IMITATION OF SIGN LANGUAGE IN YOUNG CHILDREN WITH AUTISM:

VIDEO MODELING VERSUS IN VIVO MODELING

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ABSTRACT

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The purpose of this study was to determine if video modeling of sign language is more effective than in vivo modeling in teaching sign language to children with autism. Three 2-year-old children participated in sessions of video modeling and in vivo modeling. During video modeling sessions, participants watched a video of one segment of *Signing Time Volume I: My First Signs.* During in vivo sessions, the researcher modeled the same script from the video. Sessions were video-recorded for later scoring. Volunteers graded the responses as "attempts made" and scored the quality of each attempt. All three children responded to both video and in vivo modeling. The number and quality of signing attempts varied across sessions and conditions presented. There did not appear to be a difference between responses to in vivo and video modeling. However, video modeling can be an alternate approach to teaching sign language to children with autism.

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CHAPTER I

INTRODUCTION

Autism is a neurobiological disorder in which children show deficits in three main areas: communication, social skills, and an increase in repetitive or stereotypical behaviors (American Psychiatric Association [APA], 1994). These impairments usually appear before the age of 3 years (National Institute on Deafness and other Communication Disorders [NIDCD], 2008). Coexisting with these impairments are associated features, such as problems with attention, cognition, motor skills, and sensory processing (Rice, 2007).

The incidence of autism has increased over the last 2 decades (Boulware, Schwartz, Sandall, & McBride, 2006). Current estimates are that 1 in 150 children has one of the autism spectrum disorders (ASD) (Center for Disease Control [CDC], 2007). Children are now being diagnosed at an earlier age, often before the age of 3 years (Boulware, et al 2006). Studies have shown that providing intervention at an earlier age has a greater impact than beginning treatment at a later age (Jordan, 2004). With the increase of early diagnosis of ASD, therapists in early intervention have seen an increase in the number of children with autism referred for treatment. Children with ASD have problems with motor planning and imitation (Ming, Brimacombe, & Wagner, 2007). This makes it difficult to learn sign language through traditional methods as a means of

communication. Traditional approaches to teach sign language to children with autism include in vivo modeling and hand-over-hand techniques. There have been many studies which involve the use of video modeling to teach a variety of skills to children with autism, such as social skills (Nikopoulos & Keenan, 2007), pretend play (MacDonald, Clark, Garrigan & Vangala, 2005), and perspective-taking (LeBlanc, Coates, Daneshvar, Charlop-Christy, Morris, & Lancaster, 2003). One possible way to teach sign language to children with autism is by using a sign language video. The purpose of this study is to determine the effectiveness of video modeling of sign language versus in vivo modeling to teaching sign language to children with autism.

CHAPTER II

LITERATURE REVIEW

Sign language facilitates speech in normal children (Acredolo & Goodwyn, 1990; Acredolo & Goodwyn, 1997; Daniels, 1994; Daniels, 1996; Goodwyn & Acredolo, 1993; Goodwyn, Acredolo, & Brown, 2000). One reason is that signing uses larger muscle groups, as opposed to verbal speech, which requires the intricate skills of smaller muscles (McLaughlin, 1998). Therefore, learning to sign is easier than learning to speak. Children normally begin to develop the ability to use gestures to communicate at the age of 6 to 10 months. This is long before a child has the physical capability for oral speech. Gestures are also an important and natural part of communication. Babies are able to symbolize, to form a visual picture of an object in their minds (Coe, nd). Gesturing continues to develop alongside speech. Even adults use gesturing with their hands while they are speaking. Neurological research also supports the use of gesturing to foster language skills in normal children. When a parent signs, both the visual and auditory pathways are stimulated in the child's brain. Both brain hemispheres are used for sign language, whereas hearing spoken words primarily uses the left hemisphere (Bates, Benigni, Bretherton, Camioni, & Volterra, 1979). Also, by using sign language simultaneously with speech, the child's brain is being stimulated in two ways, by both the signing and the speech (Poizner, Klima, & Bellugi, 1990).

It is well-documented that children with autism have difficulty with motor-planning and imitation (Hertzig, Snow, & Sherman,1989; Vanvuchelen, Roeyers, & Weerdt, 2007; DeMyer et al. 1972). In a study done by Ming et al. (2007), 34% of children with autism showed problems with motor planning. Ingersoll and Gergans (2006) note that children with autism have problems imitating play actions and gestures. Glazebrook, Elliott, and Szatmari (2008) did a study which supports the idea that children with autism have difficulty planning and adjusting their movements if the first movement attempt failed. The importance of imitation begins early in life as a child begins to interact with the parent. (Stone, Ousley, & Littleford, 1997). Meltzoff and Gopnik (1993) propose that an imitation deficit underlies social, communication, and affective problems in children with autism. Charman, Swettenham, Baron-Cohen, Baird, Drew, and Cox (2003) state that early performance with imitation tasks can predict language and play skill development. A study by Ming et al. (2007) indicates that children with autism have deficits with motor-planning. Jansiewicz et al. (2006) did a study that concluded that children with autism have more difficulty with motor skills than normal developing children. In addition, Stone et al. (1997) found that children with autism perform more poorly on motor tasks than children without autism with developmental delays. However, the study showed that motor imitation skills increase between the ages of 2 and 3 years. Children are able to learn through movement, through the kinesthetic sensation (Reynolds, 1995).

There is also a strong relationship between motor-imitation and sign language skills (Soorya, 2003). Furthermore, there is a connection between imitation and language development (Bates et al. 1979). A deficit in imitation underlies problems, such as social skills and communication skills (Meltzoff & Gopnik, 1993). It can be connected to problems with eye contact, expressive language, and receptive language (Dawson & Adams, 1984), which are symptoms associated with autism.

However, there is research to support that children with autism can learn sign language (Bonvillian & Nelson, 1976; Fulwiler & Fouts, 1976). In a study by Benaroya, Wesley, Olgivie, Klein, and Meaney (1977), using a multisensory approach, six children with autism were able to acquire some sign language. Two studies showed that children with autism were able to master signs and improve spontaneous signing with the help of techniques such as prompting, reinforcement, and fading (Carr & Kologinsky, 1983; Salvia, Rowth, Foster, & Lovejoy, 1977). Some studies show that children with autism can generalize to other social situations after learning signs (Bonvillian & Nelson, 1976; Carr, 1987; Fulwiler & Fouts, 1976), or into verbal skills (Benaroya et.al, 1977).

Some children with autism learn signing better with simultaneous communication, rather than signing alone. Simultaneous communication is the presentation of sign language along with verbal speech at the same time. In a study by Yoder and Layton, (1988), 60 children with autism were separated into the following groups of training conditions: Speech alone, sign alone, simultaneous presentation of

sign and speech, and alternating presentation of sign and speech. The simultaneous communication group showed a greater increase in child-initiated speech than the sign alone group. Carr (1979) adds that children with autism with good verbal imitation skills will show improvement in verbal speech with simultaneous communication only, but nonverbal children with autism are not likely to improve verbal skills with simultaneous communication without additional verbal skills training. One study showed no difference between simultaneous communication and signing alone in how fast sign language was acquired (Remington & Clarke, 1983). However, there were only 2 participants in this study.

One way to help children with autism learn sign language is by using sign language videos. The *Signing Time* video series is one video set that is on the market today. The videos are vividly colorful; accompanied by original playful music; simple signs for beginning words are used; and they provide many repetitions of the signs on the video (Bowers, 2003). Studies have been done to investigate the effectiveness of the use of video modeling with children with autism. Video modeling is a technique in which a target behavior is demonstrated on video in hopes that the child will observe the behavior and then perform it. The person modeling the behavior on the video can be a peer (Bellini, Akullian, & Hopf, 2007; Malone & Mirenda, 2006; Nikopoulos & Keenan, 2004; Simpson, Langone, & Ayres, 2004), an adult (D'Anteno, Mangiapanello, & Taylor, 2003; Kinney, Vedora, & Stromer, 2003; MacDonald et al. 2005), or a sibling (Reagon,

Higbee & Endicott 2006). The researcher can also use self-modeling, in which the child being studied is videotaped (Coyle & Cole 2004; Wert & Neisworth, 2003).

There are many reasons that video modeling might be effective with children with autism. Children with autism tend to repeat what they hear (echolalia), and have good memories (Charlop & Milstein, 1989). Children with autism also tend to be visually oriented (MacDowell-Boyer, 2002; Shreibman, 2000) and have good visual processing (DeMyer et al. 1974). According to Grandin (1996), people with autism think in pictures, and also have the ability to learn from passive observation (Biederman & Freedman, 2007). Using video modeling is also time and cost effective (Charlop-Christy, Le & Freeman, 2000; Schreibman, Whalen & Stahmer, 2000). It is also easy to implement (Buggey, Toombs, Gardener, & Cervetti 1999). It does not require social performance (MacDowell-Boyer, 2002), and therefore, is not intrusive (Alcantara, 1994). Because it uses passive observation, it does not require any cueing from caregivers or professionals (Sturmey, 2003).

Video modeling has been studied in a variety of issues with children with autism. There are many studies which have addressed areas of social skills, such as social engagement, social initiation, conversation skills, and compliment-giving skills. Bellini et al. (2007) researched the effect of video modeling on social engagement. The child watched a video of himself interacting with same-aged peers. This was different from other studies in that it used peers instead of adult models, and it did not use any other

intervention such as prompting. Nikopoulos and Keenan (2004) studied complex social sequences and social initiation in a multiple baseline study. Children with autism between the ages of seven and nine years watched a video of typically developing peers interacting in play with the experimenter. The results of this study showed a significant increase in reciprocal play. The effect of video modeling on social initiation was also studied by Buggey (2005). Using video modeling, he studied a number of behaviors, including social initiations. The participants watched a video of themselves performing a targeted behavior. All participants showed immediate and significant gains in social initiations. Charlop and Milstein (1989) studied the effects of video modeling on conversation skills. Three boys with autism watched a video of 2 people having a conversation about a toy. After the boys demonstrated that they had learned the skills, the experiments demonstrated that the boys could generalize what they had learned and maintain the skills for a period of 15 months. Apple, Billingsley, and Schwartz (2005) investigated compliment-giving skills with children with autism. The participants watched three videos of their peers modeling compliment-giving responses and initiations and giving clear and precise instructions for making compliments. During the first part of the experiment, the participants were able to give appropriate responses to compliment-giving, by watching the video. Simpson et al. (2004) used embedded video clips in computer software to improve social skills with children with autism. The participants used interactive software which was embedded with videos of peers

modeling the targeted behaviors. Each participant showed a significant improvement of the targeted behaviors.

Researchers have also studied communication skills, such as spontaneous requesting, peer-directed social language, and response to questions. To research the effects of video self-modeling on spontaneous requesting, Wert and Neisworth (2003) did a study involving 4 children with autism, who watched videos of themselves performing the targeted behavior. To make the video, researchers elicited requesting behaviors from the children, then edited the video so that it appeared as though the children were spontaneously requesting, without any prompting. All 4 participants showed a significant gain in spontaneous requesting behaviors. Malone and Mirenda (2006) did a study to determine the effectiveness of video modeling and video feedback on peer-directed social language skills. In this study, the only participant was a 5-year-old boy with autism. He watched nine video segments featuring 2 adults talking to each other while they were playing. The videotaped behaviors included a variety of social skill behaviors. Short activity sessions were held two to three times a week, during which the participant and one of his peers engaged in the specified play activities. Each day, the participant watched three video segments. During one activity, feedback and prompting was added in addition to the video modeling. The participant showed improvement in social language in all three play activities. Buggey et al.(1999) studied the effectiveness of video self-modeling on response to questions. Three children with autism, ranging

from age 12 to 17, were asked 17 typical questions during play sessions. The sessions were videotaped for 4 weeks. Then the videotape was edited to include only the appropriate responses to the questions. A separate video was made of each child. The child watched his or her own video prior to each session. All participants showed significant increases in the targeted behavior soon after the intervention sessions began.

Several studies have investigated play skills. D'Anteno et al. (2003) studied complex play with children who have autism. A 3-year-old girl with autism participated in this single-subject design. The participant watched a video sequence involving play materials. After 1 hour, she was allowed to play in the room with the play materials. The results of the study showed an increase in verbal and motor responses during play after watching the video. Reagon et al. (2006) and MacDonald et al. (2005) did studies on pretend play. A 4-year-old boy with autism watched videos of his older brother participating in pretend play with a peer in four various scenarios. Then the participant and his brother were told to play. The results showed that video modeling using the sibling was effective in improving pretend play skills of the child with autism. A single-subject study using a three-year-old boy with autism, researched the effects of video modeling on socio-dramatic play (Dauphin, Kinney, & Stromer 2004). In the first phase of the study, the participant learned computer activity schedule using embedded video models. Then the next phase of the study consisted of the participant learning to use

notebook schedules with picture cues. The results of this study showed that video-enhanced activity schedules can enhance learning of children with special needs.

Specific behaviors associated with autism have been investigated. Using video self-modeling, Buggey (2005) investigated tantrums and aggression in children with autism. Five boys between ages 5 and 11 participated in three different studies. The second study addressed tantrums. The participants were videotaped in scripted situations that were likely to cause a tantrum. The video was edited so that only the most positive reactions were played on the video. The participants then watched the video before the beginning of class. A decrease in tantrum behaviors was seen following the viewing of the video. The third study addressed pushing behaviors. As with the second study, and videotape was made and edited so that the most positive touching behaviors were seen. This study also showed a decrease in the targeted behaviors.

The incidence of autism has increased over the last two decades, in part due to earlier diagnosis of the disorder. Many studies support the use of video modeling to teach a variety of skills to children with autism. Because most young children with autism are very limited in their communication skills, more effective ways of helping them learn to communicate need to be investigated. Even though children with autism have difficulty with imitation and motor-planning, studies suggest that they may be able to learn to communicate with sign language.

Statement of Problem

Research indicates that video modeling can be an effective instruction tool for children with autism. Inquiry into its use in learning sign language, however, has not been made.

Statement of Purpose

The purpose of this study is to determine if video modeling of sign language is more effective than the traditional approach of in vivo modeling in teaching sign language to children with autism.

Limitations

There was a small number of participants. Only three children were used. This does not necessarily accurately represent the population of children with autism. There was a possibility of a learning effect occurring. If this occurred, it should be evident on the graphs during the interpretation of the data. There is also a potential bias with the data collector also being the in vivo session model. It is possible that the data collector performed the in vivo script in such a way as to increase the responses of the participants. In a home setting, it was hard to minimize distractions. Lastly, withdrawal of the treatment during the baseline phases can be considered to be an ethical problem.

CHAPTER III

METHOD

Design

An ABAB/BABA single-subject design was used. A single-subject design can demonstrate whether a change in behavior has occurred, if the change in behavior is the result of the intervention, and whether the change in behavior is significant (Hawkins, Sanson-Fisher, Shakeshaft, D'Estes, & Green 2007).

Participants

Three children were recruited for this research project. The children were receiving early intervention services from Community Healthcore Early Childhood Intervention. Each child was between the ages of 2.0 and 3.0 years old at the beginning of the study and had a diagnosis of autism, diagnosed by an appropriate outside professional according to the criteria of the American Psychological Association. Each child had ten or less consistent spontaneous words or signs in his or her vocabulary and had sufficient motor skills in order to form signs. Each child was able to do the following upper extremity motor skills: pincer grasp; hands to midline; hand to mouth; 90 degrees elbow flexion; loose fist; ulnar deviation of wrist; hand on thigh; finger abduction; 120 degree elbow extension. Any child with a dual medical diagnosis or a significant visual or auditory impairment was excluded from this study.

Participant A was a female and was 2 years and 7 months old at the beginning of the study. She was diagnosed in the severe range of autism by an outside professional. She had nine consistent spontaneous words and let her family know her wants and needs by going to the object. She had no previous exposure to sign language. She was a very active child and frequently climbed on furniture.

Participant B was a male who was 2 years and 3 months old. He was diagnosed with severe autism by an outside professional. His vocalizations consisted of echolalia. He initiated no words on a consistent basis. Wants and needs were expressed by going to the object. He was previously exposed to the *Signing Time* video, which the speech therapist had given to him.

Participant C was a male who was 2 years and 9 months at the beginning of the study. He was diagnosed with severe autism by an outside professional. He had no spontaneous words and did not imitate any words. He was a very active child and did not indicate wants and needs in any way. His speech therapist gave him the *Signing Time* video, so he had previous exposure to sign language.

Instruments

The instruments used include a parent interview form, one video camera, *Signing Time* video, and a rubric. A parent questionnaire (Appendix B) was used prior to the beginning of the data collection. Information gathered pertained to the child's current communication abilities and previous exposure to signs or the *Signing Time* video. The questionnaire also determined eligibility for the study.

One video camera was used to videotape each session in order to capture an accurate portrayal of signing attempts made by the child. During the video sessions, the researcher held the video recorder. Another professional held the mobile video recorder and followed the child during the in vivo sessions.

A rubric was used to provide criteria for grading imitation attempts by the participants (Tables 4, 5, and 6). The rubric consisted of five criteria, rated 1 through 5, with 5 being the score for accurately imitating the sign. Each criteria, beginning with the first, was increasingly closer to the accurate production of the sign.

Signing Time, *Volume I: My First Signs* was used for the video modeling sessions. Only the segment showing the sign randomly chosen for each child was shown. *Signing Time* consists of an adult introducing and modeling each sign, followed by a segment during which various children model the sign. Each segment lasted between 1 minute 9 seconds and 1 minute 54 seconds. The segment was shown 4 times consecutively during each segment.

Procedure

Prior to the data collection, an interview was held with each child's primary caregiver to determine which signs and words the child already knew. Those signs/words were deleted from the list of possible signs to use during the study sessions. The child was observed in typical play to determine if the child met the inclusion criteria. For the data collection, one sign was presented to each child. The sign for each child was chosen randomly from a list of signs presented in *Signing*

Time. The list of signs includes: eat, milk, more, bird, dog, shoes, ball, and car. Sessions alternated between video modeling (treatment) and in vivo modeling (control). Either ABAB or BABA was randomly chosen for each child. For baseline, in vivo modeling was used for five sessions. The next five sessions were video modeling, using the *Signing Time* video. The in vivo and video modeling sessions repeated for a total of 20 sessions. All of the sessions were video recorded for internal validity. Sessions took place in each child's home.

Verbal interaction with the child during in vivo modeling was scripted the same as the video except where the words would not make sense to the situation. Props used during this session were as similar to the video as possible (Appendix C). The researcher's fingers were taped with colored tape, as seen in the video. There was blue tape on the thumbs and index fingers and red tape on the rest of the fingers. A video camera was set up. The child was placed facing the researcher. However, the child was allowed to get up and walk around the room at will. The script was presented four times consecutively. During the in vivo sessions, no prompting was given by the researcher for the child to imitate the sign. The caregiver was instructed not to give any prompts during the session for the child to imitate the sign.

For the video modeling sessions, the researcher brought *Signing Time* to the home. The video was played on the TV/DVD player with which the child is accustomed. A video camera was set up. The child was placed in front of the TV;

however, he or she was allowed to get up and walk around the room at will. The *Signing Time* segment was played four times consecutively during each session, and the child's responses were video-recorded. During the video session, no prompts were given by the researcher for the child to imitate the sign. Also, the caregiver was instructed not to give any prompts during the session for the child to imitate the sign.

Each session was 10 to 15 minutes long. Production of signs by the child were graded as "attempt made", according to the acceptable responses listed on the rubric. Two independent professionals not related to the study, graded the responses on the grading sheets (Appendices C and D). The raters have experience with autism and sign language, and were a therapy assistant, and early intervention specialist, or a certified teacher. Raters rated each video and came to a consensus for the score. The model used for the in vivo sessions was the researcher.

When choosing the sign for Participant A, ball, daddy, mama, and shoes were deleted from the list because they were words in her vocabulary. The sign "eat" was randomly chosen from the words remaining on the list. Visits occurred two times a week. Sessions took place in the living room/kitchen area where the TV was located. Initially the TV was at Participant A's eye level. However, after several sessions, the TV was mounted on the wall at approximately six feet high. This was done for safety due to Participant A's climbing on the entertainment center. Participant A's sessions began with video modeling. During the sessions, she frequently moved around, climbed and jumped off of furniture, played with toys, and took items out of the refrigerator.

However, she returned occasionally to watch the TV or the in vivo model. She randomly vocalized and occasionally repeated words, including the word "eat". The tape was stopped once when Participant A had to go to the bathroom. The caregiver would retrieve Participant A when she would climb on something unsafe, when she got into the refrigerator, and when she tried to climb inside the washing machine.

"Ball" was the sign randomly chosen for Participant B. Sessions began with video modeling and took place once a week. The TV, which had a screen at least 58" wide, was located in the living room and was at Participant B's eye level. During the sessions, Participant B remained in the room. He was very aggressive to the researcher and the video recorder volunteer. He also jumped on furniture and threw objects. He randomly vocalized. The video recorder was stopped once, because Participant B fell and bumped his face and required comfort from the caregiver.

Participant C's randomly chosen sign was "shoes". The TV was in the living room and was at Participant C's eye level. Sessions occurred twice a week. After four sessions, Participant C moved from an apartment to a house in another town. His sessions began with in vivo. During the sessions, he occasionally sat on the couch, but frequently ran to other rooms, then immediately came back and looked at the TV or the in vivo model. He also climbed on furniture and made random vocalizations. He sometimes looked at the TV screen from within four inches of it.

CHAPTER IV

DATA ANALYSIS

The number of signing attempts during each session were recorded on a tally sheet (Tables 1, 2, and 3). Each signing attempt was then graded for quality according to the rubrics listed in tables 4, 5, and 6. Data collected was plotted on three graphs. The first graph shows the number of signing attempts that the participant made during each session. In vivo sessions are represented by a dotted line, and the video modeling sessions are represented by a solid line. The session number is plotted on the x-axis, and the number of attempts is plotted on the y-axis. The second graph displays the quality of each attempt, based on the rubric scores of the attempts . The scores of each signing attempt is plotted on the y axis. The third graph shows the mean quality of attempts during each session . Data analysis is the descriptive method, which is the most appropriate method for single-subject studies. The data was interpreted in terms of the mean level of behavior, a change in trend of the behavior, latency of change of the behavior, and the immediacy of the change in behavior from one phase to another phase.

Results

Participant A's sessions began with video modeling. She made signing attempts with both in vivo and video modeling. The number of signing attempts ranged from 0 to

7. Out of 20 sessions, she made attempts during 11 sessions. Participant A made 24 signing attempts throughout the study. The quality of attempts ranged from 1 to 5. Thirteen of the signing attempts had a quality of 5 and 7 of the attempts were scored with a quality of 5. Three attempts had a quality score of 3 and 1 attempt had a score of 1. The mean quality of attempts ranged from 2.5 to 5.

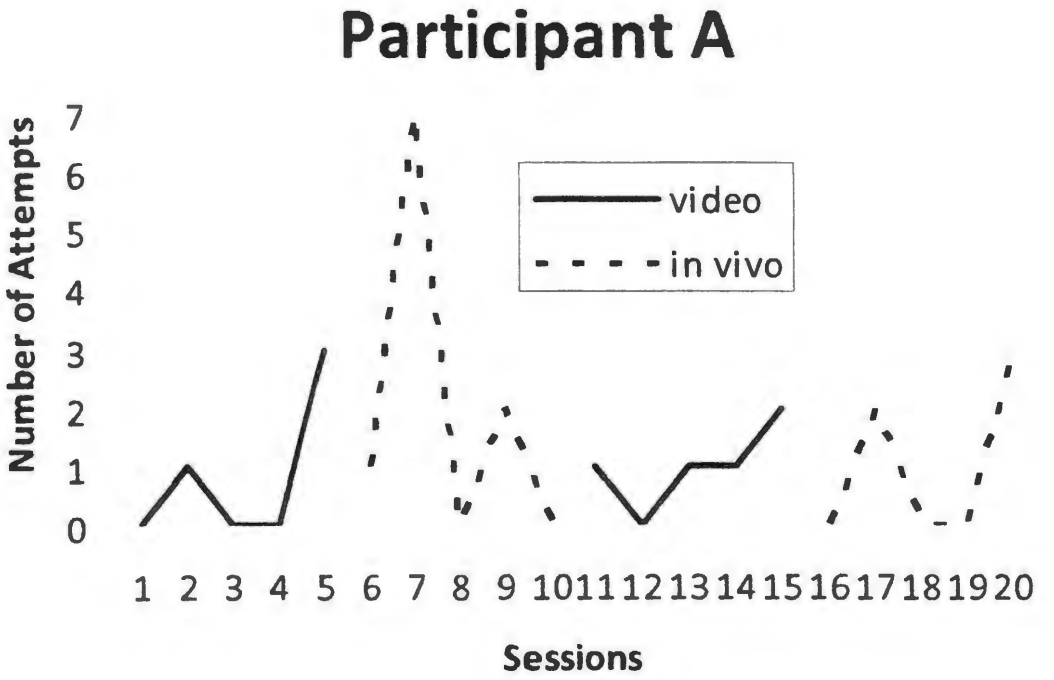

Figure 1. Number of signing attempts of participant A

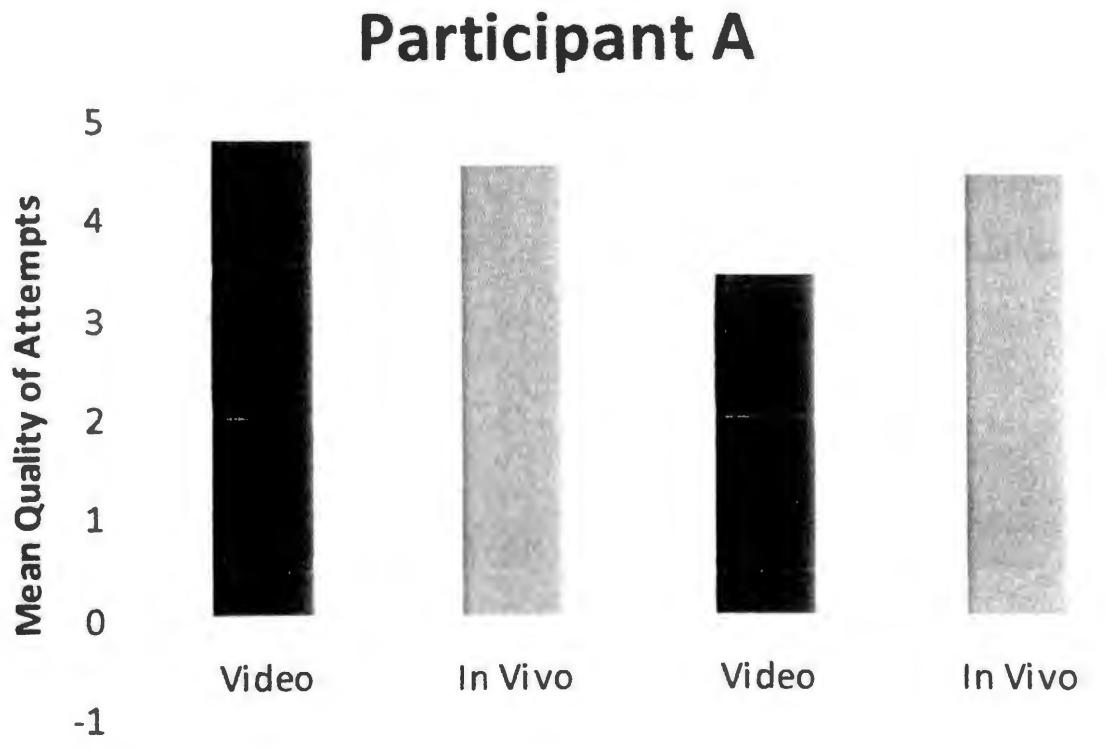

Figure 2. Mean quality of attempts of participant A

Participant B's sessions began with video modeling. He made signing attempts during both in vivo and video modeling sessions. The number of attempts ranged from 0 to 7. Out of 20 sessions, he made attempts during 3 sessions. Participant B made 12 signing attempts. All but 1 attempt had a quality score of 4 or 5. Three attempts had a score of 5 and 8 attempts had a score of 4. The mean quality of attempts were 1, 4.5 and 4.3.

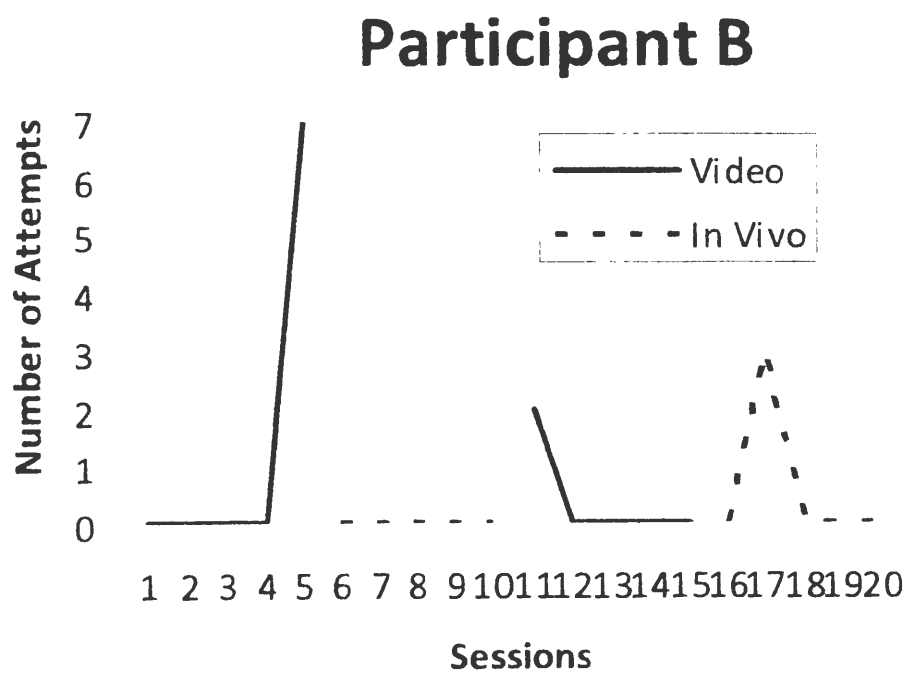

Figure 3. Number of signing attempts of participant B

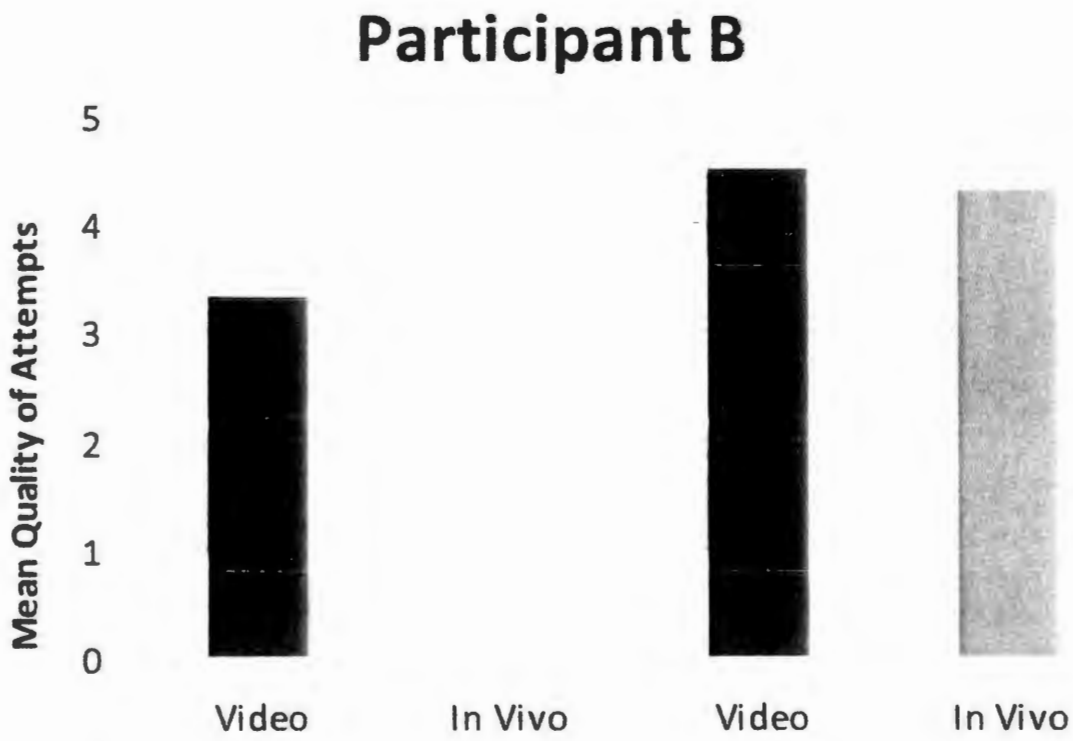

Figure 4. Mean quality of attempts of participant B

Participant C's sessions began with in vivo modeling. He made signing attempts during both in vivo and video modeling sessions. The number of signing attempts ranged from 0 to 2. Out of 20 sessions, he made signing attempts during 3 sessions. Participant C made 4 signing attempts. The quality of the attempts ranged from 1 to 3. Fifty percent of the attempts had a score of 3. The mean quality of attempts was 1, 3, and 2.

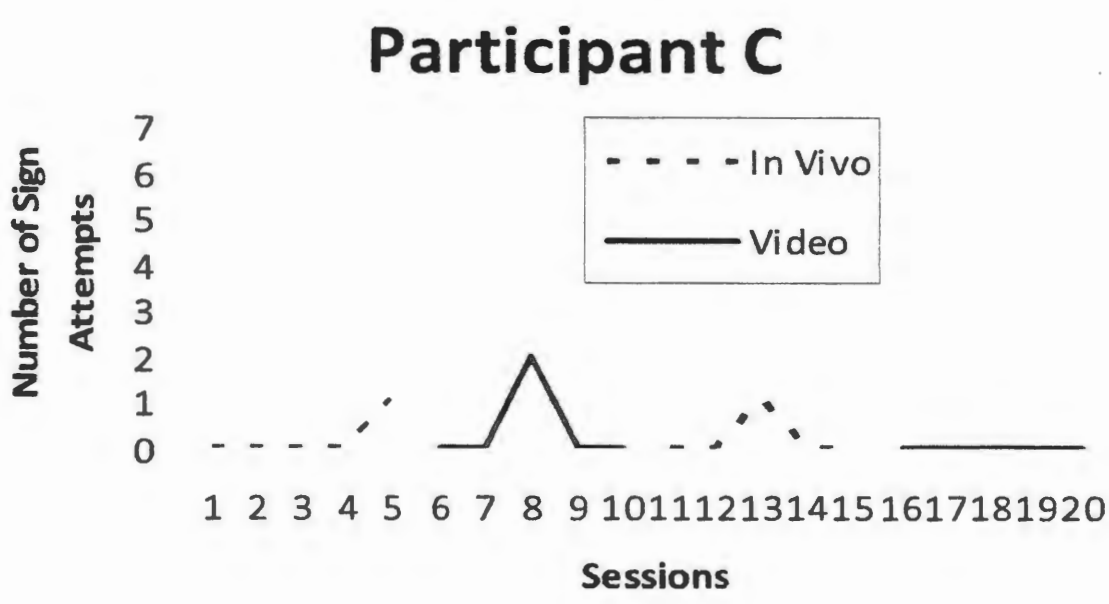

Figure 5. Number of signing attempts of participant C

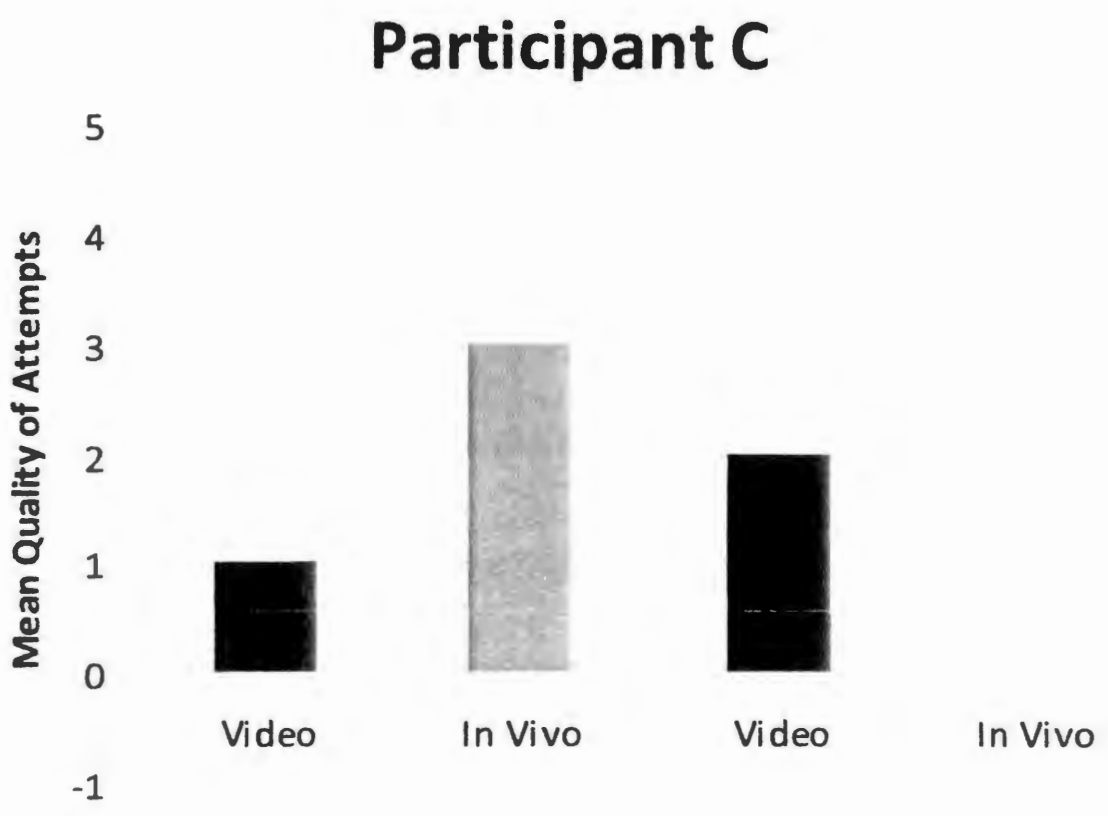

Figure 6. Mean quality of attempts of participant C

Discussion

The purpose of this study was to determine if video modeling is more effective than in vivo modeling in eliciting imitation of sign language in young children with autism. In this study, all three participants responded to both video and in vivo

modeling. No learning effect was noted with any of the participants. Even though each child was allowed to walk away from the *Signing Time* video or the in vivo model, they all returned frequently to the condition which was presented. With each participant, the number of signing attempts and the quality of signing attempts varied across sessions and the conditions presented. There did not appear to be a difference between the response to in vivo and video modeling for each of the participants. The mean quality of the signing attempts during video modeling in comparison with in vivo modeling also did not show a significant difference.

Over the past few decades, there has been a dramatic increase in the number of children being diagnosed with autism. Additionally, children are being diagnosed at a much younger age. With intervention at an earlier age having a greater impact, there is an increased need for research in the treatment of children with autism. There have been many studies of the use of video modeling to teach a variety of skills to children of autism. Although this study did not show a significant difference between video modeling and in vivo modeling for eliciting imitation of sign language, it does show that video modeling can be an alternate approach to teaching sign language to young children with autism. However, more research is needed in this area.

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APPENDIX A

Tables

APPENDIX A

Tables

VIDEO NO.	IV/Video	PART 1	PART 2	PART 3	PART 4	TOTAL
6878	Video	0	0	0	0	**0**
4864	Video	0	0	1	0	**1**
6450	Video	0	0	0	0	**0**
3293	Video	0	0	0	0	**0**
8351	Video	0	2	1	0	**3**
2970	In Vivo	0	0	1	0	**1**
9573	In Vivo	0	6	0	1	**7**
3168	In Vivo	0	0	0	0	**0**
1912	In Vivo	2	0	0	0	**2**
9120	In Vivo	0	0	0	0	**0**
5980	Video	0	1	0	0	**1**
7823	Video	0	0	0	0	**0**
1054	Video	1	0	0	0	**1**
3668	Video	1	0	0	0	**1**
1864	Video	2	0	0	0	**2**
8761	In Vivo	0	0	0	0	**0**
2454	In Vivo	1	0	1	0	**2**
5727	In Vivo	0	0	0	0	**0**
2476	In Vivo	0	0	0	0	**0**
6147	In Vivo	3	0	0	0	**3**

Table 1. Number of signing attempts of participant A

VIDEO NO.	IV/Video	PART 1	PART 2	PART 3	PART 4	TOTAL
8396	Video	0	0	0	0	**0**
9390	Video	0	0	0	0	**0**
8507	Video	0	0	0	0	**0**
7384	Video	0	0	0	0	**0**
1143	Video	0	0	4	3	**7**
5733	In Vivo	0	0	0	0	**0**
9409	In Vivo	0	0	0	0	**0**
9427	In Vivo	0	0	0	0	**0**
6401	In Vivo	0	0	0	0	**0**
2030	In Vivo	0	0	0	0	**0**
3566	Video	1	0	1	0	**2**
1180	Video	0	0	0	0	**0**
4729	Video	0	0	0	0	**0**
5511	Video	0	0	0	0	**0**
8602	Video	0	0	0	0	**0**
6554	In Vivo	0	0	0	0	**0**
7592	In Vivo	2	0	1	0	**3**
2451	In Vivo	0	0	0	0	**0**
6459	In Vivo	0	0	0	0	**0**
5479	In Vivo	0	0	0	0	**0**

Table 2. Number of signing attempts of participant B

VIDEO NO.	IV/Video	PART 1	PART 2	PART 3	PART 4	TOTAL
2497	In Vivo	0	0	0	0	**0**
1213	In Vivo	0	0	0	0	**0**
5254	In Vivo	0	0	0	0	**0**
4000	In Vivo	0	0	0	0	**0**
1896	In Vivo	0	0	0	1	**1**
2842	Video	0	0	0	0	**0**
1975	Video	0	0	0	0	**0**
1666	Video	2	0	0	0	**2**
2288	Video	0	0	0	0	**0**
1749	Video	0	0	0	0	**0**
6899	In Vivo	0	0	0	0	**0**
4058	In Vivo	0	0	0	0	**0**
7356	In Vivo	0	0	0	1	**1**
3631	In Vivo	0	0	0	0	**0**
7042	In Vivo	0	0	0	0	**0**
5570	Video	0	0	0	0	**0**
8385	Video	0	0	0	0	**0**
7715	Video	0	0	0	0	**0**
4229	Video	0	0	0	0	**0**
5531	Video	0	0	0	0	**0**

Table 3. Number of signing attempts participant C

Attempt #	1- Moves hand toward mouth not within 5" of mouth	2- Holds fist to mouth	3- Moves open hand to mouth	4- Fingers to mouth, but not thumb	5- Fingers and thumb bent at mouth
1				X	
2					X
3					X
4					X
5					X
6					X
7					X
8					X
9					X
10					X
11					X
12					X
13				X	
14	X				
15				X	
16			X		
17				X	
18			X		
19			X		
20				X	
21				X	
22					X
23					X
24				X	

Table 4. Quality of attempts rubric-eat

Attempt #	1-Touches open palms together	2-Touches thumbs together, hands closed	3-Touches thumbs together, hands open	4-Touches tips of fingers together; doesn't form "ball" shape	5-Touches tips of fingers, thumbs together; forms "ball" shape
1		X			
2				X	
3				X	
4				X	
5				X	
6					X
7				X	
8				X	
9					X
10				X	
11				X	
12					X

Table 5. Quality of attempts rubric-ball

Attempt #	1-Brings palms together	2-Touches fingers of 1 hand to palm of other hand	3-Touches fingers of both hands together	4-Touches fists together; not on radial side	5-Touches fists together; radial side
1	X				
2			X		
3			X		
4		X			

Table 6. Quality of attempts rubric-shoes

APPENDIX B

Parent Pre-study Interview

APPENDIX B

Parent Pre-study Interview

Child's first name: _____

Age in months: _____

Sex: ____ Male ____ Female

1. Does the child have any other medical problems/diagnoses? If yes, please explain

2. Does your child have a visual or auditory impairment? If yes, please explain.

3. What words does the child say on a consistent basis?

4. Has the child been exposed to any sign language?

5. What signs has the child used?

6. How does the child let you know wants/needs?

7. Do you own a TV/DVD player?

8. Do you own the *Signing Time* Video, Volume I: Everyday Signs?

APPENDIX C

Script for in Vivo Modeling Sessions

APPENDIX C

Script for in Vivo Modeling Sessions

Eat

Eat eat (show word)
Banana, apple, cookie
Eat or food…it's just like you're putting food to your mouth.****
Eat**
Ummm…yummy ** (eat cracker)
Eat
Eat (eat gummy)
Yummy
He's signing "eat" **
Food ! *** (pretend to eat cracker)
Peanut butter and jelly
Ooh good…I like peanut butter…That's a good sandwich (spread peanut butter and jelly then cut sandwich into quarters)
Eat*, eat
Banana, apple, cookie

Props:
Gummy bears
Bowl of fake fruit
Crackers
Peanut butter
Jelly
Bread
Plastic butter knife
Picture of banana, apple, and a cookie
Picture of the word "eat"

Ball

Ball, Ball (show word)
Ball*-just like you're patting a ball*
Ball****
(boing, boing, boing, boing, boing)
(bounce red boundy ball)
A ball!
Red ball
(show 2 small balls, and mouth 1) *
Hey, they're [we're] playing together
Ball-ooh, look at how big that one is!
(roll theraball)*
Ball*
Ball*

Props:
Picture of word "ball"
Small balls
Theraball
Red Bouncy ball

Shoes

Shoes....Shoes (show word)
Shoes* (bang shoes together)
Tap your fists together like a pair of shoes**
My shoes? (point to your feet and dance your feet)
Daddy's shoes (sit down, touch hand to your shoe, then show large male shoe)
Shoes
My shoes*
My shoes*
Shoes* Shoes* Shoes (bang shoes together)

Props:
Picture of word "shoe"
A pair of small shoes
One large male shoe

APPENDIX D

Texas Woman's University Subject Informed Consent Form

APPENDIX D

TEXAS WOMAN'S UNIVERSITY
SUBJECT INFORMED CONSENT FORM

Study Title: Imitation of Sign Language in Young Autistic Children: Video Modeling Versus in Vivo Modeling

Contacts and Questions:
The researcher conducting this study is: Sara Spurlock OTR; phone: 903-720-2401.
Advisor: Catherine Candler PhD, OTR, BCP; phone: 214-706-2350

Eligibility Criteria
Your child is eligible for this study if he/she (1) has a diagnosis of autism or Asperger's Syndrome (2) has less than 5 words in his/her vocabulary (3) Is between the age of 2.0 and 3.0 at the beginning of the study (4) has sufficient fine motor skills to form the sign language signs. You are not eligible for this study if he/she (1) has a dual medical diagnosis (2) has a significant visual or auditory impairment.

Introduction:
Your child is invited to be in a research study of the use of a sign language video for children with autism. Your child was selected as a possible participant because of his/her diagnosis and difficulty with communication. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: **Sara Spurlock OTR, at Texas Woman's University.**

Background Information:
The purpose of this study is: to compare the use of a sign language video to the use of modeling signs in person to improve communication in young children with autism.

Maximum time required for this study: 5.5 hours

Procedures:
If you agree to be in this study, we will ask your child to do the following things: Sessions will be held approximately twice a week for a total of 20 sessions. 10 sessions will consist of watching a sign language video and 10 sessions will consist of watching the

investigator perform a script which is similar to the video. The sing language video will be played on the participant's TV screen. Each session will last up to 10 minutes. Each session will be videotaped with two video recorders. Parents are asked not to intervene in any way, including verbal prompting or encouragement, except to return the child to the room if the child should leave.

Participants will be videotaped during each session. The purpose of the video taping is so that independent raters can watch and rate each video as to the number of signing attempts and the quality of each attempt. Only the researcher and the raters will have access to the tapes.

Research Subjects' Consent to Audio/Video/Photo Recording:
It is okay to videotape my child while he/she is in this study and use my videotaped data in the research.

Please initial: _____Yes _____No

Risks and Benefits of Being in the Study:
This study has a risk: May cause meltdowns or tantrums
The benefits to participation are: (1) free services (2) advancement of occupational therapy treatment with children who have autism
The researchers will try to prevent any problem that could happen because of this research. You should let the researchers know at once if there is a problem and they will help you. However, TWU does not provide medical services or financial assistance for injuries that might happen because you are taking part in this research.

Alternatives to Participating in this Study: None

Confidentiality:
The records of this study will be kept in a locked file cabinet. All confidential data will be deleted from the video cameras and the laptop computer following the conclusion of this study. In any sort of report we might publish, we will not include any information that will make it possible to identify a participant. Your child's record for the study may, however, be reviewed by any member of the research team, the Institutional Review Board or the Federal Office of Human Resource Protections and to that extent, confidentiality is not absolute. *Confidentiality will be protected to the extent that is allowed by law."*

Voluntary Nature of the Study:

Your decision whether or not to participate in this study will not affect your current or future relations with Texas Woman's University or with Early Childhood Intervention. If you decide to participate in this study, you are free to withdraw at any time for any reason without affecting those relationships

Results of the study will be mailed to each participant following the conclusion of the study. No confidential information will be included in these results.

You will be given a copy of this signed and dated consent form to keep. If you have any questions about the research study you should ask the researchers; their phone numbers are at the top of this form. If you have questions about your rights as a participant in this research or the way this study has been conducted, you may contact the Texas Woman's University Office of Research and Sponsored Programs at 940-898-3378 or via e-mail at IRB@twu.edu.

Statement of Consent:

The information about the proposed research study and consent has been explained to you by:

_____ _____

Name of Principal Investigator Signature of Principal Investigator

When you sign this form, you agree that you understand the above description of this research. You also agree that your questions have been answered, and that you want to take part in this research study.

Child's name (printed): _____

_____ _____

Signature of Participant's Parent/Legal Guardian Date