approach. The Sociocultural Approach (see Background) was utilized to include FD's family in the intervention and programming of the device. Intervention was family-centered and education was provided on how to use the device in family's home language (Spanish). FD's mother or sister was present for each therapy session and were directly involved decisions around programming of the device and vocabulary targeted during each therapy session. In the initial interview, FD's mother identified daily routines, such as eating a meal or getting ready in the morning, as an area in which she would like communication to be targeted. Intervention sessions revolved around those communicative themes.

Communicative Competence. Goals and activities for intervention were developed around the principles of the Communicative Competence Model. This model divides communication

competency for AAC users into four parts; operational, linguistic, social and strategic. In order for an AAC user to competently communicate using his or her AAC system, mastery of each of these four categories is required. Operational competency refers to the individual's ability to apply motor, cognitive, visual and auditory skills to operate the AAC system (Kovach & Kenyon, 2003; Rowland & Schweigert, 2003; Treviranus & Roberts, 2003). Linguistic competence refers to the individual's understanding and use of the semantic, morphosyntactic, pragmatic and other linguistic skills required to use their AAC system correctly (Blockberger & Sutton, 2003; Mineo Mollica, 2003; Romski & Sevcik, 2003; Smith & Grove, 2003). Social competency refers to the individual's ability to use pragmatic discourse strategies like initiating and maintaining a conversation or repairing a communication breakdown, as well as their ability to make choices, such as requesting or rejecting (Brady & Halle, 2002, Iacono, 2003, Light et al., 2002; Light et al. 2003; Mirenda & Bopp, 2003; Sigafoos & Mirenda, 2002; Sigafoos et al, 2002,). Finally, strategic competence refers to the development of compensatory strategies that allow for effective communication within restrictive situations (Light, 1996, Mirenda & Bopp, 2003) In this participant's case, focus was placed on linguistic and social competency. Beginning aspects of linguistic competency were addressed through instruction of several items of the core vocabulary, while social competency was addressed through teaching of communicative functions such as requesting and rejecting. Focus for this study was placed on these two communicate functions in hopes to reduce behaviors by giving the participant a method of communicating with his family his wants (ie. a hug, a squeeze, a break, etc.) rather than using negative behaviors.

Aided Language Stimulation. Aided language stimulation was utilized as one of the main methods of intervention during a session and provided in family education. Aided language

stimulation is defined as the use of continuous natural speech while pointing or labeling visual symbols on an AAC device. This intervention method emphasizes modeling while speaking and modeling the expansion of language that was produced by the AAC user. This method is based on the idea that observation of the AAC system and symbols being used by others in a natural interaction provides the AAC user with the opportunity to become familiar with the use of symbols as a method of interaction and/or communication during an activity. Aided language stimulation is based on the way typically developing children learn to understand language by the language models of others around them (Binger & Light, 2007; Bruno & Trembath, 2006; Dada & Alant, 2009; Harris & Reichle, 2004).

Shared Story Reading. Shared story reading was used during the session and in family education to introduce new vocabulary and promote emergent literacy skill acquisition. Shared story reading consists of (a) talking about and pointing to the text, (b) asking questions or making comments about story and the pictures, and (c) pointing out and following along with the book's text. The emergent literacy skills gained through shared story reading are defined as the knowledge of the function of print and the letters of the alphabet and the relationship between oral and written language (Teale & Sulzby, 1986). This intervention strategy has been shown to promote literacy for students with CCN (Browder et al., 2008; Koppenhave et al. 2008; Mims et al., 2009; Spooner et al., 2009). Additionally, research has shown that parent instruction and use of shared storybook reading with bilingual AAC users can result in increases in communicative turns taken and the number of novel semantic concepts expressed (Rosa-Lugo & Kent-Walsh, 2008). CROWD in the CAR strategies were utilized to introduce the different ways language can be used through shared story reading. CROWD in the CAR strategies include; Completion, Recall, Open-ended questions, "Wh" Questions, and Distancing (Lonigan & Whitehurst, 1998).

FD's mother was first provided models of shared story book reading using the CROWD in the CAR strategies. She then was encouraged to use the strategies herself. She was provided with scaffolded support to begin reading stories with FD and using his AAC device to model different core vocabulary used in the book. Scoffolded support consisted of verbal models, then visual models of different strategies she could use until she no longer needed the supports. *Core Vocabulary.* An emphasis was placed on the instruction of core vocabulary words during intervention so that the vocabulary learned was beneficial and useful for the AAC user, no matter the context. Core vocabulary words are the most commonly used words in the language of typically-developing children. These words include a variety of word classes and allow for a variety of communicative functions such as, requests, comments, protests, questions, etc. These words, such as "go", "more", "I", "you", etc. are useful across a variety of environments and contexts and can be combined to increase both semantic and syntactic complexity (Banajee et al., 2003; Rembath et al., 2007). Targeted core vocabulary words were chosen in collaboration between the clinican and FD's mother the week before each session. The clinician then created a book (see Appendix B) that had a high amount of repetition of these targeted core vocabulary words and could be used during shared storybook reading.

Session Layout

Below is an example of the activities and goals of each session. It is important to note, however, that each session did not follow this exact plan due to participant behaviors and attention.

Table 1

Session Layout

Time	Activity	Strategy
10 minutes	Discuss previous week's homework of modeling "hola" on device in appropriate situations with mother. Discuss goal for current session of working on FD communicating when he doesn't want something instead of throwing the item.	Sociocultural approach Aided Language Stimulation
3 minutes	Present "first, then" chart to client – "read first, then play". Have mother do this with child if she is comfortable.	Sociocultural approach
15 minutes	Practice with mother first to find words "quiero" and "no quiero" on the device. Mother reads book with focus on core words "quiero" and "no quiero"	Core vocabulary. Sociocultural approach Aided language stimulation Shared Storybook Reading Communicative competency
15 minutes	Take turns with mother, participant and clinician using device to indicate turns and choices (e.g. "yo quiero"= - I want", "mi turno" – my turn, quien?" – who?, etc.)	Aided language stimulation Communicative competency
10 minutes	Practice turning guided access on and off with mother. Discuss possible situations to practice modeling "no quiero" (I don't want) on device during the week.	Aided Language Stimulation Communicative competency Core vocabulary

Data collection. Baseline data for specific in-therapy use of the device was collected across three consecutive sessions. Intervention data was collected during each therapy session over a total of ten individual one-hour therapy sessions. In-session data collection was taken by the student researcher. Data for the baseline and intervention data collection stages of the study

consisted of documentation of opportunities provided by clinicians and taken by the participant during a session in regards to the study goals, as well as by documenting all words produced by participant on the device and whether these productions were functional communications or not (i.e. relevant to the communicative context or not). Data was recorded on (a) the use of the AAC device for functional communication and (b) the number of negative behaviors exhibited during a session (ie. kicking, hitting, throwing items, running/inattention to task). For each data point involving functional communication, the amount of clinician support and prompting required was documented. Cueing was provided from minimal to maximal levels to encourage independence. The following cueing hierarchy was used to document level of cueing used to gain successful communication from the participant.

Table 2

Types of Cueing Provided by Communication Partner

Type of Cue	Level of Cue	Description
Physical	Maximal	Full support to select target (e.g. hand-overhand) to teach desired response
Physical	Moderate	Partial support of body part to initiate movement to select target (e.g. gentle nudge)
Physical	Minimal	Light support (e.g. touch/tap) of body part or equipment to direct attention to select target
Visual	Maximal	Point to specific target (e.g. location on device) to teach desired response
Visual	Moderate	Point to general area (e.g. left side, row) OR give multiple choice options to orient location
Visual	Minimal	Point to device/look at device to remind child of strategic use
Verbal	Maximal	Tell the child "push *name of symbol"* to teach specific target
Verbal	Moderate	Provide verbal topic cues (e.g. "How are you today?....(wait)…"Find your *feeling* words" OR provide verbal multiple-choice
Verbal	Minimal	Provide verbal direction for communication strategy (e.g. "Tell me with your talker")

Note. Reprinted from "Types of Cueing by Communication Partner" from Trainer Education Packet at Talking with Technology Camp, Children's Hospital Colorado.

During baseline data collection, a form was provided to the family documenting the amount of time the child spent using the device with the family. Data was collected retrospectively for the three weeks prior to meeting the researchers and the first three weeks of baseline data collection. Data on home practice was collected weekly via parent report using the

provided form. A five-point Likert rating scale was provided to the family to rate comfort level and level of knowledge when using the device, prior to the study and following the study.

Following ten sessions of intervention, data from the final three intervention sessions were used for final data. Qualitative observations regarding family attitude towards the device, participant behavior and other factors, such as participation in daily routines, were also recorded during data collection.

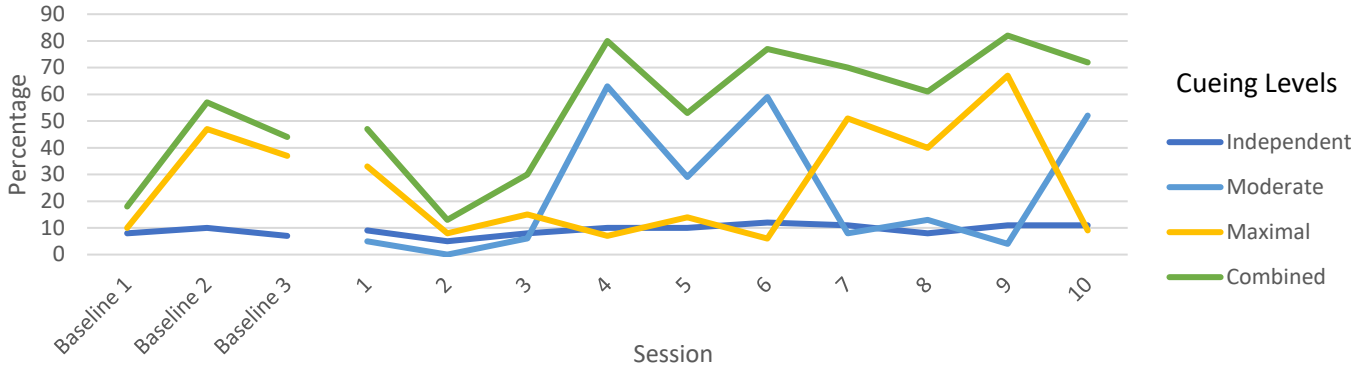
Data analysis. Following final data collection, data points from baseline data collection were compared directly to final data collection, as well as across all therapy sessions, to determine if significant progress was made during intervention. Simple qualitative and quantitative measures were used to describe any changes between baseline and final data collection. Cohen's kappa was used to calculate interrater reliability between ratings of functional communication by the participant during data collection sessions.

Qualitative data was used for descriptive purposes. Observations throughout the study were compiled and any notable changes were compared descriptively.

Results

The results examining the effect of bilingual AAC intervention on this child's use of an AAC system to produce functional communication in the home setting and its effect on the family's interaction with the child and the AAC system, are laid out in this section, including: difference in productions of functional communication between baseline data collection and the final intervention session, difference in family's use and understanding of AAC device, demonstration of negative behaviors pre and post intervention, and interrater reliability for ratings of functional communication.

Functional Communication*Overall functionalcommunication.* Percent of functional communication during each therapy session was analyzed. Functional communication and the level of cueing used to achieve successful functional communication during therapy sessions, varied throughout intervention. Overall total functional communication increased with varying levels of moderate and maximal cueing, as shown in Figure 1. According to Figures 2 and 3, successful functional communication given moderate cueing increased from 0% during baseline to 25% in the final intervention sessions.



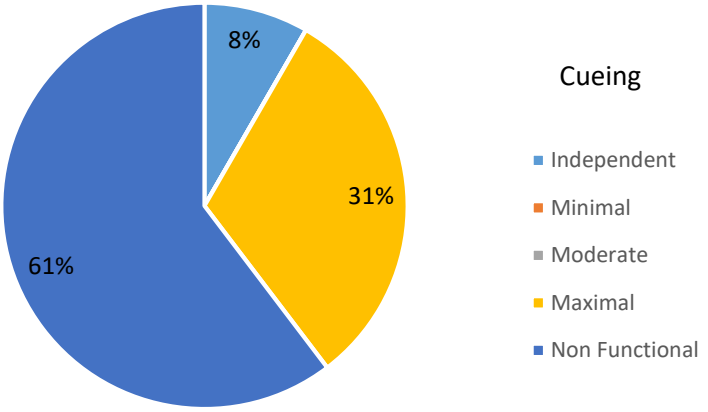
Note. Minimal cueing remained at 0% throughout baseline and intervention and therefore is not pictured on graph.

Figure 1. Functional communication using AAC device.

Nonfunctional communication. As shown in Figures 3 and 4, nonfunctional communication decreased from an average of 60% during three baseline sessions to an average of 27% during the final three intervention sessions. Figure 4 shows the variable, but overall decline of nonfunctional communications exhibited by the participant as intervention progressed.

Nonfunctional communication constituted 80% of communications during the first baseline data collection session and was reduced to 30% at the final intervention session.

Note. Minimal and moderate cueing 0%



Data determined by average of performance across 3 sessions.

Figure 2. Breakdown of cueing during baseline data collection.

Note. Minimal cueing 0%

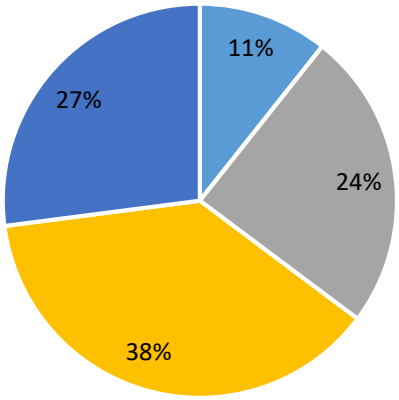


Figure 3. Breakdown of cueing during final data collection.

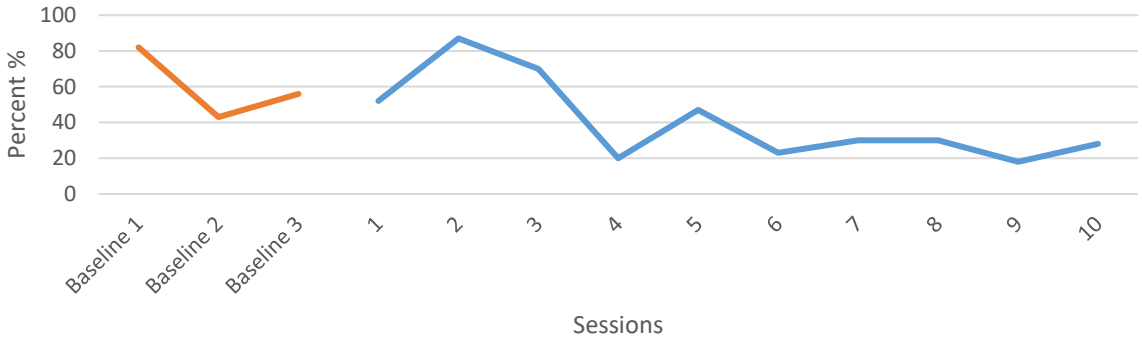


Figure 4. Nonfunctional communication using AAC device.

Vocabulary used for communication. During baseline data collection, FD used his AAC device to communicate certain wants and needs, or to explore the device and navigate to his favorite items or activities, like swimming (natación). In the final stages of intervention, FD used a greater range of vocabulary on his device and a greater range of communicative functions, as illustrated in Table 2. FD also began to link together longer phrases, both with cueing and independently.

Table 3
Categories of vocabulary used during communication

Sessions	Vocabulary Categories Used	Function of Communication	Number of Words in Phrase	Examples of words used
Baseline	Fringe	Request	1	leche
				comer
		Label		natación
Final	Social	Request	1-3	Quiero jugar juguete
	Core	Label		Perro
	Fringe	Comment		No me gusta
		Recurrence		Más
		Answer Question		Me llamo…
		Greeting		Hola

Negative behaviors

FD's negative behaviors gradually decreased and reached a relative plateau as intervention progressed (see Figure 6). FD's negative behaviors during baseline data collection and the beginning of intervention consisted of kicking, hitting, throwing objects, knocking materials to the ground, and placing his hands around the neck of the researcher or his mother. The functions of these behaviors were to avoid or escape an undesired activity, or gain attention, or retrieve a desired item. During the final intervention sessions, negative behaviors consisted of

knocking materials to the ground and giving the researcher or his mother a long hug in order to avoid or escape an undesired activity. In contrast to the reduction of negative behaviors seen in the study therapy sessions, FD's school reported a regression of behaviors back to behaviors seen two years prior. These behaviors included falling on the ground to protest and avoid, as well as needing to use diapers again at school. His private SLPs reported an increase in hitting and avoidance behaviors during sessions consistent with those seen at the school. Reinforcements and behavior strategies were communicated between the different settings, but were not always consistent.

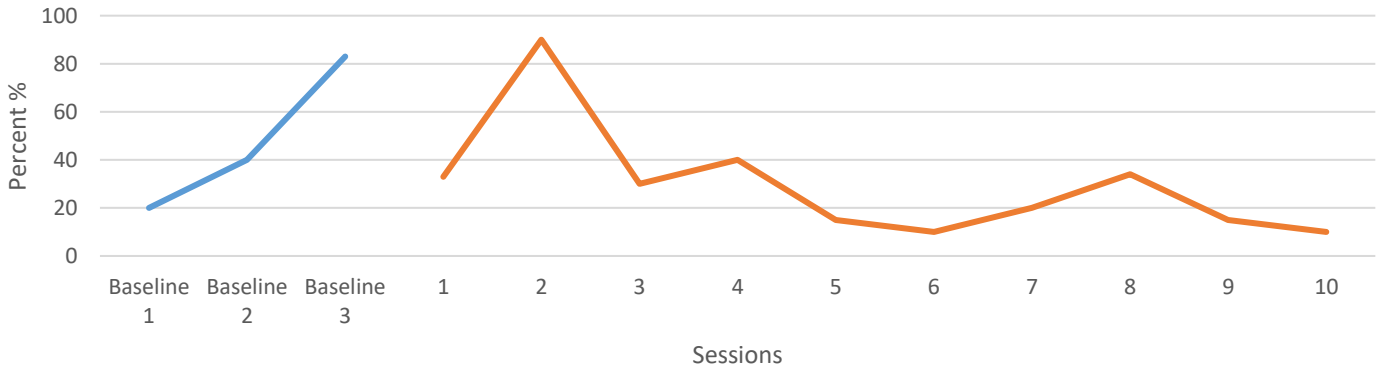


Figure 5. Percentage of negative behaviors exhibited during therapy session

Interrater Reliability

Results of Cohen's Kappa statistical analysis indicate significant agreement between results obtained by two separate raters, the student investigator and a clinical supervisor, when scoring functional communication attempts (see Table 2).

Table 4

Interrater reliability of evaluations of functional communication (Cohen's Kappa)

		Rater 1		
		Functional	Nonfunctional	Total
Rater 2	Functional	205	11	216
	Nonfunctional	13	76	89
	Total	218	87	**K = .808**

Note. K> .8 indicates significant agreement between results

Table 5

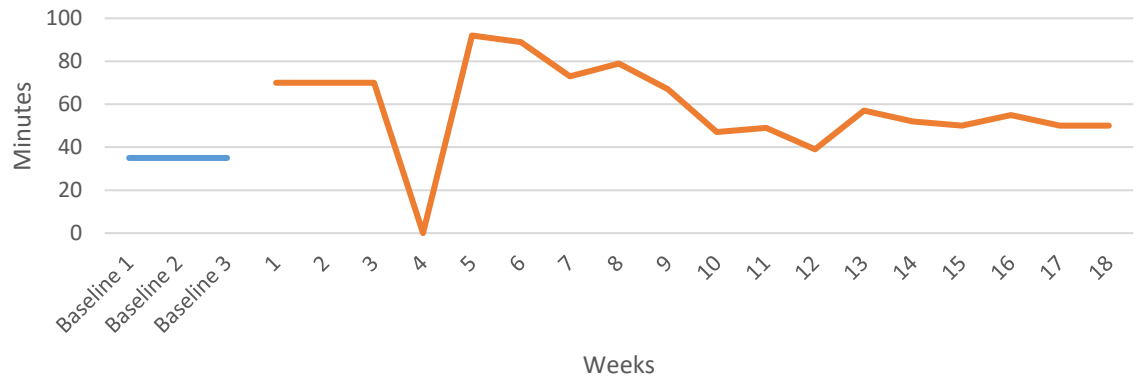
Probability of Agreement

	Probability
Both raters rate functional randomly	*.506*
Both raters rate nonfunctional randomly	*.083*
Random agreement	*.589*

Note. K> .8 indicates significant agreement between results

Family's perception of device

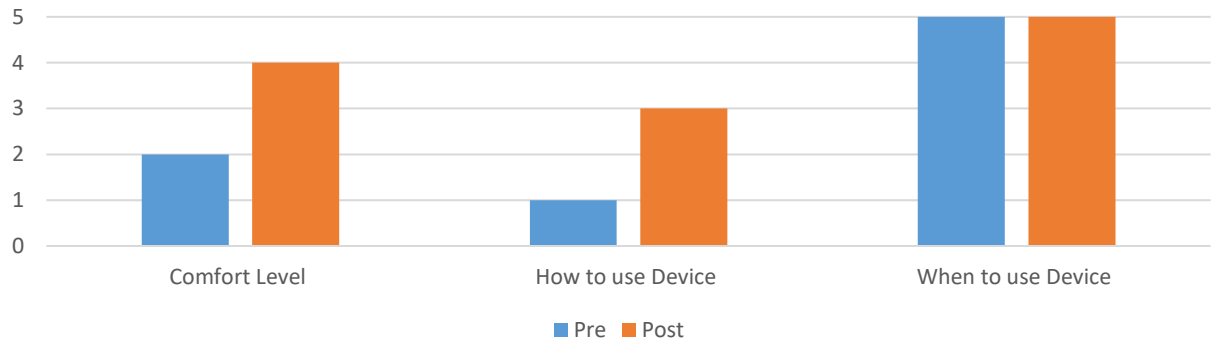
Figure 7 shows an increase in the amount of time the family spent using the device following the start of intervention per family report. The family increased their time using the device at home by 35 minutes per week following the start of intervention. Once school began, the use of the device at home decreased, but remained an average of 15 minutes more than pre-intervention. Usage of the device at home dropped to zero minutes when the device was locked in English and the family did not yet know how to switch the language back to Spanish.



Note. Due to cancellations and scheduling conflicts, the 10 therapy sessions were administered across a period of 18 weeks but home use of the device was recorded throughout. *Week 4:* Device was locked using guided access in English and family did not know how to change back to Spanish. *Week 9:* First week of school.

Figure 6. Time spent using AAC device at home per week.

Per parent report using a Likert scale questionnaire for pre-and post-intervention, there was an increase in the mother's own perception of her comfort level using the AAC device as well as her technical knowledge of the device. This knowledge was defined by knowledge of navigation of device vocabulary as well as knowledge of technical aspects of the device, such as using guided access and switching between languages on the device. The mother began the study feeling highly confident in her knowledge of when to use the device with her son, and her confidence remained at this level post intervention.



Note. 0 = Minimal, 3 = Moderate. 5 = High

Figure 8. Parent self-rating of use of device.

Discussion

The present investigation was a case study of FD – a young adolescent with Down Syndrome and a suspected diagnosis of autism who is bilingual in Spanish (L1) and English (L2). The purpose of the present study was to examine the effects of providing therapy and an AAC vocabulary in a child's home language on the participant's use of the device, as well as the

family's perception and use of the device as well. This study also examined how providing an AAC device may affect the child's use of negative behaviors.

Functional Communication

Overall functional communication. FD showed increasing success with lower levels of cueing as intervention progressed. Cueing was provided from independent to maximal cueing and all opportunities were always provided with substantial wait time (at least eight seconds). Success was variable throughout intervention, there was an increase from an average 0% success with moderate cueing at baseline to an average 23% success during the final three intervention sessions, with a 52% success rate during the final intervention session. This shows an increase in the success rate with a smaller amount of cueing following intervention. This indicates that the introduction of a Spanish vocabulary and intervention in Spanish with this participant resulted in an increase in the overall amount of functional communication produced in the child's home language during therapy sessions.

FD's successful communication rate following ten intervention sessions appeared similar to his success reported by his English-speaking SLPs during baseline data collection, who reported an average of 30% success with moderate-maximum cueing after 5 months with FD. During final data collection, success from the English intervention sessions was reported to be highly variable given an increase in FD's negative behaviors during sessions (see Behaviors Results section).

FD had not had exposure to the Spanish vocabulary prior to baseline data collection. However, during the initial three baseline data collection sessions, he independently navigated through the new vocabulary to find his favorite items he commonly used on his English

vocabulary, including favorite foods and activities. He also continued to communicate using novel words that had never been modeled during intervention. He began to respond "adios" independently as the researcher departed at the end of the session, similar to when he said "goodbye" to his English SLP at the end of a session. This indicates a potential transfer of linguistic and operational use from one language to another, or language transfer from L2 to L1. It also could indicate a connection and transfer of his receptive language L1 skills over to expressive L1 skills when using the AAC device. Another potential reason for this immediate success could be a visual-motor component where the layout and symbols for the device in Spanish was similar to that in English so he could access his device via motor or visual memory.

No conclusions as to the effect of adding the Spanish vocabulary and intervention on FD's use of the AAC device in English can be made from the results found in through this study. However, given the evidence for the Language Interdependence Hypothesis (Gutierrez-Clellen, 1999; Jordan, 2008; Perozzi & Sanchez, 1992)., it could be expected that some language skills learned in the L1 would transfer to the L2. Some educational professionals working with FD reported a fear that he would be learning a fifth language (i.e. ASL, spoken English, spoken Spanish, AAC in English, AAC in Spanish) when beginning to use the device in Spanish, however no data was found to support this claim. His independent use of his Spanish vocabulary with novel vocabulary words negates this idea of the Spanish vocabulary as a separate language and supports the idea of language transfer and bilingualism for individuals using AAC devices. Additionally, FD's communication system did not allow for easy code-switching. Therefore, FD did not demonstrate any successful codeswitching during therapy sessions or per parent report. Neither FD, nor his mother, was able to successfully navigate between languages without maximal support from the clinicians because it was so many steps. This difficulty makes it

difficult for FD to be a true bilingual without codeswitching capabilities (Paradis et al., 2011). Further research is needed to examine how adding another language to an AAC device affects a child's use of the previous language and how the child interacts with the two languages when they are both made available.

Vocabulary used for communication. While results do not show a significant increase in the quantitative number of successful communications produced by FD during intervention, it is important to note the change in the type of communicative function and category of vocabulary used by FD throughout the study. Results show an increase in the length of utterance and variety of vocabulary used following intervention. These increases could be the result of an exposure to a variety of communicative functions and categories of vocabulary during shared storybook reading activities and during interventions which attempted to target commenting and social communications, in addition to requesting. These different vocabulary words were emphasized with FD's family each week as a home practice focus for the week using aided language stimulation. The combination of exposure during therapy sessions and during home practice times throughout the rest of the week, could have led to the changes in vocabulary used during the final intervention data collection.

Negative Behaviors

While FD's negative behaviors decreased as Spanish intervention sessions continued, his negative behaviors at school and with his other private SLP increased. Given the many factors involved in FD's behavior outside of this investigation's therapy sessions, no conclusions can be made about the influence of Spanish language intervention and Spanish vocabulary on FD's behavior outside of the therapy sessions. A potential factor contributing to the increase in

negative behaviors seen outside of the therapy sessions could be due to inconsistent responses to the negative behaviors across environments. While FD's professional team attempted to collaborate on different ways to approach the behaviors, there was a lack of team cooperation in maintaining the same methods of addressing, shaping and responding to behaviors. Kossyvaki, Jones & Guldberg emphasize the importance of specific behaviors that adults should utilize to increase the spontaneous communication of individuals with autism and complex communication needs (2014). Future studies dealing with participants exhibiting the same negative behaviors and low amount of spontaneous language output should ensure that all adults on the participant's professional team are using principles of the Adult Interactive Style Intervention in order to increase communication opportunities and maintain consistent communication consequences across settings (Kossyvaki, Jones & Guldberg, 2014). The decrease in negative behaviors seen during therapy sessions indicates a negative correlation between the number of therapy sessions attended by the participant and the amount of negative behaviors exhibited by the participant during the session. Many other factors, in addition to the availability of a method of communication system in his home language, may have caused this decrease, including; familiarization with the clinical researcher, adjustment to the routine and expectations during the session, and changes in his mother's reactions to his negative behaviors.

Family's Perception of Device

The family's reported use of the device at home increased immediately following the provision of services in their home language. Homework and specific tasks to practice were provided and explained each session to practice during the following week. The availability of the device in Spanish, in comparison to just English, appeared to be one of the main reasons for the increase in use of the device. This is supported by data from Week 4 of intervention when the

device was locked into the English vocabulary and the family did not yet know how to change it back to Spanish, so the device was not used during Week 4. FD's mother reported that while she understood basic English, she understood less than 50% of what FD's device spoke with the digital voice. This is consistent with the conclusions of Axmear et al., indicating that the digital voices used by AAC devices can be difficult for non-native speakers to understand (2005). When the family was not understanding the output of the device in their L2, they used it less. When the device was changed to their L1, they used the device more.

Results from the self-perception scoring pre-and post-intervention indicate that FD's mother felt she knew how to use her son's device better and she felt more comfortable when using the device, following the provision of therapy services and an available device vocabulary in her L1. The Likert scales indicated no increase or decrease in her knowledge of when to use the device with her son, which she reported as the area in which she felt most confident. It is important to note that this Spanish vocabulary was available prior to the beginning of this study, but the family had received no education on how to use it and download a Spanish-speaking voice. Therefore, they did not use it. FD's mother and sister had taken a class to learn about the AAC device when FD first received it. While the class had been offered in English with an interpreter, FD's mother reported that she was unable to follow along or ask questions and did not gain anything from the class. She reported in an interview, that she learned much better through this study's intervention where the instructions were provided in a one-to-one setting directly in her L1.

The mother reported that the most helpful aspect of the intervention was the guidance she received with the technical aspects of the device that had made her uncomfortable with the device prior to the study. Of particular help, were learning how to use guided access, learning

how to turn editing on and off on TouchChat, and learning how to switch between FD's English profile to his Spanish profile on the device. Learning to use guided access was of particular importance as the school was becoming frustrated with the family's use of the device at home because FD was using the device to look at pictures and play games. The school wanted his mother to lock the device using guided access, however his family did not know how to do this.

It is important to note that these interviews and the Likert scales were completed in the presence of the lead researcher. Therefore, response bias may be a factor in the results achieved regarding participant perception and use of the device. This bias may be present due to the personal involvement of the principle investigator in the intervention and the positive relationship that was formed between the researcher and the family through the therapy sessions. This personal relationship or the family's own personal investment in a positive outcome may have contributed towards a potential response bias in the data.

Validity

Ecological validity is defined as "The confidence with which the conclusions of an empirical investigation can be generalized to naturally occurring situations in which the phenomenon under investigation occurs" (Colman, 2015). The implementation of this study during regular therapy sessions indicates a strong ecological validity for the results. However, it is important to note that the intervention for this study was carried out by researchers with proficiency in both languages spoken by the participant and a foundational knowledge of AAC. Given the small number of SLPs who are fluent in another language and have expertise in the field of AAC, the intervention conducted during this case study is not a plausible option for all SLPs to carry out. Future research will need to examine bilingual AAC intervention using an interpreter.

Implications and Future Recommendations

An important finding of this study is that the provision of therapy in Spanish, the home language of the participant and a language mutually spoken by the participant and SLP, seemed to constitute an effective and culturally and linguistically appropriate intervention for this participant. However, this was a case study of one individual, therefore more research is needed before conclusions can be made about bilingual AAC vocabularies and language intervention for individuals with complex communication needs. The positive reactions and increased knowledge by the family in addition to the progress shown by the participant in therapy, indicate that bilingual AAC intervention was beneficial for this individual and his family and should be further explored with other individuals in similar situations in order to gain a larger body of evidence in the area of bilingual AAC. Further research with higher levels of evidence (e.g. single subject design studies, randomized controlled trials) is needed to better understand the effects of bilingual AAC.

Additional further studies should examine the effects of providing therapy in a bilingual format from the same clinician in order to control for variables and better examine the effect of using both languages on each language. Further research is also needed into the use of codeswitching and AAC, as well as using interpreters when conducting bilingual AAC intervention and evaluations.

References

American Speech-Language-Hearing Association. (2010). *Code of ethics* [Ethics]. Available fromwww.asha.org/policy.

Andres, P. (2006). Developing an appropriate icon set for a Mandarin Chinese augmentative communication system. International Journal of Computer Processing of Oriental Languages, 19, 275–283.

Angelo, D., Jones, S., & Kokoska, S. (1995). Family perspective on augmentative and alternative communication: Families of young children. *Augmentative and Alternative Communication*, *11*(3), 193-202. Doi: 10.1080/07434619512331277319.

Axmear, E., Reichle, J., Alamsaputra, M., Kohnert, K., Drager, K., & Sellnow, K. (2005). Synthesized Speech Intelligibility in Sentences; A Comparison of Monolingual English-Speaking and Bilingual Children. *Language, Speech, and Hearing Services in Schools*, *36*(3), 244-250.

Bailey, R. L., Parette, H. P., Stoner, J. B., Angell, M. E., & Carroll, K. (2006). Family members' perceptions of augmentative and alternative communication device use. *Language, Speech, and Hearing Services in Schools*, *37*(1), 50-60. doi:10.1044/0161-1461(2006/006).

Baker, B. R., & Chang, S. (2006). A Mandarin language system in Augmentative and Alternative Communication (AAC). International Journal of Computer Processing of Oriental Languages, 19, 225 – 237.

Banajee, M., Stricklin, S., & DiCarlo, C. (2003). Toddler vocabulary arranged by frequency. *Augmentative and Alternative Communication*.

Bialystok, E. (2007). Cognitive effects of bilingualism: How linguistic experience leads to cognitive change. International Journal of Bilingual Education and Bilingualism, 10, 210–223.

Binger, C., Light, J. (2007). The effect of aided AAC modeling on the expression of multi-symbol messages by preschoolers who use AAC. *Augmentative and Alternative Communication*. *23,* 30–43.

Bird, E. K. R., Lamond, E., & Holden, J. (2012). Survey of bilingualism in autism spectrum disorders. International Journal of Language and Communication Disorders, 47(1), 52–64. http://doi.org/10.1111/j.1460-6984.2011.00071.x

Bird, E.K.R., et al. (2005). The language abilities of bilingual children with Down syndrome. *American Journal of Speech-Language Pathology*14.3 187-199. doi:10.1044/1058-0360(2005/019)

Blockberger, S., Sutton, A., & Light, J. (2003). Toward linguistic competence: Language experiences and knowledge of children with extremely limited speech. *Communicative competence for individuals who use AAC,* 63-106.

Brady, N. C., & Halle, J. W. (2002). Breakdowns and repairs in conversations between beginning AAC users and their partners. *Exemplary practices for beginning communicators: Implications for AAC,* 323-351.

Bridges, S. J. (2004). Multicultural issues in augmentative and alternative communication and language: Research to practice. *Topics in Language Disorders, 24*(1), 62-75.

Browder, D. M., Mims, P., Spooner, F., Ahlgrim-Delzell, L., & Lee, A. (2008). Teaching elementary students with multiple disabilities to participate in shared stories. Research and Practice for Persons with Severe Disabilities, 33,3 Y12.

Bruno, J., Trembath, D. (2006). Use of aided language stimulation to improve syntactic performance during a weeklong intervention program. *Augmentative and Alternative Communication*. *22* 300–313.

Burgoyne, K., Duff, F. J., Nielsen, D., Ulicheva, A., & Snowling, M. J. (2016). Bilingualism and Biliteracy in Down Syndrome: Insights from a Case Study. *Language Learning*.

Carter, M., & Maxwell, K. (1998). Promoting Interaction with Children using Augmentative Communication through a Peer-directed Intervention. *International Journal of Disability, Development and Education*, *45*(1), 75-96. doi: 10.1080/1034912980450106

Colman, A. (2015). ecological validity. In A Dictionary of Psychology: Oxford University Press. Retrieved 14 Jul. 2016, from http://0-www.oxfordreference.com.libraries.colorado.edu/view/10.1093/acref/9780199657681.001.0001/acref-9780199657681-e-2613.

Dada, S. & Alant, E. (2009). The effect of aided language stimulation on vocabulary acquisition in children with little or no functional speech. *Am J Speech Lang Pathol*ogy, 18(1), 50-64. doi: 10.1044/1058-0360(2008/07-0018).

de Houwer, A. (2007). Parental language input patterns and children's bilingual use. Applied Psycholinguistics, 28, 411–424.

Eilers, R., & Oller, K. (2003). Language and literacy in bilingual children: The Miami experience. Symposium presented at the Society for Research in Child Development Biennial Meeting, Tampa, Florida.

Francis, N. (2005). Research findings on early first language attrition: Implications for the discussion on critical periods in language acquisition. Language Learning, 55, 491–531.

Fredman, M. (2006). Recommendations for working with bilingual children – prepared by the Multilingual Affairs Committee of IALP. Folia Phoniatrica et Logopaedica, 58, 458–464.

Gathercole, V., & Thomas, E. (2009). Bilingual first-language development: Dominant language take-over, threatened minority-language take-up. Bilingualism, Language and Cognition, 12, 213–237.

Gutierrez-Clellen, V. (1999). Language choice in intervention with bilingual children. American Journal of Speech-Language Pathology, 8, 291–302.

Gutiérrez-Clellen, V. F., Simon-Cereijido, G., & Leone, A. E. (2009). Code-switching in bilingual children with specific language impairment. *International Journal of Bilingualism, 13*(1), 91-109.

Hakansson, G., Salameh, E., & Nettelbladt, U. (2003). Measuring language development in bilingual children: Swedish–Arabic children with and without language impairment. Linguistics, 41, 255–28.

Hambly, C., & Fombonne, E. (2012). The impact of bilingual environments on language development in children with autism spectrum disorders. Journal of Autism and Developmental Disorders, 42(7), 1342–1352. http://doi.org/10.1007/s10803-011-1365-z

Harris, M. D., Reichle, J. (2004). Impact of aided language stimulation on comprehension and production in children with moderate cognitive disabilities. *American Journal of Speech-Language Pathology*. *13* 155–167.

Harrison-Harris, O. l. (2002). AAC, literacy and bilingualism. ASHA leader 11/5/2002, 7(20), 4–17.

Huer, M. B., Parette, H. P., & Saenz, T. I. (2001). Conversations with Mexican Americans regarding children with disabilities and augmentative and alternative

communication. *Communication Disorders Quarterly*, *22*(4), 197-206. doi: 10.1177/152574010102200405

Iacono, T. (2003). Pragmatic development in individuals with developmental disabilities who use AAC. In J.C. Light, D.R. Beukelman, & J. Reichle (Eds.), *Communicative competence for individuals who use AAC: From research to effective practice (*pp. 323-360). Baltimore: Paul H. Brookes Publishing Co.

Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology*, *59*, 12–19. doi:10.1037/0022-006X.59.1.12

Jia, G., Kohnert, K., Collado, J., & Aquino-Garcia, F. (2006). Action naming in Spanish and English by sequential bilingual children and adolescents. Journal of Speech, Language, and Hearing Research, 49, 588–602.

Jordaan, H. (2008). Clinical intervention for bilingual children: An international survey. Folia Phoniatrica et Logopaedica, 60, 97–105.

Johnson, J. M., Inglebret, E., Jones, C., & Ray, J. (2006). Perspectives of speech language pathologists regarding success versus abandonment of AAC. *Augmentative and Alternative Communication*, *22*(2), 85-99. Doi: 10.1080/07434610500483588

Kan, P.F., & Kohnert, K. (2005). Preschoolers learning Hmong and English: Lexical–semantic skills in L1 and L2. Journal of Speech, Language, and Hearing Research, 48, 372–378.

Kayser, H. (1995). Intervention with children from linguistically and culturally diverse backgrounds. In M., Fey, J. Windsor, & S. Warren (Eds.), Communication and language intervention series, vol. 5. Language intervention: Preschool through the elementary years (pp. 315–331). Baltimore: Brookes.

Kayser, H. (2008). Educating Latino preschool children. San Diego, CA: Plural Publishing Inc.

Kent-Walsh, J., & McNaughton, D. (2005). Communication partner instruction in AAC: Present practices and future directions. Augmentative and Alternative Communication, 21, 195 – 204.

Kohnert, K. (2010). Bilingual children with primary language impairment: Issues, evidence and implications for clinical actions. *Journal of Communication Disorders* 43.6, 456-473. doi: 10.1016/j.jcomdis.2010.02.002

Kohnert, K. (2008). Language disorders in bilingual children and adults. San Diego, CA: Plural Publishing Inc.

Kohnert, K., & Bates, E. (2002). Balancing bilinguals II: Lexical comprehension and cognitive processing in children learning Spanish and English. Journal of Speech, Language, and Hearing Research, 45, 347–359.

Koppenhaver, D. A., Erickson, K. A., & Skotko, B. G. (2001). Supporting communication of girls with Rett syndrome and their mothers in storybook reading. International Journal of Disability, Development and Education, 48, 396Y410.

Kovach, T. M., & Kenyon, P. B. (2003). Visual issues and access to AAC. *Communicative competence for individuals who use AAC: From research to effective practice*, 277-319.

Kummerer, S. (2012). Promising strategies for collaborating with Hispanic parents during family-centered speech-language Intervention. Communication Disorders Quarterly, 33, 84 – 95.

Kummerer, S., & Lopez-Reyna, N.A. (2006). The role of immigrant mothers' beliefs on parental involvement in speech-language therapy. Communication Disorders Quarterly, 27, 83 – 94.

Lang, R., Rispoli, M., Sigafoos, J., Lancioni, G., Andrews, A., & Ortega, L. (2011). Effects of language of instruction on response accuracy and challenging behavior in a child with autism. *Journal of Behavioral Education, 20*(4), 252-259. doi:http://0-dx.doi.org.libraries.colorado.edu/10.1007/s10864-011-9130-0

Light, J. C., Arnold, K. B., Clark, E. A., & Light, J. C. (2003). Finding a place in the "social circle of life". *Communicative competence for individuals who use AAC: From research to effective practice*, 361-397.

Light, J., Beukelman, D., & Reichle, J. (2003). *Communicative competence for individuals who use AAC: From research to effective practice.* Baltimore: Paul H. Brookes Publishing Co.

Light, J. C., Parsons, A. R., & Drager, K. (2002). There's more to life than cookies: Developing interactions for social closeness with beginning communicators who use AAC. *Exemplary practices for beginning communicators: Implications for AAC*, 187-218.

Lonigan, C.J., & Whitehurst, G.J. (1998). Relative efficacy of parent and teacher involvement in a shared reading intervention for preschool children from low-income backgrounds. *Early Childhood Research Quarterly, 13*, 263-290.

Martin, D. (2012). A critical linguistic ethnographic approach to language disabilities in multilingual families. In S. Gardner & M. Martin-Jones (Eds.), Multilingualism, discourse, and ethnography (pp. 305– 360). New York: Routledge.

McCord, S. M., & Soto, G. (2004). Perceptions of AAC: An ethnographic investigation of Mexican-American families. Augmentative and Alternative Communication, 20, 209 – 227.

McEwen, I., & Karlan, G. (1990). Case studies: Why and how. Augmentative and Alternative Communication, 6(1), 69–75.

McNaughton, D., Rackensperger, T., Benedek-Wood, E., Krezman, C., Williams, M. B., & Light, J. (2008). "A child needs to be given a chance to succeed": Parents of individuals who use AAC describe the benefits and challenges of learning AAC technologies. *Augmentative and Alternative Communication*, *24*(1), 43-55. Doi: 10.1080/07434610701421007

Mims, P. J., Browder, D. M., Baker, J.N., Lee, A., & Spooner, F. (2009). Increasing comprehension of students with significant intellectual disabilities and visual impairments during shared stories. *Education and Training in Developmental Disabilities,* 44, 409Y420.

Mineo Mollica, B. (2003). Representational competence. *Communicative competence for individuals who use AAC: From research to effective practice*, 107-146.

Mirenda, P., Bopp, K., Light, J. C., Beukelman, D. R., & Reichle, J. (2003). Playing the game": Strategic competence in AAC. *Communicative competence for individuals who use AAC*, *3*, 401-437.

Nakamura, K., Iwabuchi, M., & Alm, N. (2006). A cross-cultural study on the interpretation of picture-based sentences. International Journal of Computer Processing of Oriental Languages, 19, 239– 248.

Nunes, D., & Hanline, M. F. (2007). Enhancing the alternative and augmentative communication use of a child with autism through a parent-implemented naturalist intervention. International Journal of Disability, Development and Education, 54, 177–197.

Ohashi, J. K., Mirenda, P., Marinova-Todd, S., Hambly, C., Fombonne, E., Szatmari, P., & Thompson, A. (2012). Comparing early language development in monolingual- and bilingual exposed young children with autism spectrum disorders. Research in Autism Spectrum Disorders, 6(2), 890–897. http://doi.org/10.1016/j.rasd.2011.12.002

Parette Jr, H. P., Brotherson, M. J., & Huer, M. B. (2000). Giving families a voice in augmentative and alternative communication decision-making. *Education and Training in Mental Retardation and Developmental Disabilities*, 177-190.

Pearson, B. Z. (2007). Social factors in childhood bilingualism in the United States. Applied Psycholinguistics, 28, 399–410.

Perozzi, J., & Sanchez, M. (1992). The effect of instruction in L1 on receptive acquisition of L2 for bilingual children with language delay. Language, Speech and Hearing Services in Schools, 23, 348–352.

Petersen, J. M., Marinova-Todd, S. H., & Mirenda, P. (2012). Brief report: An exploratory study of lexical skills in bilingual children with autism spectrum disorder. Journal of Autism and Developmental Disorders, 42(7), 1499–1503. http://doi.org/10.1007/s10803-011-1366-y

Pickl, G. (2011). Communication intervention in children with severe disabilities and multilingual backgrounds: Perceptions of pedagogues and parents. Augmentative and Alternative Communication, 27, 229 – 244.

Ratner, N.B. (2006). Evidence-based practice: An examination of its ramifications for the practice of speech-language pathology. Language, Speech, and Hearing Services in Schools, 37, 257–267.

Paradis, J., Genesee, F., & Crago, M. B. (2011). *Dual language development and disorders: A handbook on bilingualism & second language learning* (2nd ed.). Baltimore, MD: Brookes.

Restrepo, M. A., Castilla, A., Schwanenflugel, P., Neuharth-Pritchett, S., Hamilton, C., & Arboleda, A. (2010). Effects of a supplemental Spanish oral language program on sentence length, complexity, and grammaticality in Spanish-speaking children attending English-only preschools. Language, Speech and Hearing Services in Schools, 41, 3–13.

Robillard, M., Mayer-Crittenden, C., Minor-Corriveau, M., & Bélanger, R. (2014). Monolingual and bilingual children with and without primary language impairment: Core vocabulary comparison. *Augmentative and Alternative Communication*, *30*(3), 267-278.

Romski, M. A., Sevcik, R. A., Light, J., Beukelman, D., & Reichle, J. (2003). Augmented input: Enhancing communication development. *Communicative competence for individuals who use AAC*, 147-162.

Rosa-Lugo, L. I., & Kent-Walsh, J. (2008). Effects of parent instruction on communicative turns of Latino children using augmentative and alternative communication during storybook reading. *Communication Disorders Quarterly*, *30*(1), 49-61.

Rowland, C., Schweigert, P. D., Light, J. C., Beukelman, D. R., & Reichle, J. (2003). Cognitive skills and AAC. *Communicative competence for individuals who use AAC: From research to effective practice*, 241-275.

Seung, H.-K., Siddiqi, S., & Elder, J. (2006). Intervention outcomes of a bilingual child with autism. Journal of Medical Speech-Language Pathology.

Sigafoos, J., & Mirenda, P. (2002). Strengthening communicative behaviors for gaining access to desired items and activities. In J.C. Light, D.R. Beukelman, & J. Reichle (Eds.),

*Communicative competence for individuals who use AAC: From research to effective practice (*pp. 123-156). Baltimore: Paul H. Brookes Publishing Co.

Sigafoos, J., O'Reilly, M., Drasgow, E., & Reichle, J. (2002). Strategies to achieve socially acceptable escape and avoidance. In J.C. Light, D.R. Beukelman, & J. Reichle (Eds.), *Communicative competence for individuals who use AAC: From research to effective practice (*pp. 157-186). Baltimore: Paul H. Brookes Publishing Co.

Smith, M. M., & Grove, N. C. (2003). Asymmetry in input and output for individuals who use AAC. *Communicative competence for individuals who use AAC: From research to effective practice*, 163-195.

Soto, G., & Yu, B. (2014). Considerations for the provision of services to bilingual children who use augmentative and alternative communication. *Augmentative and Alternative Communication*, *30*(1), 83-92.

Spooner, F., Rivera, C. J., Browder, D. M., Baker, J. N., & Salas, S. (2009). Teaching emergent literacy skills using cultural contextual story-based lessons. Research and Practice for Persons with Severe Disabilities, 34, 102Y112.

Starble, A., Hutchins, T., Favro, M. A., Prelock, P., & Bitner, B. (2005). Family-centered intervention and satisfaction with AAC device training. *Communication Disorders Quarterly, 27*(1), 47-54. Retrieved from http://0-search.proquest.com.libraries.colorado.edu/docview/213789564?accountid=14503

Thordardottir, E. (2010). Towards evidence-based practice in language intervention for bilingual children. *Journal of Communication Disorders*, *43*(6), 523-537.

Thordardottir, E., Cloutier, G., Ménard, S., Pelland-Blais, E., & Rvachew, S. (2015). Monolingual or bilingual intervention for primary language impairment? A randomized control trial. *Journal of Speech, Language, and Hearing Research*, *58*(2), 287-300.

Thordardottir, E. T., Ellis Weismer, S., & Smith, M. E. (1997). Vocabulary learning in bilingual and monolingual clinical intervention. Child Language, Teaching and Therapy, 13, 215–227.

Trembath, D., Balandin, S., & Togher, L. (2007). Vocabulary selection for Australian children who use augmentative and alternative communication. *Journal of Intellectual and Developmental Disability*, *32*(4), 291-301.doi: 10.1080/13668250701689298

Treviranus, J., Roberts, V., Light, J., Beukelman, D., & Reichle, J. (2003). Supporting competent motor control of AAC systems. *Communicative competence for individuals who use AAC*, 107-145.

Tsybina, I. & Eriks-Brophy, A. (this issue). Bilingual dialogic book reading intervention for preschool children with slow expressive vocabulary development. Journal of Communication Disorders.

Unicomb, R., Colyvas, K., Harrison, E., & Hewat, S. (2015). Assessment of Reliable Change Using 95% Credible Intervals for the Differences in Proportions: A Statistical Analysis for Case-Study Methodology. *J Speech Lang Hear Res*, 58(3), 728-739. doi: 10.1044/2015_JSLHR-S-14-0158.

United States Census Bureau (2014). Language spoken at home; American community survey 5-year estimates. Retrieved July 14, 2016, from http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_S1601&prodType=table.

Valicenti-McDermott, M., Tarshis, N., Schouls, M., Galdston, M., Hottinger, K., Seijo, R., & Shinnar, S. (2013). Language differences between monolingual English and bilingual English Spanish young children with autism spectrum disorders. Journal of Child Neurology, 28(7), 945–8. http://doi.org/10.1177/0883073812453204

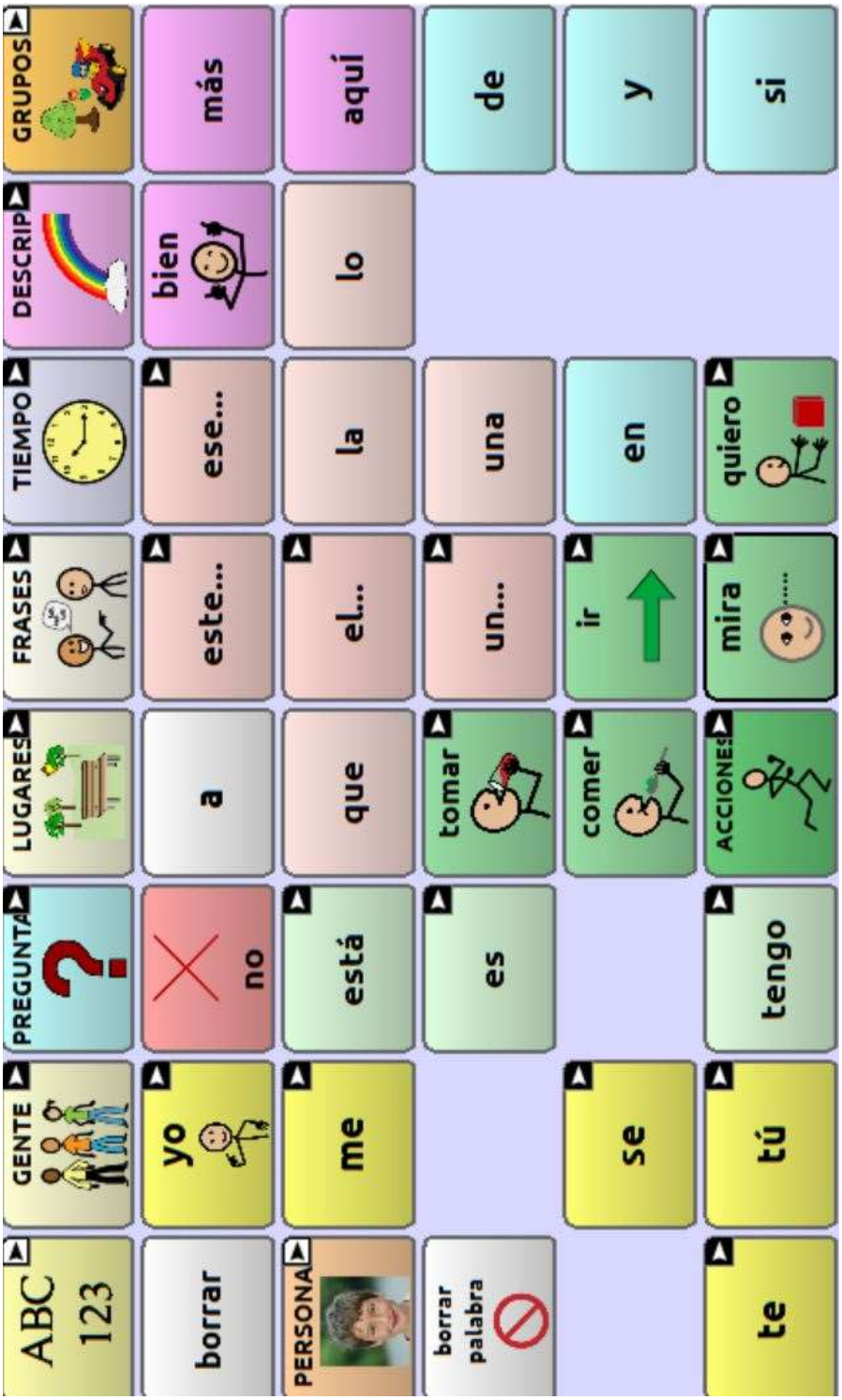
Woll, B., & Grove, N. (1996). On language deficits and modality in children with Down syndrome: A case study of twin's bilingual in BSL and English.

Wong-Fillmore, L. (2000). Loss of family languages: Should educators be concerned? Theory into Practice, 39, 203 – 210.

Yong, S. (2006). Comparison of outcomes of an augmentative and alternative communication system used by an English and a Mandarin Chinese speaker – A clinical perspective. International Journal of Computer Processing of Oriental Languages, 19, 263– 273.

.

Appendix A


ABC 123
GENTE
PREGUNTA
LUGARES
FRASES
TIEMPO
DESCRIP
GRUPOS
borrar
yo
no
a
este...
ese...
bien
más
PERSONA
me
está
que
el...
la
lo
aquí
borrar palabra
es
tomar
un...
una
de
se
comer
ir
en
y
ACCIONES
mira
quiero
te
tú
tengo
si

Appendix B

¡Quiero Comer!

¿Qué piensas la chica quiere comer?

¡Mamá, *quiero comer!*

¿Qué quieres comer?

¿Te gusta o no te gusta las manzanas?

Quiero comer una manzana.

¿Te gusta o no te gusta pastel?

Quiero comer pastel.

¿Te gusta o no te gusta las hamburguesas?

Quiero comer una hamburguesa con queso.

Quiero comer _____.