2015

Effects of early intervention on pragmatic language in children with autism

Charlotte L. Tomevi
Eastern Washington University

EFFECTS OF EARLY INTERVENTION ON PRAGMATIC LANGUAGE IN CHILDREN WITH AUTISM

A Thesis

Presented to

Eastern Washington University

Cheney, Washington

In Partial Fulfillment of the Requirements

for the Degree

Master of Science in Clinical Psychology

By

Charlotte L. Tomevi

Spring 2015

MASTER'S THESIS

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Abstract

Autism appears in the first three years of a child's life, involving impairments in social and verbal and nonverbal communication. Children with Autism Spectrum Disorder with core deficits in social and communication, struggle to effectively accomplish social interactive goals through pragmatic language. Early intervention programs may strengthen expressive communication and increase functional communication by some children with autism. The current study examined if participation in an intensive early intervention program increases functional communication in social situations with children with autism. I hypothesized that participation in an early learning program would increase functional communication in social situations for children with autism. Results indicated that all three children decreased their ADOS-2 scores on module two posttest when compared to module one pretest, demonstrating a decrease in symptoms of autism. Results of functional communication demonstrated that participation in the early learning program did not increase functional communication, however participation did increase the types of functional communication used by all three children. At the end of the intervention each child was able to discriminate between different types of functional communication and utilize their new behaviors to communicate.

Keywords: autism, early intervention, communication, pragmatic, language

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Effects of Early Intervention on Pragmatic Language in Children with Autism

Autism appears in the first three years of a child's life. Autism spectrum disorder (ASD) is characterized by delays or abnormal functioning in social interaction and impairments in communication as well as demonstrations of restrictive, repetitive and stereotyped patterns of behavior and interests (American Psychiatric Association, 2013). According to the Centers for Disease Control and Prevention (2014), approximately 1 in 68 children have been identified with ASD. There has been an estimated 30% increase since 2008 and a 120% increase in identifying children with ASD in the United States since 2000 and 2002. The estimates are based on health and special education records of 9% of 8-year-olds with and without documented diagnosis of ASD that lived in the United States in 2010. The estimates were collected from the Autism and Developmental Disabilities Monitoring Network consisting of 11 areas in the United States (Alabama, Arizona, Arkansas, Colorado, Georgia, Maryland, Missouri, New Jersey, North Carolina, Utah, and Wisconsin). The etiology and cause of ASD remains unknown, however ASD is a developmental disability and potentially may be caused by differences in the brain (Centers for Disease Control and Prevention, 2014). A recent study conducted by Fujita-Jimbo et al. (2015), examined the genetic etiology and potential imbalances of pathogenesis of ASD in the brain. Findings suggest a disturbance in the formation of neurons decreased transportation and synthesis of GPR865, a protein that helps determine brain size and regulate neural and synaptic plasticity, and modulate behaviors such as learning and memory. In addition, Kasarpalkar, Kothari, and Dave (2014), suggest that the Brain-Derived Neurotrophic Factor (BDNF), a widely distributed neurotrophin, which plays a pivotal role in the functioning of the Central Nervous System, is the target

for the MeCP2 gene that is key in the epigenetic regulation of gene expression in ASD. Further examination is needed to understand the roles of molecular pathogenesis and gene expression resulting in ASD. In addition to recent studies examining differences in the brain, diagnostic factors may also influence the prevalence rates of ASD.

The factors that contribute to the increase in ASD diagnosis remain unknown, however the increase may be due to how local communities are diagnosing and serving children identified with ASD. Local communities may provide special services, have more education about diagnosis and treatment, or better access to funding. In addition, the largest increases over time were among Hispanic children and African-American children (110% and 91% respectively; Centers for Disease Control and Prevention, 2014). Increase in ASD diagnosis may be due to the rise in awareness and improvement of identification among these groups. Further, the use of the ASD label in educational settings to establish eligibility for services, the broadening of diagnostic construct of strictly defined autism spectrum disorder, and recently, the changes in diagnostic criteria have influenced the increase of identification over time (McPartland, Reichow, & Volkmar, 2012).

With the increase in prevalence of ASD, there is an increased demand for early intensive intervention programs (Bolton & Mayer, 2008). Researchers suggest that children with ASD that receive early intervention will substantially improve poor language deficits, cognition, and social interactions (e.g., Harris & Handleman, 2000; Jocelyn, Casiro, Beattie, Bow, & Kneisz, 1998; Kelley, Paul, Fein, & Naigles, 2006; Lord, 2006). A critical behavioral indicator of the social deficits is that people with autism have difficulty expressively and receptively communicating with others in their

environment (Zwaigenbaum et al., 2005). Receptive language is the ability to understand and comprehend language that is heard or read. Expressive language means being able to put thoughts into words and sentences that are grammatically correct and logical. In a longitudinal analysis of expressive language development, children with ASD and lower verbal abilities benefitted from more intensive intervention that concentrated on both expressive and receptive language abilities and nonverbal language skills (Tek, Mesite, Fein, & Naigles, 2014).

The use of social or pragmatic language is used to examine the communication deficit of requesting and sharing information in children with ASD. Pragmatic language is comprised of three components: language usage (different purposes, such as greeting, manding, and tacting), changing language (according to needs of the listener), and following rules (i.e., taking turns, staying on topic, or use of facial expressions and eye contact). Children with ASD with core deficits in social and communication, struggle to effectively accomplish social interactive goals through pragmatic language. In addition, children with ASD demonstrate deficits in functional skills that are more evident than deficits in their cognitive functioning (Carpentieri & Morgan, 1996).

Another language issue children with ASD struggle with is requesting and sharing information and responding to questions (Kelley, Paul, Fein, & Naigles, 2006). Matson, Sevin, Box, Francis, and Sevin (1993) examined the spontaneous or self-initiated speech. Children with autism often lack the ability to respond to verbal prompts for daily communication, therefore it is an important goal to examine communication skills and strategies for teaching children to initiate language. In the last decade, an interest in spontaneous communication in children with autism has increased (Ingersoll, Dvortcsak,

Whalen, & Sikora, 2005). To gain a better understanding of how spontaneous communication occurs in children with autism, researchers examined early communication skills.

Communication training and speech and language interventions have been extensively researched and remain a central focus for treating children with autism (e.g., Donaldson, 2015; Goldstein, 2002; Kane, Connell, & Pelleccia, 2010; Larue, Weiss, & Cable, 2009; Matson, Sevin, Box, Francis, & Sevin, 1993). An effective form of communication training is applied behavior analysis (ABA), which is derived from the principles of operant learning. ABA has been found to be an effective form of communication training (Axelrod, McElrath, & Wine, 2012; Goldstein, 2002; Matson et al., 1993). In the past 20 years, large-scale controlled studies have demonstrated that children who receive more than 25 hours per week of ABA therapy for more than one year improve their communication skills. Additionally, some children achieve functioning in communication within the average range for their age (Granpeesheh, Tarbox, & Dixon, 2009). Further, empirical results from behavioral interventions indicated that children with ASD can build complex behaviors of language (Lovaas, 1987). Lovaas conducted a study consisting of 40 hours per week of early intensive behavioral intervention that emphasized language skills. The results indicated that there was a significant improvement in language development and the children were successfully mainstreamed with their typically developing peers. ABA treatment programs for children and adults with autism are effective in addressing language and social skills deficits (Granpeesheh, Tarbox, & Dixon, 2009).

One of the most frequently used techniques in the treatment for ASD is discrete

trial training (DTT) (Smith, 2001). DTT is an instructional approach that utilizes the principles of ABA, using an individualized treatment that simplifies instruction to enhance the student's learning (Smith). One of the main uses of DTT is teaching children with autism new behaviors or actions that the child could not previously perform (Smith). Carr and Kologinsky (1983) demonstrated an increase in spontaneous signed request compared to baseline with six children with autism using DTT. Further, DTT is used to teach the child how to incorporate new behaviors into their repertoire and to make new discriminations. DTT is a one-to-one instructional approach used to teach a specific skill in a controlled, systematic series of repetitive steps using intensive shaping, prompting, prompt fading, and reinforcement strategies leading to eventual fading of the prompting and mastery of the target component (Paul, 2008). To reinforce desired skills or behaviors, positive praise and/or tangible stimuli are used (e.g., toy, food, or activity such as singing a song). The primary goals for DTT are to teach new behavior, teach discrimination, and to promote generalization through different settings and situations (Smith).

With ASD increasing in prevalence due to improvement in identifying and diagnosing individuals with ASD, the need for intensive early intervention programs is important for treatment in autism. Empirically-based treatment methods like ABA provide techniques for behavioral change to help individuals with ASD. DTT has been an instructional method effective for teaching new behavior and new discriminations to individuals with autism (Smith, 2001). Because DTT uses a large number of trials presented in a short period, ensures a large number of learning opportunities (Granpeesheh, Tarbox, & Dixon, 2009). DTT is a well-known effective treatment and can

provide an additional foundation for teaching skills necessary to assist in other therapies or treatments (i.e., speech therapy, occupational therapy, and naturalistic approach). Based on the individualized systematic approach of DTT, individuals with autism can receive effective treatments to help them gain skills and behaviors necessary for independence.

To increase understanding in treatment of ASD the current study aims to address if participation in an early learning program may strengthen expressive communication in social situations with children with autism. The current study examines pre and post participation in an intensive early learning program and assesses if participation in an early learning program increases functional communication in social situations (i.e. with caregiver(s), appropriate context, getting needs met) for children with autism.

Method

Participants

Three male children with autism spectrum disorder, diagnosed by a licensed clinical psychologist, and based on the criteria of the American Psychiatric Association were selected for participation (APA, 2013). The participants ranged in age from 5 years old to 5 and half years old. The participants engaged, five days a week, in an inclusive, intensive, and individualized early learning program for children with autism to develop communication and social skills. The participants participated in the early learning program for varying amounts of time, but range from 10 months to 2 and a half years.

Materials

ADOS-2. A revision of the Autism Diagnostic Observation Schedule (ADOS), the ADOS-2 is a semi-structured observational standardized assessment of

communication, social interaction, play, and restricted and repetitive behaviors of Autism Spectrum Disorders (Multi-Health Systems Inc., 2015). The ADOS-2 is used to assess individuals from 12 months through adulthood. The ADOS-2 consists of four modules that are appropriate for children and adults ranging from verbal to nonverbal. Module one is intended for individuals with phrase speech (i.e., non-echoed, three-word utterances, and meaningful word combinations). Module two is for individuals with some phrase speech, but who are not verbally fluent. Module three is for verbally fluent children who have expressive language fluency when producing a range of sentence types, grammatical forms, and logical connections within sentences. Module four is for individuals that are verbally-fluent adolescents and adults who can demonstrate appropriate social communication acquired during play or conversational interview. The ADOS-2 takes approximately 40 min to 60 min to administer. Scoring consists of modules one through four which provide cutoff scores for autism and autism spectrum classifications. In addition, modules one through four comprise a score indicating level of autism spectrum-related symptoms compared to children with ASD who are the same age and have similar language skills.

Procedure

The current study utilized previously collected ADOS-2 evaluation scores and video recordings of the ADOS-2 observations conducted by Inland Center for Autism and Related Disorders (ICARD). The selection for using ADOS-2 module one for pretest measurement and ADOS-2 module two for posttest measurement was determined by a clinical psychologist at ICARD. The current study examined the pretest scores on the ADOS-2, module one and posttest ADOS-2, module two scores. Pre-recorded videos of

observations of module one and module two were obtained from ICARD for data collection. Initial and post recorded observation data of each child was viewed and recorded by a trained observer in a secure lab setting.

Context. The Domino Project was a year-round university-based early learning program for children two to five years of age diagnosed with autism spectrum disorder. The Domino Project ran five days a week for five hours per day and consisted of eight children diagnosed with autism spectrum disorders alongside five children without autism spectrum disorders. Independent treatment programs were designed for each child to help improve communication and social interaction.

Behavioral observation. The dependent measures were collected in indirect and continuous measures by trained observers. A complete observation was conducted in which all instances of the criteria behavior were recorded by video in one minute intervals for 30 total min. The particular behavior measured was the use of functional communication. Pre-intervention and post-intervention observations were compared.

Topographical definition. Functional communication is defined by two criteria. The first is based on the child's body position relative to the other communicator. The direction of the child's frontal portion (i.e., chest) is within approximately 45 degrees of the observer's frontal portion of their body. If the first criterion was met then the second criterion was measured. The second criterion measured the frequency of functional communication that expressed needs, wants, feelings, and preferences. Observations were made for approximately 30 min using one minute intervals to assess interobserver agreement.

Observer training. Observer training consisted of four hours of learning the

topographical definitions by matching the definitions to behavior by observing four training videos provided by the researcher. The two observers independently collected training data using the video recordings of the ADOS-2 module one intake assessment and the ADOS-2 module two exit assessment. Data used for training was collected from the first and second observer and scored independently. Based on the initial observations, feedback was provided for each observer. Then the observers recollected data and were again provided feedback. This process continued until total interobserver agreement reached an acceptable level of 85%.

Interobserver agreement. One observer collected data during a video recorded session. The second observer watched the video at a different time. Interval agreement was calculated using the total of interval agreements for each child by each observer, dividing by 30 time-intervals, and converting the result to a percentage. Interval agreement scores for pretest module one, ranged from 30% to 73% respectively. Interval agreement scores for posttest module two ranged from 26% to 83% respectively. Due to inconsistency in observer two observation scores, the scores of observer one were retained and used for data analysis (See Figure 1).

Results

ADOS-2 Scores

The pre- post-test analysis of the module one results indicates that all the children's ADOS-2 scores decreased (see Figure 2). The decrease in score indicates a decrease in symptoms of autism.

Functional Communication

During post-observation A. H. demonstrated five types of functional

communication in comparison to pre-observation of the delivery of the ADOS-2, where he used only two types of functional communication. D.C. demonstrated an increase in types of functional communication during post-observation using six types in comparison to using four types of functional communication during the pre-observation delivery of the ADOS-2. D. M. demonstrated using four types of functional communication for both pre- and post-observation of the delivery of the ADOS-2. Even though, the number of types of functional communication used by D. M. did not change from pre-observation to post-observation, he used a new type functional communication to communicate. (see Figures 3,4,5, and 6).

Discussion

Research suggests, that children with ASD that receive early intervention will substantially improve their language deficits, cognition, and social interactions (e.g., Harris & Handleman, 2000; Jocelyn, Casiro, Beattie, Bow, & Kneisz, 1998; Kelley, Paul, Fein, & Naigles, 2006; Lord, 2006). My goal was to expand on previous research regarding functional communication in social situations for children with autism spectrum disorder. I examined seven facets of functional communication which included request attention, request help, request preferred food and objects, request preferred activity, show you something or someplace, request break, and protest or reject a situation or activity.

The results from the current study show that all three children experienced a decrease in severity of autism according to the ADOS-2 modules one and two. The purpose for using module one for pre-observation and module two for post-observation was determined by a clinical psychologist at ICARD, who conducted the ADOS-2

assessment for the children who participated in this study. Selecting to use module one for pre-observation and module two post-observation may be due to the fact that module two encompasses communication indicators from module one, while measuring the increase in phrase speech. Furthermore, the determination to use module two post-observation could be attributed to obtaining a more accurate measurement of the child's severity of symptoms of autism.

The results of functional communication types used by each child showed an increase for A. H. and a decrease for both D. C. and D. M. A. H. experienced a decrease in one type of functional communication (show you something or someplace) and demonstrated an increase in types of functional communication using five out of seven types in post-observation. The increase in types of functional communication shows that A. H. was able to demonstrate functional communication in more various forms as compared to the initial observation. D. C. increased using four types of functional communication, two of which are new behaviors (request attention, request help, request preferred food or object, and protest or reject a situation or activity). Not only did D. C. demonstrate an increase in use of types of functional communication in post-observation compared to pre-observation, he demonstrated that he can use functional communication to meet his needs. D. M. demonstrated four types of functional communication for both pre- and post-observation, however, D. M. increase in request preferred food and objects and used a new type of functional communication, protest or reject a situation or activity. The decrease in post-observation scores for D. M. may be due to extraneous factors such as tiredness, which was confirmed by his mother during post-observation. Regardless of D. M. demonstrating that he was tired during post-observation he was able to use

functional communication to meet his needs during the delivery of the ADOS-2. Despite the fact that there was an increase of functional communication for only A. H., all three children increased in their types of functional communication used from pre-observation to post-observation. The current study demonstrates that DTT programs integrated in the Domino Project, helped all three children to increase in types of functional communication and discriminate in social situations.

As previous researchers have demonstrated ABA continues to be an effective form of communication training for children with autism (Axelrod, McElrath, & Wine, 2012; Goldstein, 2002; Matson et al., 1993). The early learning program, the Domino Project, integrated DTT programs into classroom instruction to teach participating children communication skills to increase the use of functional communication. Utilizing DTT to teach these three children new behaviors and build upon what was already integrated into their repertoire, each child was able to discriminate between the various facets of functional communication and utilize their new behaviors to communicate. Research suggests that children with language delays in expressive language may benefit from a comprehensive treatment that targets both receptive and expressive language abilities as well as nonverbal language skills (Tek, Mesite, Fein, & Naigles, 2014). According to Tek et al. (2014), long-term outcomes are strongly correlated with language functioning early in life. By participating in the early learning program, the Domino Project, the objective was that all three children will continue to build their functional communication and generalize to different settings and situations.

Due to the increase in prevalence of ASD and the improvement in identifying and diagnosing individuals with ASD it is important that children receive intensive early

intervention services. Based on the results of the current study these three children benefited from the early learning program, the Domino Project. Some of the success of the Domino Project can be attributed to utilizing empirical-based treatments such as DTT. DTT is an instructional method that is effective in teaching new behavior and new discrimination to individuals with autism (Smith, 2001). Furthermore, the systematic approach of DTT can be effectively applied in clinical settings as well as home-based and school-based settings (Paul, 2008).

According to Carpentieri and Morgan (1996), individuals with autism when compared to their typical age peers were significantly more impaired in verbal reasoning abilities and substantially more impaired in everyday socialization and communication skills. Therefore, providing individuals with autism opportunities to better their lives can be achieved by using intensive early intervention services.

Children who were enrolled in an intensive early intervention program before 48 months of age were more likely to achieve inclusive educational placement in a regular education class than children who began after that age (Harris & Handleman, 2000). Furthermore, children who receive more than 25 hours per week of ABA for more than one year improve and some children achieve functioning within the average range for their age (Granpeesheh, Tarbox, & Dixon, 2009). According to the results from the current study, A. H. and D. C. participated 25 hours a week in the learning program for approximately two and half years in comparison to D. M. who participated in the early learning program 25 hours a week for approximately ten months. The length of time the children participated in the early learning program in the current study is not consistent with the findings in the study conducted by Granpeesheh, Tarbox, and Dixon (2009). The

length of time a child remains in an early intensive program may increase their functional communication.

A major limitation in the current study was the lack of interobserver agreement. This limitation was attributed to the lack of training and exposure in observing children with ASD by observer two. In future studies to improve interobserver agreement additional training sessions are necessary to help differentiate behaviors observed in a child with autism compared to a child without autism and to increase understanding of the symptoms exhibited by children with autism. Another limitation in the current study was using previously recorded videos. The use of previously recorded videos limited the examination of functional communication.

In future studies, using data that was not previously collected would provide an understanding of how effectively children are using functional communication. Then effective use of functional communication may also help increase the deficits in verbal reasoning in individuals with autism, which contributes to their impairment in everyday socialization and communication skills (Carpentieri & Morgan, 1996). Furthermore, the current investigation could also help to bring understanding of how functional communication may generalize across settings. In future studies to better understand how functional communication is used in social situations it would be beneficial for future researchers to examine the generalization of functional communication across various settings and which facets are used and how often.

In summary, these findings suggest that the early learning program, the Domino Project did not increase functional communication, however the Domino Project did increase the types of functional communication used by the children. The focus of the

early learning program was to provide experiences for the children to engage with peers without autism to generalize their social and communication skills learned through integrated DTT programs. Participation in early intensive intervention programs can help some children with ASD gain communication skills and new behaviors necessary to strengthen types of functional communication used and improve social interaction.

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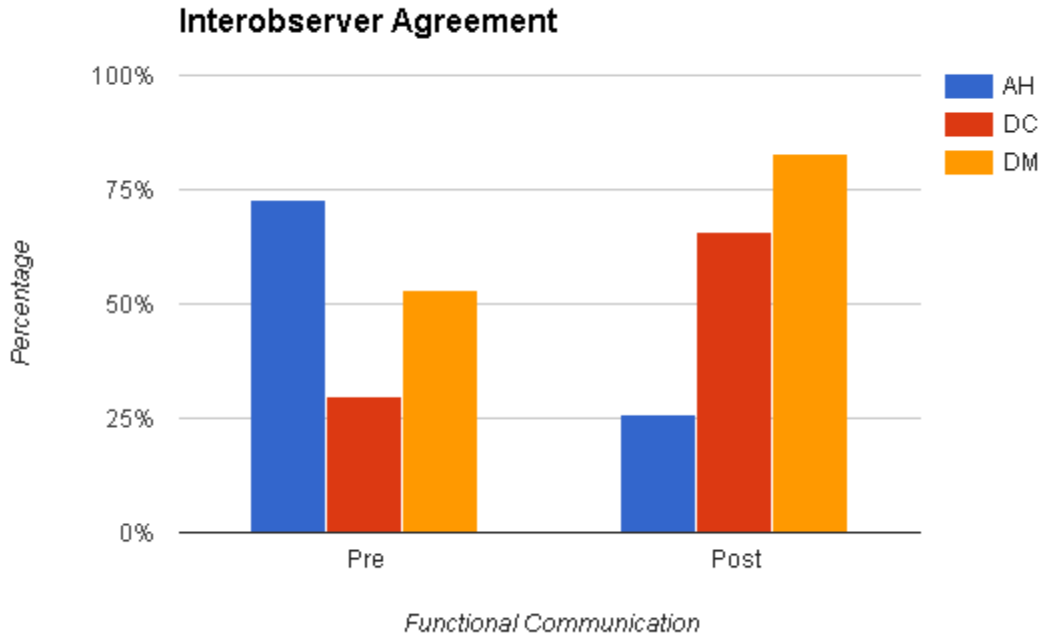

Figure 1. Interobserver Agreement. Functional communication pre and post observation scores.

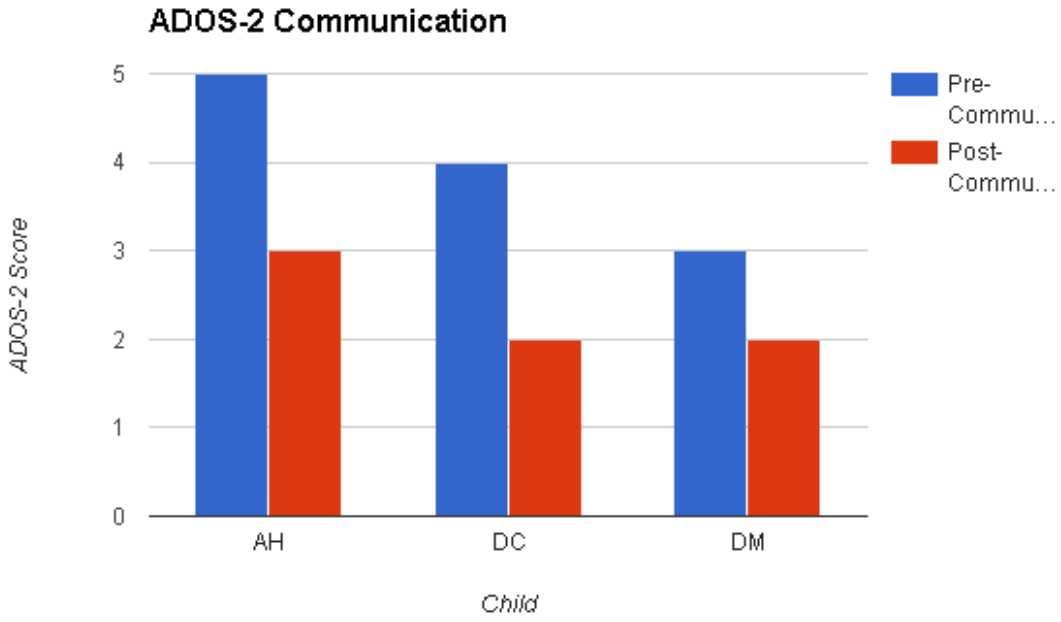

Figure 2. ADOS-2 Communication. Module one pretest and Module two posttest scores. Lower scores indicate fewer number of symptoms of Autism.

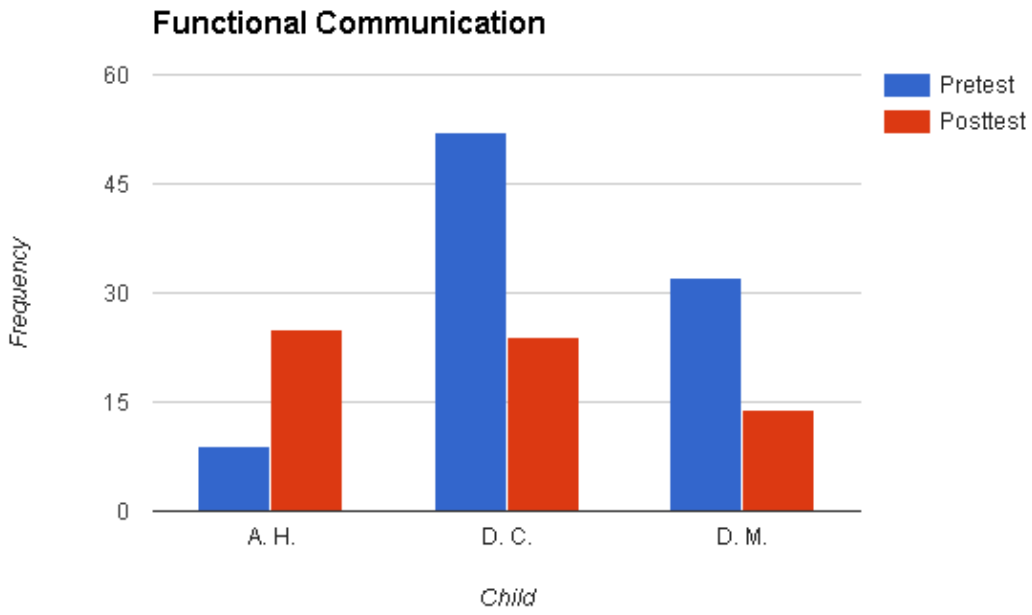

Figure 3. Functional communication. Module one pretest and module two posttest scores. Lower scores indicate the child used fewer types of communication.

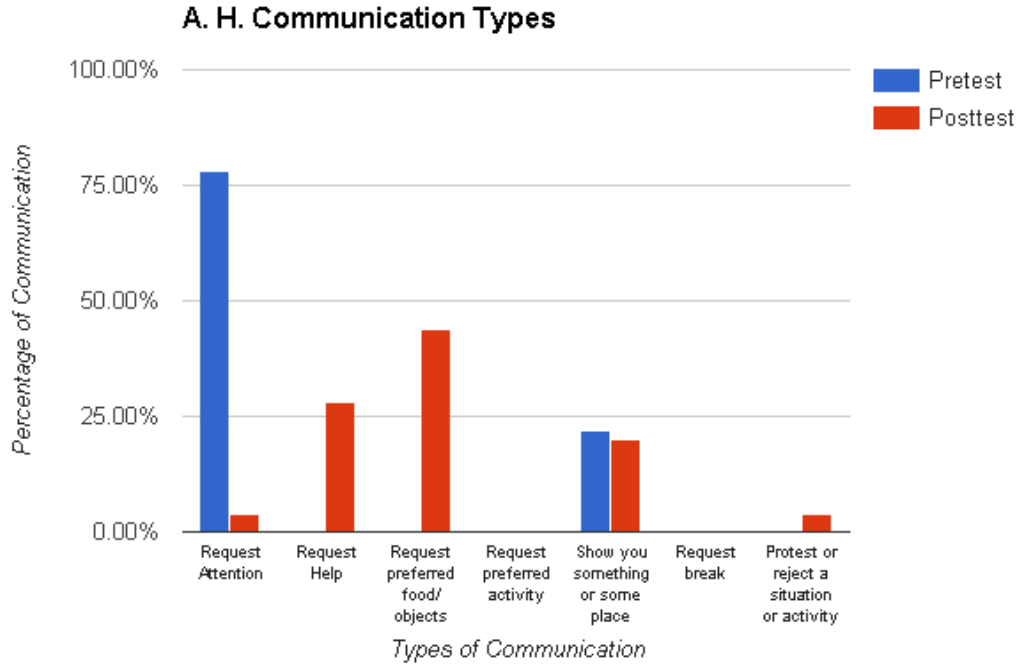

Figure 4. A. H. Communication Types. Module one pretest and module two posttest scores. Lower scores indicate the child used fewer types of communication.

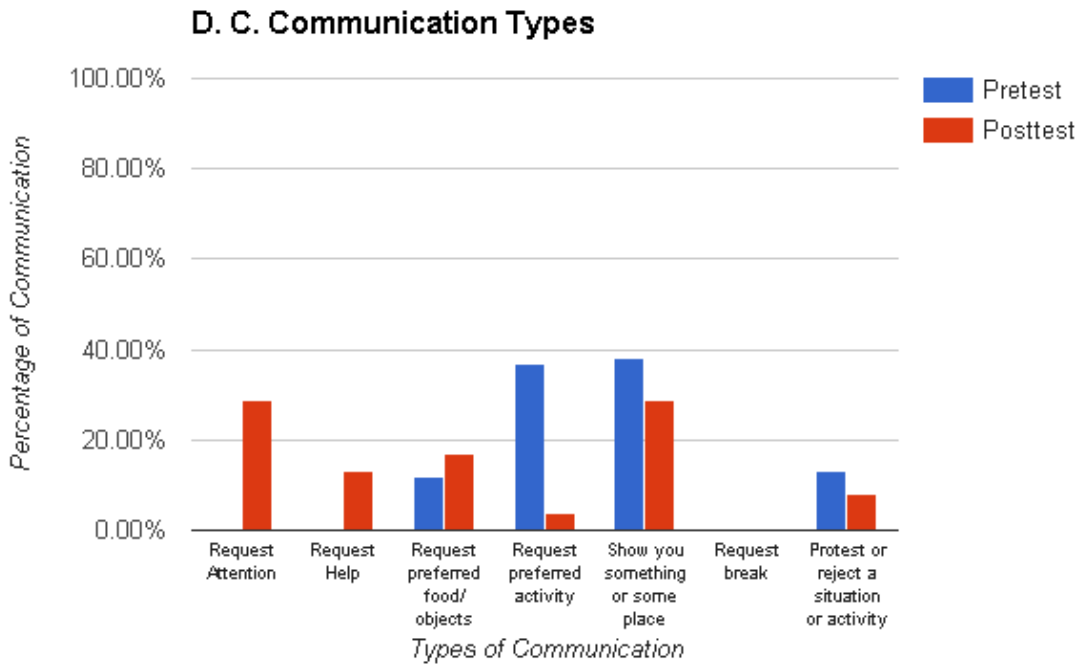

Figure 5. D. C. Communication types. Module one pretest and module two posttest scores. Lower scores indicate the child used fewer types of communication.

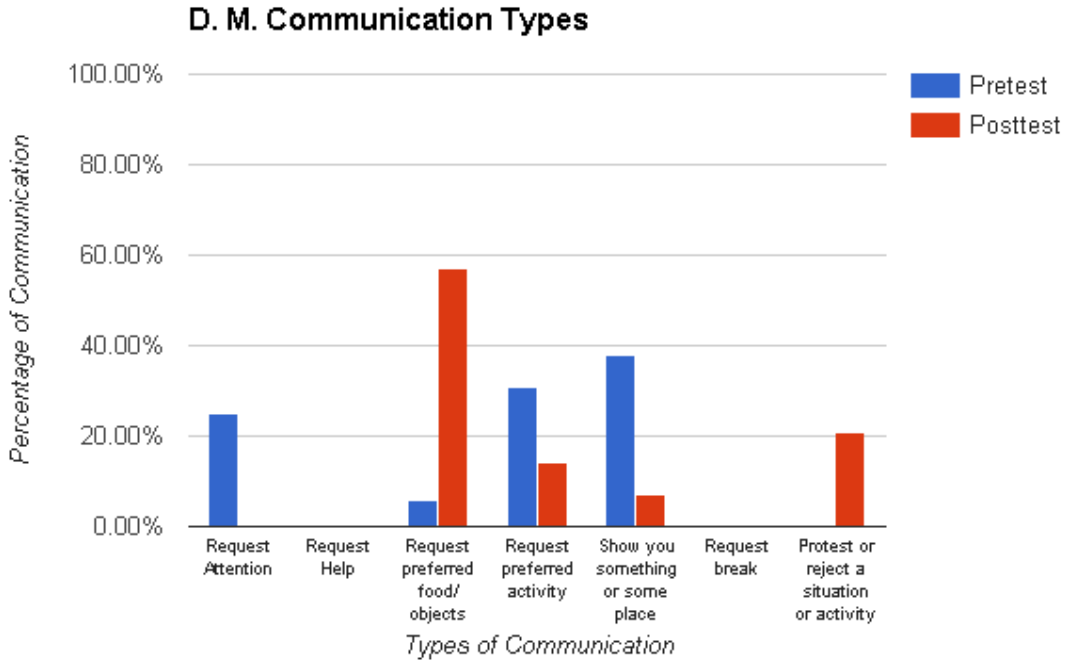

Figure 6. D. M. Communication type. Module one pretest and module two posttest scores. Lower scores indicate the child used fewer types of communication.

Curriculum Vita

Author: Charlotte L. Tomevi

Undergraduate Schools Attended: Boise State University

Degrees Awarded: Bachelor of Science in Psychology, 2013, Boise State University

Honors and Awards:

2010-2013	McNair Scholar
2011-2012	McNair Scholar Program Research Fellowship
2012	Research Scholar Award

Professional Experience: Internship, Northwest Autism Center, Spokane, Washington 2013-2015