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## Video Self-Modeling to Facilitate Visual Symbol Learning in Preschoolers with Developmental Delays

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THE FLORIDA STATE UNIVERSITY  
COLLEGE OF COMMUNICATION

VIDEO SELF-MODELING TO FACILITATE VISUAL SYMBOL LEARNING  
IN PRESCHOOLERS WITH DEVELOPMENTAL DELAYS

By

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## TABLE OF CONTENTS

|                         |    |
|-------------------------|----|
| List of Tables          | iv |
| List of Figures         | v  |
| Abstract                | vi |
| <br>                    |    |
| 1. INTRODUCTION         | 1  |
| <br>                    |    |
| 2. STATEMENT OF PROBLEM | 24 |
| <br>                    |    |
| 3. METHOD               | 26 |
| <br>                    |    |
| 4. RESULTS              | 43 |
| <br>                    |    |
| 5. DISCUSSION           | 50 |
| <br>                    |    |
| APPENDICES              | 59 |
| <br>                    |    |
| REFERENCES              | 73 |
| <br>                    |    |
| BIOGRAPHICAL SKETCH     | 80 |

## LIST OF TABLES

|   |    |
|---|----|
| Table 1. Participant characteristics of AAC research                            | 14 |
| Table 2. Design characteristics of AAC research                                 | 15 |
| Table 3. Example stimuli for video self-modeling                                | 35 |
| Table 4. Example stimuli for matching to sample                                 | 37 |
| Table 5. Child coding form  | 39 |
| Table 6. Child attention to videos  | 40 |
| Table 7. Mean ratings of participants' communication before and after treatment | 49 |

## LIST OF FIGURES

|  |    |
|--|----|
| Figure 1. Frequency of picture giving response             | 46 |
| Figure 2. Frequency of correct picture responses and words | 47 |

## ABSTRACT

There is a growing trend toward the use of augmentative and alternative communication (AAC) in addressing the communicative deficits of preschool children with developmental disabilities. Of particular interest is the use of pictures to teach children to request desired items. However, discrimination among pictures can be a challenge for children with developmental disabilities. The purpose of this study was to investigate the use of video self-modeling to teach young children with developmental delays to give a picture from a selection of four desired items or activities. Four children participated in a multiple baseline design across participants to evaluate an intervention that taught picture discrimination through video self-modeling. Child measures focused on the frequency of accurate requests using pictures, gestures, and/or spoken words. Three of the four children learned to give a picture following the initiation of video self-modeling. One of the four children learned to make accurate requests using video self-modeling. The other three children required a branch step, direct teaching, to learn to discriminate among the pictures. The videos appeared to provide adequate contextual cues for learning to request but not necessarily for discrimination among pictures.

## CHAPTER 1

### INTRODUCTION

Multiple teaching methods have been used successfully to help children and adults use Augmentative and Alternative Communication (AAC) systems. These methods include traditional prompting, fading procedures, imitation, and modeling and more recent techniques that include naturalistic strategies such as milieu teaching. Children and adults are frequently taught to use these AAC systems for many purposes including social interactions, scheduling, transitions between activities, labeling, requesting, and commenting. The focus of this investigation involves a unique application of AAC strategies, videos, and pictures to teach requesting and accurate picture discriminations. In this study the AAC system incorporated video self-modeling (VSM), prompting, and matching pictures. Because the children in this study are required to accurately select and give a picture following a specific verbal stimulus, the literature review will include information about how AAC systems have been used to teach requesting, developmental patterns for discrimination skills, and how modeling has been included in AAC systems to teach target behaviors.

The first issue addressed relates to how AAC strategies have been used in the past to teach accurate requests and how discrimination skills develop in preschool children with and without disabilities. To teach accurate requesting it seems appropriate to consider the degree of successful use of previous strategies and how discrimination skills of preschoolers may play a part in the success of accurate requesting. The next topic examines discrimination difficulties related to picture selection and AAC systems, and strategies used to teach discrimination skills. Because children with disabilities tend to have difficulty making accurate discriminations, the manner in which discrimination skills have been taught in the past is examined. Finally, the last issue discusses how pictures have been used to help individuals request, how researchers have used modeling in AAC systems as a language facilitation technique, how VSM is a form of modeling, and how VSM has been used in the past. As mentioned earlier, it seems logical to address how AAC systems have been used to teach accurate requests and how discrimination abilities may affect these requests.

#### *AAC & Accurate Requests*

Requesting is an early function of communication that occurs when an individual indicates his or her desire for a certain item or activity. Infants and toddlers' early request

involve asking for objects and actions. Learning to request seems important because the greatest proportion of communicative acts for those with severe communication disorders is requesting (Cirrin & Rowland, 1985). Yet, some children with developmental delays do not learn to request on their own. Thus, alternative modes of communication have been used to provide a means for basic communication, especially for requesting. For example, the Picture Exchange Communication System (PECS) was developed as a means to augment the language of children who have limited verbal communication. PECS is one type of AAC system that has been used in previous research to initiate and expand the requests of children with a variety of disorders using strategies like verbal prompts and gestural cues (Bondy & Frost, 1994; Kravits, Kamps, Kemmerer, & Potucek, 2002; Schwartz, Garfinkle, & Bauer, 1998).

There is evidence for the successful use of augmentative and alternative communication (AAC); however, a major concern of the use of AAC methods is determining the accuracy of requesting. Young children may request items that may or may not be what they desire (i.e., child gives picture of blocks but rejects the item when they receive it). There are a variety of means by which interventionists can teach individuals to use AAC for requesting and some strategies may be more efficient and effective for teaching accurate picture discrimination. These strategies include milieu teaching, modeling, time-delay, and labeling. These procedures often begin with teaching a general requesting behavior and progress to more specific requesting. For example, Reichle, York, and Sigafos (1991) used milieu teaching strategies such as mand-model and incidental teaching to teach children to use a single symbol like “want” in multiple situations. After the child learned the generalized request, they were taught to use more specific referents like “want cookie” and “want baby.” In this situation the children were presented with one verb and object at a time. Thus, the question of accurate picture discriminations was not addressed. It seems important to establish discriminated communicative requesting using strategies that are efficient and effective. When naturally occurring cues such as gestures and verbalizations do not result in learning, it is possible that they are too subtle to establish required discriminations. A correct discrimination occurs within a natural context when an individual takes an item or activity, uses it appropriately, and appears to enjoy it. An incorrect discrimination occurs when the person rejects the item or activity selected. Discriminations also occur when an individual indicates a correct selection from two or more options following a

request from another person (e.g., “Give me the square.” Options include a square and circle). For the purpose of this study, the latter is discussed.

### *Assessing & Teaching Discrimination*

There are a variety of ways to assess and teach discrimination skills such as matching to sample, exclusion, and imitation. Matching to sample procedures involve matching items or pairing two stimuli on the basis of certain attributes such as color, shape, size, or sound (Kerr, Meyerson, Flora, Tharinger, Schallert, Casey, & Fehr, 1977; Sidman, Willson-Morris, & Kirk, 1986), and participants typically are reinforced for responding to the target stimuli in one condition versus another (Schenk, 1993). A simple form of matching to sample includes matching pictures that are alike in the presence of dissimilar pictures. In these situations the individual is required to identify the pictures that are identical. For example, it has been used to teach preschoolers to match picture samples and dictated picture names (Gutowski & Stromer, 2003; Kelly, Green, & Sidman, 1998; Sidman et al., 1986) and to match video picture stimuli (Brown, Brown, & Poulson, 1995). It also has been used to teach kindergartners sight word recognition (Conley, Derby, Roberts-Gwinn, Weber, & McLaughlin, 2004). Because of the success of matching procedures it is common and widely used to teach a variety of discrimination behaviors. Exclusion has also been used to facilitate learning among children who experience difficulty, learning discriminations.

*Exclusion.* With exclusion, the individual is presented with one or more familiar stimuli (objects, pictures, written words, etc.) paired with one novel stimuli and spoken word. This allows the individual to select the novel object, picture, or written word through a process of elimination. The participant pairs the novel word and picture in the presence of known pictures (Carr, 2003). For example, the individual is familiar with pictures of a car, boy, and bird but unfamiliar with a picture of a yak. The instructor asks for the picture of the yak and the individual is expected to identify the yak through the process of elimination. Exclusion has been used to teach typical preschoolers conditional discriminations and matching of pictures and spoken words (McIlvane, Munson, & Stoddard, 1988), and auditory-visual discriminations to children with autism (Carr, 2003). It also has been used to examine the mutual exclusivity bias or the assumption that words have no exemplars in common (Merriman & Stevenson, 1997). For example, preschoolers heard a story in which a novel noun (stealth jet) was used for an atypical exemplar of a familiar noun (airplane) and when asked to select exemplars of the familiar noun,

the children tended to avoid the object from the story (Merriman & Stevenson, 1997). For children that lack world knowledge or symbolic representation, exclusion may have limited usefulness for teaching picture or verbal discriminations.

*Imitation.* Imitation is one of the most important means of learning a variety of tasks. Imitation has been widely researched in infants, young children, and adults as well as with individuals with disabilities. It has been considered a significant component of early cognitive, language, and social development and it is a current focus of research in many disciplines (Huang, Heyes, & Charman, 2002; Hurley & Chater, 2005; Meltzoff, 1995). The capacity to imitate behaviors emerges at a relatively early age and imitation of the target person's behavior has facilitated increases in target behavior and imitation skills. For example, Heimann (1989) reported that individual differences in the capacity of neonates to imitate several movements were correlated with mother-child interaction variables a few months later. New born babies have the capacity to imitate and discriminate among simple motor movements like tongue protrusion and head movement (Meltzoff, 1989). Knowledge of these primitive skills has facilitated support and wide use of imitation as a teaching tool. Gazdag and Warren (2000) used contingent vocal imitation to examine vocal imitation skills of young children with disabilities. When parents imitated their children's vocalizations, children demonstrated increases in their imitative and spontaneous vocalizations. The presence of these fundamental imitation and discrimination skills is imperative because they provide the foundation for learning other behaviors (Kerr et al., 1977). Research indicates that there are differences in the discrimination skills of children with and without delays (Kerr, Meyerson, & Flora, 1977; McIlvane, Kledaras, Munson, King, de Rosa, & Stoddard, 1987; Saunders, 1989). An understanding of the nature of these differences may help develop effective interventions.

*Discrimination skills of children developing typically.* It has been suggested that typically developing preschoolers can integrate auditory-visual information by age three (Casey & Kerr, 1977). In auditory visual discrimination (AVD) tasks individuals are expected to associate a particular auditory stimulus with a particular visual stimulus regardless of the position of the visual stimulus and order of auditory stimulus. Casey and Kerr investigated matching to sample (e.g., matching two cubes) procedures, AVD, and the relationship of AVD to speech production in typically developing 13-35 month old children. Results indicated that typically developing children develop matching to sample skills by 17-18 months of age and AVD skills between 2

and 3 years of age. For example, when given two choices and directions a three-year-old child typically can perform this task regardless of the location (e.g., “Put the block in the blue can” with a variety of such requests presented randomly). To understand language and its purpose, children must evaluate and integrate auditory and visual input. Results also suggested that there is a correlational relation between speech production and AVD skills. However, failure of AVD tasks did not mean that no speech was present. Some children who failed the AVD task had many words and could string words together. Thus, language production is related to AVD tasks but their mastery may not be required for language production. Findings also indicated that the order of learning discrimination tasks is the same for children with and without disabilities (Casey & Kerr. 1977). Thus children learn visual, matching to sample, auditory, and auditory-visual discriminations in that order but children with delays learn these tasks at a slower rate.

The discrimination skills of young children have been assessed in a variety of formats. For example, Merriman and Stevenson (1997) assessed AVD between novel and familiar nouns and pictures in 32 typically developing preschoolers. When a novel name was given to a picture that resembled a common item, children were less likely to select this picture when asked for its common name. For example, if the child was presented with an image of a tree and the investigator called it a “flark,” children were less likely to choose the picture when asked “Show me the tree.” An estimated 31% of the sample chose an object that had just been called by a novel name less often than one that had not. The researchers were primarily concerned with mutual exclusivity, or the assumption that words have no exemplars in common, but these data provide information about young children’s capacity to map different labels onto symbols that have already been labeled otherwise. For example, a child who has no knowledge of the verbal or visual attributes of a cat may be taught to call what is labeled a “cat” a “buke” or after stating a horselike animal is a “pilson,” young children may be less likely to accept it as a “horse.” This information can have ramifications for choosing appropriate picture vocabulary for children with disabilities who may be using AAC methods to communicate. If the interventionist begins with a less abstract representation of an item, the child may have difficulty moving from the concrete representation to a more abstract representation based upon prior training and knowledge. It is critical to gather complete information about the child’s working vocabulary and receptive identification of pictures.

In another study, Merriman et al. (1996) assessed novel word and action discrimination skills of typically developing preschoolers. The investigators used videotaped actions of familiar and novel verbs and asked children to select novel verbs for referents. The children chose self-focused actions (e.g., man runs back and forth, man sits down, woman sings) in 70% of the trials versus 36% of the trials for object-focused actions (e.g., man washes door, man picks up spoon, woman cuts paper). The investigators hypothesized that these differences are due to preschooler's difficulties with encoding actions and perceived similarities in verbal encodings of familiar object-focused actions. For example, the test phrase for object-focused actions always included a direct object such as "can you point to the man *glarving* the door" which is similar to "opening the door" whereas self-focused actions were intransitive and contained no direct object such as "can you point to the man *yomm ying*." Thus, young children's response to AVD tasks may be affected by the part of speech being investigated.

In an object-focused task, Thompson and Massaro (1994) examined AVD in typically developing four year olds using videotape models that labeled objects (i.e., speech mode), pointed to objects (i.e., gesture mode), or pointed to and labeled objects in conditions where labels for one of the four objects sounded alike or different from each other. The speech modality had a greater influence on word comprehension than gestures. This greater influence of speech versus gestures may not be true for children with disabilities. Cognitive delays will have an effect on their auditory comprehension and these children may rely more on gestures to understand their surroundings. It seems appropriate to suggest that children with delays will have more difficulty with object-focused behaviors and rely heavily on gestures to help with AVD tasks.

In a study that examined abstract items, where the child had no prior knowledge of verbal or visual attributes, Smeets (1994) taught typically developing five year olds simple discrimination among colored Greek letters. The objective was to establish these simple discriminations and then reverse them within matching to sample procedures. In the first condition, the researcher used verbal reinforcement such as "Good job" and tangible reinforcement with beads. In the second condition, the researcher tested accuracy of the same skills with different Greek letters without verbal or tangible reinforcement. In the third condition, generalization was examined using other colored Greek letters. The children were 99% accurate for their simple discrimination skills.

These studies demonstrate typically developing children's capacity to learn and form unique discriminations. The results from these studies show that typically developing children can learn to discriminate among a variety of familiar and unfamiliar symbols. They also appear to have the skills to complete matching to sample and AVD tasks by three years of age.

*Discrimination skills of children with developmental disabilities.* Research indicates that children with severe to profound cognitive delays perform poorly on matching to sample, and AVD tasks (Kerr, Meyerson, & Flora, 1977). Investigators have examined discrimination in children with disabilities using common, routine symbols for functional relations and unfamiliar symbols. In a two part study, Carr (2003) examined the auditory-visual conditional discrimination skills of children with autism using colored photographs of children's everyday items. In the first study, seven preschool children were taught four novel word-item pairs through reinforced exclusion responding or choosing a novel item by the process of eliminating familiar items. Only one of the seven children learned the four words and developed a stable relation in the absence of the exclusion criterion. The remaining six children who failed the exclusion tasks [and positive outcome trials] were included in a second study. In Study 2, non-reinforced exclusion trials with four new word-item pairs and reinforced exemplars from Study 1 were used. Five of the six remaining children learned the new word-item pairs. The author speculated that repeated exposure to exclusion trials in Study 1 could have provided the context necessary to help children learn the word-item pairs and that the child's entry level linguistic performance played a role in their ability to learn the pairs. Meaning, the least linguistically advanced children made improvements in exclusion scores in Study 2 but their scores were unstable and the children did not demonstrate positive learning outcomes. It appears as though a child's linguistic performance will play a role in their capacity to accurately complete AVD tasks. Children who are not at the prelinguistic stage, may be at a disadvantage for learning AVD.

Kerr, Meyerson, and Flora (1977) investigated discrimination of imitation, position, visual, auditory, and auditory-visual tasks for 177 individuals 3-36 years described as having "mild to profound retardation." Results indicated that the order of difficulty for discriminations is similar to that of typically developing children (Casey & Kerr, 1977). Thus, imitation (do this gesture), position (sorting based on position only), visual (sorting into cans based on different positions), auditory (response based on modifier words, e.g., put in red vs. blue box), and auditory-visual discriminations (response based on modifier+object, e.g., red can, blue box, red

box) go from the least to most difficult in this order for both children with and without disabilities. However, children with disabilities appear to develop these discriminations at a slower rate. If one extrapolates from prior research, children making accurate position discriminations may not be capable of AVD until they master visual discriminations and auditory discriminations.

In summary, children with and without delays appear to follow the same sequence of developing discrimination abilities. This similarity prompts questions about cognitive functioning and its relation to the use of AAC systems. It would seem that children with cognitive delays are capable of the same discrimination tasks as those typically developing but they are learned at a slower rate or at a later age. Thus, it is important to examine theories related to linguistic skills and AAC use.

*Discrimination Difficulty.* AAC interventions commonly assume young children possess the skills to make accurate AVDs. However, some children may have deficits in prerequisite component skills required for discrimination (Saunders & Spradlin, 1993). Investigators have documented that preschool children with moderate to profound delays often have great difficulty with AVD tasks that involve responding to verbal commands that are appropriate only in the context of certain visual stimuli (Kerr, Meyerson, & Flora, 1977; McIlvane, Dube, Kledaras, Iennaco, & Stoddard, 1990; Meyerson, 1977; Ronski et al., 1988; Tharinger, Schallert, & Kerr, 1977).

Historically, preschool children have been considered too young to benefit from the use of AAC systems prior to the acquisition of certain prerequisite skills (Chapman & Miller, 1980; Cress, & Marvin, 2003; Ronski, Sevcik, Hyatt, & Cheslock, 2002). Researchers and practitioners have followed a cognitive hierarchy that moves from the least to the most abstract matching to sample procedure. Matching to sample behavior is demonstrated when one can pair two stimuli that are identical in some respect, such as color, shape, size, or type. An example of matching to sample could involve the pairing of hats based on color or pairing hats based on type such as caps with caps or visors with visors. It was assumed that if an individual cannot match an object with its appropriate picture, that person cannot use an AAC system effectively. Practitioners begin with teaching the person to match objects with objects, then pieces of objects to the object, objects with photographs, objects with line drawings, and pictures with pictures. Children with some comprehension of spoken language tend to be more successful with picture

systems than children who lack language comprehension skills (Carr, Wilkinson, Blackman, & McIlvane, 2000; Mineo-Mollica, 2003; Rowland & Schweigert, 2000). Children who demonstrate some understanding of spoken language have an advantage in language learning—the capacity to use symbols to communicate. But that is not to say, if a child cannot match, he or she cannot use AAC systems.

Mineo-Mollica (2003) refined a linguistic task complexity continuum that describes picture tasks requiring no linguistic ability and those requiring receptive and expressive language skills. Along this continuum, recognition tasks such as matching identical stimuli, matching identical stimuli with time-delay, or matching nonidentical stimuli require no linguistic ability as the child must recognize the similarity between two stimuli. This sort of matching task is not representational and it does not require understanding. Matching an object with a picture is further along the continuum but it is still described as perceptually based versus conceptually based and thus, does not require linguistic knowledge. This notion of language comprehension does not suggest that introducing picture systems should wait.

Researchers from the AAC community have cited a number of reasons why it is inappropriate to base decisions about AAC use on cognitive development (Kangas & Lloyd, 1988; Notari, Cole, & Mills, 1992; Snyder-McLean, McLean, & Etter, 1988). For example, cognitive skills are confounded by social and expressive skills. That is, speech typically is used to assess cognitive skills. Intervention with AAC users cannot be based solely on existing knowledge about speech and language development (Tetzcher & Martinsen, 1996).

In a review of assessment data from 45 children between the ages of 3-12 years, Rowland and Schweigert (2001) sought to examine the relationship among five Piagetian cognitive skills and the presence of symbolic communication. If data supported a strong prerequisite relationship between symbolic communication skills and specific Piagetian skills, participants would have the Piagetian skill and the symbolic communication or neither. Rowland and Schweigert's research did not support this theory because imitation and symbolic play were associated with the largest percentage of mismatches with cognitive skills. Thus, symbolic communication was present but cognitive skills were absent with imitation and symbolic play for 24% and 28% of the participants, respectively. For 22% and 9% of the participants, imitation and symbolic play were absent but the cognitive skill was present. There were mismatches between object permanence, means-end, and tool use at 26%, 38%, and 38%, respectively.

Investigators have examined the relationship between language and cognition in individuals with developmental delays (Abbeduto, Davies, & Furman, 1988; Abbeduto, Furman, & Davies, 1989; Atlas & Lapidus, 1988; Rast & Meltzoff, 1995), nonlinguistic concepts and language in typically developing children (Gopnik & Meltzoff, 1986; Goldfield & Reznick, 1990; Rice, 1989), and language development and Piagetian stages in typically developing children (Lifter & Bloom, 1989; McCune, 1995; Shore, 1986). These investigations have demonstrated a correlational relation between language and cognition for both children with and without disabilities. However, there is no support for causal relationships and no strong conclusions for the support of cognitive prerequisites.

Despite these findings, cognitive prerequisites have been widely applied and incorporated into the decision making process for AAC users (Notari, Cole, & Mills, 1992; Owens & House, 1984; Shane, 1981). Ronski and Sevcik (1993) suggested that there are no clear prerequisite skills for AAC use and that some milestones are not necessary to begin a communication inventory. Language and cognition prerequisites are a common topic of debate and scrutiny, especially concerning people with disabilities. Research indicates that individuals with disabilities commonly develop receptive linguistic competence and language comprehension at a slower rate than children without disabilities of the same age (Bartel, Bryen, & Keehn, 1973; Dewart, 1979; Merrill & Mar, 1987). Research has not revealed strong links between cognition and linguistic development. However, it has been suggested that there are specific cognitive and language skills that may be related (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; Miller, Chapman, Branston, & Reichle, 1980; Gopnick & Meltzoff, 1986; Harris, 1982). Abbeduto et al. (1988) suggested that the experiences of persons with developmental disabilities may help them better recognize the communicative behavior of other people than recognition of other people's feelings, morality, or social aspects. Thus, there is evidence for concurrent cognitive and language development versus cognitive prerequisites for language development (Bowerman, 1980; Corrigan, 1978; Kuczaj, 1982).

This idea of a causal relationship between cognition and language is questionable, highly debatable, and has long been a roadblock for researchers and practitioners in their efforts to implement appropriate systems and strategies with AAC users. Of course, one cannot refute the evidence of a correlation between cognition and language but one can contest the rationale of waiting to provide AAC services based upon cognitive indicators. Sevcik, Ronski, and Adamson

(2004) suggested that the more significant the developmental delay, the more important it is to begin intervention in early childhood. They note that participation in traditional speech-only therapy may frustrate the child and the family. It was suggested that receiving early augmented language experiences might help children at risk follow a 'typical' developmental pattern. The use of an AAC system with traditional speech therapy may enhance symbol and production skills at a faster rate than speech alone. Furthermore, the National Joint Committee for the Communication Needs of Persons with Severe Disabilities (2003) states that an individual's eligibility for AAC services and supports is based on individual communication needs versus a priori criteria that may violate recommended practice principles. "Absence of cognitive or other skills purported to be prerequisites" exemplifies an inappropriate a priori criterion according to the National Joint Committee for the Communication Needs of Persons with Severe Disabilities (2003).

Because cognition and language are related, it is important to be aware of factors that can affect AAC use. There are six cognitive factors related to AAC use: awareness, communicative intent, world knowledge, memory, symbolic representation, and meta-cognitive skills (Rowland & Schweigert, 2003). *Awareness* involves the perception of stimuli leading to the understanding of causal relationships or an understanding of self, people versus objects, and purposeful direction of behavior. *Communicative intent* entails understanding behavior directed toward another person that may convey meaning and result in a specific response such as preintentional and intentional communication. *World knowledge* requires understanding the relationship between self and the environment based on previous experiences. *Memory* is the ability to store information and retrieve it at a later time. *Symbolic representation* is the relationship between symbols and referents such as concrete and abstract symbols. *Metacognitive skills* require an understanding of one's own learning strategies, which include metalinguistics, metamemory, and executive functions. These factors are worth considering because they provide information about an individual's capacity to learn and use various skills. For example, without awareness it would be difficult for a baby to learn and understand that when s/he cries the mother comforts him or her through various means such as rocking, giving a bottle, or changing a diaper. Further, these factors are important for teaching a variety of concepts like matching, reading, writing, and using pictures for requesting. There are several cognitive factors purported to be associated with the successful use of pictures.

The behaviors assumed to be most salient for two-dimensional symbols such as pictures are world knowledge, communicative intent, and memory. Awareness, communicative intent, and memory are important for presymbolic communication. Thus, these behaviors are assumed to be present for two-dimensional symbols. For world knowledge AAC users may be able to understand generic or commercially available drawings but symbols can be constructed to conform to the person's world knowledge. Communicative intent is important for photos or line drawings because a child who does not understand that holding out an empty bowl for a refill may not understand holding out a picture of chips for a refill. Recognition memory is important for discriminating among pictures or line drawings. Recall is not required because two-dimensional symbols are permanent. Research indicates that individuals who have intentional presymbolic communication are more successful at learning to use pictures (Rowland & Schweigert, 2000).

AAC interventions can be used to expand intentional communication functions and gestures. Children begin to produce intentional behaviors as they begin to understand the relation between actions and objects. These behaviors are directed towards objects and actions that are not specifically directed toward a partner. Adults reinforce intentional behaviors and intentional behaviors become intentional communication, which is directed towards the communication partner. Researchers have found that children with various communicative impairments produce more limited communicative functions than typically developing peers (Brady, McLean, McLean, & Johnston, 1995; Olgletree, Wetherby, & Westling, 1992; Wetherby, Yonclas, & Bryan, 1993). AAC can be used to help the child move to purposeful, intentional communication. The child can learn to use the AAC program to direct behaviors towards a communicative partner and learn to produce more behaviors that successfully evoke responses. The AAC program can help the child recognize that their intentional behaviors can influence others' behavior. It seems imperative to investigate the behaviors of young children who use AAC systems.

*Limited research with preschoolers and AAC.* There is an urgent need for further research in the AAC field. Research with preschoolers and AAC is limited in quantity and quality. This lack of research could be due to the belief that preschool children are too young to benefit from AAC. The task of determining the efficacy of AAC treatment is difficult because of the wide array of systems, outcomes, and individuals participating in studies. A common issue is the range

of ages included in a single study and the lack of participants younger than 3.5 years of age. Table 1 provides information about study characteristics of AAC research conducted with children less than six years of age. Studies typically include three or four participants and the ages of the children typically range from preschool to high school. Few studies include children under the age of 6 years (Angelo & Goldstein, 1990; Carter & Maxwell, 1998; Charlop et al., 2002; Durand, 1993, 1999; Keen et al., 2001). A further limitation is that a single study may include the use of line drawings for one participant, and an alpha talker and photographs for other participants. The use of a variety of systems within one study leads to questions regarding the effectiveness of one type of system versus another.

A comprehensive search yielded 19 empirical investigations that targeted children under the age of six. Studies that did not include at least one child under the age of six and a minimal experimental design were excluded from the review. Of the 19 studies reviewed, 17 utilized a multiple baseline design, and one study utilized a reversal design to evaluate the treatment effects and changes in behavior; one used a group design. Of those 17 studies, 13 (77%) of these intervention effects across participants and others replicated effects across behaviors, settings, or activities.

There were a variety of outcomes of interest including increasing initiations, responses, and engagement or decreasing challenging or inappropriate behavior. Ten (52%) of the studies focused on changing communication outcomes such as moving from prelinguistic to linguistic communication, teaching verbalizations, or increasing rates of communicative initiations or responses. The other 9 (48%) focused on increasing engagement and on task behavior and decreasing challenging behaviors in combination with other communication outcomes. Of the 19 studies reviewed, 6 (32%) used voice output devices, 12 (63%) used some sort of photographs, pictures, or line drawings, and only one (5%) used written print.

Table 2 shows the design, outcomes, implementation procedures, and the types of devices. It is difficult to make any conclusive judgments about the effectiveness of specific device use for preschoolers because of the lack of research and heterogeneity in population characteristics. There is some evidence to support the use of AAC with preschoolers for increasing communication, social interaction, and requesting but researchers are not specifically addressing the issue related to accurate discriminations.

Table 1. Participant Characteristics

| Study: Voice Output 1-7<br>Pictures/Drawings 8-19         | Child Diagnosis   | Sample Size | Child Age  | Gender   | SES/Ethnicity                         | Other Participants               |
|---|---|-------------|------------|----------|---------------------------------------|----------------------------------|
| 1. Dicarlo & Banajee, 2002                                | Chromosome Abnormality & Angelman syndrome                      | 2           | 2:0 – 2:4  | 2M       | None reported                         |                                  |
| 2. Drager, Light, Speltz, Fallon, Jeffries, 2003          | Typical   | 30          | 2:5-2:11   | 15M, 15F | “Middle class”; “15% diverse cultures |                                  |
| 3. Durand, 1999   | DD, MR, ASD   | 5           | 3:5 –15:0  | 4M, 1F   | None reported                         | Teacher as interventionist       |
| 4. Durand, 1993   | MR & CP   | 3           | 3:5 – 15:0 | 2M; 1F   | None reported                         | Teacher as trainer               |
| 5. Johnston, McDonnell, Nelson, Magnavito, 2003           | DD, CP, DD  | 3           | 3:3- 4:6   | 1M, 2F   | None reported                         | Fourth author as interventionist |
| 6. Schepis, Reid, Behrmann, Sutton, 1998                  | ASD   | 4           | 3:0-5:0    | 3M, 1F   | None reported                         | Classroom staff                  |
| 7. Sigafos, Didden, O’Reilly, 2003                        | DD & ASD  | 3           | 3:0- 13:0  | 3M       | None reported                         |                                  |
| 8. Angelo & Goldstein, 1990                               | MR  | 4           | 5:4- 6:4   | 2M, 2F   | None reported                         | Grad student as trainer          |
| 9. Beville, Gast, Maguire, Vail, 2001                     | DD & ASD  | 4           | 4:0 – 5:0  | 2M, 2F   | Caucasian, African American, Hispanic | Teacher as interventionist       |
| 10. Carter, Maxwell, 1998                                 | CP  | 4           | 5:9 – 9:8  | 3M, 1F   | None reported                         | Peers as interventionist         |
| 11. Charlop-Christy, Carpenter, Le, LeBlanc, Kellet, 2002 | ASD   | 3           | 3:8 –12:0  | 3M       | Ethiopian, Chinese, Korean            |                                  |
| 12. Frea, Arnold, Vittemberga, 2001                       | ASD   | 1           | 4:0        | 1M       | None reported                         | Teacher as interventionist       |
| 13. Johnston, Nelson, Evans, Palazolo, 2003               | ASD, PDD  | 3           | 4:3 – 5:3  | 3M       | None reported                         | Author as interventionist        |
| 14. Keen, Sigafos, Woodyatt, 2001                         | ASD   | 4           | 3:7- 7:7   | 3M, 1F   | None reported                         | Teacher as interventionist       |
| 15. Kravits, Kamps, Kemmerer, & Potucek, 2002             | ASD   | 1           | 6:0        | 1F       | None reported                         |                                  |
| 16. Massey, 2000  | ASD   | 1           | 4:0        | 1M       | None reported                         | Teacher as interventionist       |
| 17. Matson, Sevin, Box, Francis, Sevin, 1993              | ASD   | 3           | 4:0 – 5:0  | 3M       | None reported                         | Therapist as interventionist     |
| 18. Morrison, Sainato, BenChaaban, Endo, 2002             | ASD   | 4           | 3:5-5:10   | 2M, 2F   | None reported                         | Experimenter as interventionist  |
| 19. Spohn, Timko, Sainato, 1999                           | DD  | 3           | 4:0- 5:7   | 2M, 1F   | None reported                         | Teacher as interventionist       |
| Totals or Ranges  | ASD, PDD, CP, DD, MR, Angelman Syndrome, Chromosome abnormality | 85          | 2:0 – 15:0 | 55M, 30F | Primarily not reported                | Teacher, author, or unclear      |

| Table 2. Descriptive Information                 |                                    |                                     |                     |  |   |  |
|--|------------------------------------|-------------------------------------|---------------------|--|---|--|
| Study: Voice Output 1-7<br>Picture/Drawing 8-19  | Design                             | Length/Intensity<br>Of Intervention | Setting/<br>Context | Treatments                                       | Outcome<br>Measures   | Results  |
| 1. Dicarlo & Banajee, 2000                       | *MB across participants            | 20 min sessions; 4 months           | School              | Voice output device, prompts                     | Specific & unclear communicative initiations                          | Significant changes in specific & unclear behaviors  |
| 2. Drager, Light, Speltz, Fallon, Jeffries, 2003 | 3 Groups                           | 5 sessions; 2-4 days apart          | School or home      | Symbols & voice output                           | Vocabulary  | Failure to learn vocabulary items  |
| 3. Durand, 1999                                  | MB across participants & settings  | 4 weeks long                        | School & Community  | Voice output device & prompts                    | Unprompted communication & challenging behavior                       | Significant changes in challenging behavior & unprompted communication                               |
| 4. Durand, 1993                                  | MB across students & behaviors     | 6 weeks, 2-3xwk                     | School              | *FCT & voice output device                       | Unprompted communication, affect, challenging behavior                | Significant changes challenging behavior & affect, mediocre changes in communication                 |
| 5. Johnston, McDonnell, Nelson, Magnavito, 2003  | MB across participants             | 60 sessions                         | School              | Treatment package, graphic symbols, voice output | Symbolic communication, engagement, & social acceptability            | Significant changes in symbolic communication & social acceptability, Mediocre changes in engagement |
| 6. Schepis, Reid, Behrmann, Sutton, 1998         | MP across time & participants      | 2-13mo, 5-20min, 10-35 sessions     | School              | *VOCA & Naturalistic teaching                    | Comm. means & adult prompts   | Significant changes in child & adult behavior  |
| 7. Sigafoos, Didden, O'Reilly, 2003              | MB across participants             | 6-8, 5min sessions 1-2/wk           | Home & Clinic       | *SGD device & graphic symbols                    | SGD requesting & Vocalization   | Significant changes for SGD requesting; No changes for vocalizations                                 |
| 8. Angelo & Goldstein, 1990                      | MB across participants & behaviors | 25 sessions                         | School              | Pragmatic Teaching w/ communication board        | Initiated requests; social validation w/naïve viewers, generalization | Significant changes in initiations   |
| 9. Bevill, Gast, Maguire, Vail, 2001             | MB across participant              | 23 min session                      | School              | Photos, prompts, comments                        | Engagement, choice, peer proximity, prompts, comments                 | Significant to poor changes in engagement & choices  |
| 10. Carter, Maxwell, 1998                        | MB across participants             | 1/wk, 10 min                        | School              | Peer intervention strategies + Pic board         | Social interaction  | Significant changes in social interaction; mediocre to significant changes in peer strategies        |
| 12. Frea, Arnold, Vittimberga, 2001              | MB across settings                 | 10 minute sessions                  | School              | *PECS  | Aggression  | Significant changes in aggression, mediocre changes in picture exchange                              |

Table 2-Continued

|   |                                    |   |  |  |  |  |
|---|------------------------------------|---|--|--|--|--|
| 13. Johnston, Nelson, Evans, Palazolo, 2003   | MB across participants             | 4 days/wk   | School                                   | Colored line drawings                      | Prompted & unprompted communication;<br>Challenging behaviors  | Significant changes in prompted & unprompted communication in desired direction; Changes in challenging behavior presented with descriptive statistics, significance unknown |
| 14. Keen, Sigafoos, Woodyatt, 2001  | MB across participants & behaviors | 10 minute sessions                                  | School                                   | Treatment package, photos                  | Functions & strategies   | Mild to significant change in function; unstable changes in strategy use   |
| 15. Kravits, Kamps, Kemmerer, & Potucek, 2002   | MB across settings                 | 5 months  | Home & school                            | PECS                                       | Symbol use, verbalizations, social interaction   | Significant changes in symbol use & verbalizations; Weak results for social interaction  |
| 16. Massey, 2000  | MB across activities               | 30-50 sessions                                      | School                                   | Polaroid photo activity schedule           | Engagement disengagement, & challenging behavior   | Change in data stability but unstable baseline & high baseline   |
| 17. Matson, Sevin, Box, Francis, Sevin, 1993  | MB across behaviors                | 20 min, 4x/wk, 50 sessions                          | Clinic                                   | Flash card with print                      | Target verbalizations  | Significant changes in target verbalizations   |
| 18. Morrison, Sainato, BenChaaban, Endo, 2002   | MB across participants             | 45 min, 60 sessions                                 | School                                   | Photo activity schedule + prompts          | On task, off task, play correspondence   | Significant changes toward end of *TX; too much overlap with *BL in beginning  |
| 19. Spohn, Timko, Sainato, 1999   | Reversal w/withdrawal              | 5/wk; 12-20 minutes                                 | School                                   | Pictures & prompts                         | Verbal interactions & responses  | Significant changes in verbal interactions   |
| Totals or Ranges  | 17MB, 1 reversal, 1 group          | Range unclear because no common time frame reported | 17 school, 4 home, 3 clinic, 1 community | 12 photos or line drawings, 7 voice output | Communication initiations, responses, challenging behavior, engagement, social interaction, vocabulary | Acceptable voice output results  |
| * MB=Multiple Baseline; FCT=Functional Communication Training; VOCA=Voice Output Communication Aid; SGD=Speech Generating Device; PECS=Picture Exchange Communication System; TX=treatment; BL=Baseline |                                    |   |  |  |  |  |

*Pictures for requesting.* The communication partner or the AAC user can use pictures for requesting. The use of AAC may make language learning simpler for individuals with developmental disabilities (Sevcik, Ronski, & Wilkinson, 1991). It allows individuals to indicate preferences from two or more options, either spontaneously or in response to offers from others (Beukelman & Mirenda, 2005). For example, Bondy and Frost (1994) developed the Picture Exchange Communication System (PECS) to teach pictorial and verbal requesting. PECS is a means to augment the language of children with communication disorders who display limited verbal output. PECS utilizes intervention procedures such as reinforcement, modeling, and a most-to-least prompting hierarchy, where the child receives physical prompting initially. Schwartz, Garfinkle, and Bauer (1998) demonstrated that young children with severe communication deficits could be taught to use PECS with adults and they could generalize the use of this system with peers during snack time and other untrained play situations. However, both the Bondy and Frost and Schwartz et al. studies lacked adequate experimental control thereby limiting the conclusions that can be drawn from these data.

Using a multiple baseline design across settings, Kravits et al. (2002) implemented the first three phases of PECS and measured requests, comments, expansions, and modes of communication for a six-year-old child with ASD. The child demonstrated “reliable use” of the system, increases in verbal choices and requests within two of the three settings, and increases in verbal and pictorial initiations within all three settings. Charlop-Christy, Carpenter, Le, LeBlanc, and Kellet (2002) examined the acquisition of PECS with three children with ASD in a clinic, classroom, and home setting. They found improvements in speech and social communication accompanying picture use. Decreases in challenging behavior were difficult to attribute to PECS teaching because of a decline during baseline. With PECS, picture discrimination is assumed because prior to initiating intervention the child is assessed for preferred and non-preferred items. The procedure begins with one picture and begins to add other pictures as the child progresses through the system. A question still remains about accurate picture discriminations. The authors of these studies do not discuss their approach to accurate picture discriminations. However, the PECS protocol includes little or no demand for accurate picture selection. The child receives the opportunity to make a picture choice from two or more pictures as they advance through the system. Once the child makes a picture selection from two or more items, the child receives the selected item. If the child refuses the item, the trial begins again and

continues in this manner until the child consistently selects the picture they actually prefer or the number of picture items is reduced. In contrast to PECS, there are other procedures that have been used to help children make accurate picture requesting.

Matson, Sevin, Box, and Francis (1993) taught three preschool children with ASD to increase target verbalizations using printed words written on index cards. A time-delay procedure, verbal prompts, and reinforcers like toys and candy were employed to help the children initiate. Researchers used a five-step procedure to fade the use of prompts. Initially, the children were given a verbal cue (e.g., target="hello" so trainer says "hello") or a picture cue and verbal cue of their exact target. The target phrases were only appropriate in certain situations. Children learned to discriminate what target phrases to use in specific situations such as "hello" when the trainer entered the room. There were clear changes in children's verbalizations following the use of a picture cue. Johnston, McDonnell, Nelson, and Magnavito (2003) also used drawings to promote the initiation of requests in preschool children with ASD. Children demonstrated clear changes in their requesting through the use of these pictures. However, the children were not required to make picture discriminations because they only had one picture to make one type of request (e.g., "I want to tell you something." "Can I play?"). It is crucial to examine discrimination skills for accurate requesting that clearly demonstrate a functional relation between picture use and the ability to request effectively.

Angelo and Goldstein (1990) used a pragmatic teaching strategy and a communication board with four nonverbal preschool participants between the ages three and five to increase information requesting. In contrast to PECS, the researchers used a least-to-most "training flowchart" that outlined the use of time delay, verbal, gestural, and physical prompts. However, there was never a need to go beyond the third step, gestural prompts (i.e., point to the correct answer). Initially, the children were taught to discriminate between the pictures. The researchers used a direct teaching procedure that involved modeling the symbol name and simultaneously pointing to the symbol. The children learned to choose the appropriate picture through a correction procedure that involved time delay and gestural prompts from the teacher. The pragmatic teaching strategy was effective for teaching all four children to use three request types (who, what, and where) with generalization across partners and environments but not across request types. This study provides a nice example of beginning with a less intrusive method to

teach requesting and progressing to stronger cues if necessary. Thus, modeling paired with waiting may be another effective technique for teaching accurate picture discriminations.

In summary, these studies have explicitly taught children to use pictures to request using strategies like verbal, gestural, and physical prompts. Other investigators have begun to explore effects of teaching AAC use without explicit teaching strategies. These non-explicit teaching strategies include a few forms of modeling. The next section explores the effects of modeling on AAC use.

*AAC & Modeling.* Typically developing children receive a full year of exposure to spoken language from parents prior to producing their own words (Ronski & Sevcik, 2003). Such modeling is considered an essential component of language development. In contrast, there seems to be a lack of communication models for AAC users. It seems that modeling the use of ACC systems would facilitate faster acquisition of target vocabulary and appropriate AAC use in various contexts and situations. There are a few forms of modeling proposed for use with AAC learners.

For AAC users, there are two variations of modeling techniques used to enhance and facilitate language development: aided language stimulation (ALS) and system for augmenting language (SAL). ALS, as defined by Goossens and Crain (1986), presents activity-specific pictures throughout the day in conjunction with verbal language stimulation. The facilitator (e.g., parent or teacher) augments verbal input by simultaneously selecting graphic symbols and speaking. Modeling selection of the visual cue and modeling the items verbal label promote comprehension. However, there is little empirical evidence that ALS encourages language development in AAC users (Beukelman & Mirenda, 2005). SAL is similar to ALS in that it also encourages comprehension through modeling the use of graphic symbols. One critical difference is that SAL includes the use of a voice output device. SAL, as defined by Ronski and Sevcik (1988), is a system of five components consisting of (1) speech output communication device, (2) symbols and the lexicon, (3) teaching through natural communicative exchanges, (4) communicative partners use of the device, (5) monitoring ongoing use. Modeling is a key element in teaching within the context of daily routines and the partners' use of the device. Another key difference is that SAL encourages symbol use through modeling whereas ALS explicitly prompts individuals to use symbols.

Modeling or augmented input provides the AAC user with an opportunity to observe others using the system in daily interactions. These models show the learner what his or her turn might look like (Reichle & Sigafos, 1991). Models can select the target picture or lone drawing that is appropriate for the communication opportunity. A model is relatively quick and easy to produce and provides explicit support by demonstrating the required skill (Light & Binger, 1998). Verbal models paired with visual models may facilitate matching the symbol or the word with its physical referent (Romski & Sevcik, 2003). The use of verbal and visual models facilitates comprehension of spoken words and visual-graphic symbols in addition to reinforcing opportunities for successful communicative exchanges.

For example, Peck, Wacker, Berg, Cooper, Brown, Richman, McComas, Frischmeyer, and Millard (1996) taught five preschool children with developmental disabilities to make requests with objects, pictures, and voice output devices. Modeling, variable reinforcement, and duration were used to help children make requests. Three of the five children learned to make requests that resulted in a longer duration of reinforcing activities and higher quality of reinforcement. The other children did not learn to make requests. However, it appears that object and picture discrimination were not addressed. There may have been an expectation for the emergence of picture discriminations as the child learned to point to objects, and pictures to make requests.

Modeling also has been taught to preschool children to help them follow activity schedules. Morrison, Sainato, Benchaaban, and Endo (2002) used an activity schedule and modeling and gestural prompts to teach four preschool children with autism on-task and play behaviors. All four children demonstrated increases in on-task and play behavior with decreases in prompts. In another study, Krantz, et al. (1993) taught parents to use modeling and a photographic activity schedule with their preschoolers during daily routines. Parents modeled the use of the schedule as children transitioned from one activity to the next activity. All four children demonstrated increases in their engagement and social initiations and decreases in their disruptive behavior.

In summary, communicative partners such as parents, teachers, and peers have relied on modeling to teach children with disabilities to use various AAC systems. Modeling is a common and successful form of intervention for language behaviors. However, research has been limited regarding ways to maximize the model's effect on the observer's behaviors. Research on the

attributes of models indicates that the most effective models are those perceived as being similar to the observer (Bandura, 1969, 1977). Theoretically, the maximum use of characteristics similar to that of the observer would involve self-modeling. The extent to which the observer perceives himself or herself as similar to the model determines the extent to which the observer learns the desired behavior. A body of research has emerged within the last 20 years that has examined self-modeling through the use of videotapes. The next section explores the effects of video modeling and video self-modeling.

*Video Modeling & Self-Modeling.* Video modeling (VM) refers to a procedure in which people view models on videotape engaging in target behaviors that they will imitate (Dowrick, 1986). Video self-modeling (VSM) refers to a procedure in which people see themselves on videotapes while engaging in desired target behaviors (Dowrick, 1986). VM and VSM have been used effectively in a variety of settings with different populations to teach many types of behaviors including social interaction, communication, community skills, and motor skills (Branham et al., 1999; Brown & Middleton, 1998; Bugghey, 1995; Charlop-Christy, Le, Freeman, 2000; Dowrick & Raeburn, 1995).

For example, LeBlanc, Coates, Daneshvar, Charlop-Christy, Morris, and Lancaster (2003) used VM and reinforcement to teach children ages 7-13 years, who had been diagnosed with autism, perspective taking skills in a multiple baseline design across tasks. The children viewed an adult model completing the tasks and then answered perspective-taking questions. VM was effective for teaching the target behaviors but with limited generalization. In a study of parent training with VSM, Reamer, Brady, and Hawkins (1998) used self-assessment, VSM, discrimination training, and behavioral reversal in a multiple baseline design across parent and child behaviors. Parents watched video vignettes of interactions with their child and provided a narration of the interactions. The parent behaviors included the use of social prompts or any motor or verbal behavior that aided their child's social interaction with a sibling. The child behaviors consisted of directing verbal or motor behavior toward a sibling including using toys, turn-taking, talking, and vocalizing. The video package was effective in increasing parents' social prompts and assistance and increasing preschool children's social behaviors and task completion. Thus, VSM promoted changes in parent behavior that resulted in changes in child behavior. In another study focusing on young school age children with autism, Charlop-Christy et al. (2000) compared VM with in vivo modeling (live models) in a multiple baseline design

across five children ages 7-11 years, and tasks. Each child was taught two tasks, one for each teaching condition. Tasks taught included such behaviors as expressing emotions, independent play, and self-help skills. VM resulted in faster acquisition than in vivo modeling and effective generalization. Although VM has resulted in positive outcomes, VSM may be a more effective teaching tool. Using oneself as the model provided the greatest degree of similarity between the model and the observer. Providing the target individual with opportunities to observe him or herself engaging in appropriate behaviors has a profound effect on target outcomes. For example, Dowrick and Raeburn (1995) compared the effects of VSM with VM for teaching a variety of physical and self-help skills to five preschoolers and 13 school age children. Two target behaviors were chosen for each condition; a target behavior for VM and a target behavior for VSM. The study resulted in significant treatment effects for VSM. Sixty percent of the preschool children and 85% of the school age children showed clinically significant changes in their VSM behaviors. The results from this study indicate some promise for the use of VSM with preschoolers.

VM and VSM have resulted in positive outcomes with adults and school age children but VSM has produced mixed results for preschoolers. It does not appear to be especially effective for reducing challenging behaviors. For example, Beck (1990) compared VSM, videotaped peer modeling, and viewing Sesame Street in a reversal design to reduce aggressive behavior in four preschool boys. Unfortunately, neither the use of VSM nor any of the other interventions resulted in reduction of the problem behavior. In another study, Clark, Beck, Sloane, Goldsmith, Jenson, Bowen, and Kehle (1993) used VSM to reduce aggression and other problem behaviors in preschoolers. The use of VSM did not result in decreases in negative behaviors. Brown and Middleton (1998) used VSM in a reversal design to teach one preschooler with cognitive delays to decrease self-stimulation (hand-flapping). The authors reported decreases in the negative behavior following the use of VSM. Unfortunately, the results were confounded by the use of another teaching strategy (overcorrection). It is unclear why the use of VSM in these studies did not result in positive effects. Poor experimental design, video creation and editing, or the type of target behavior could have contributed to the ineffectiveness of VSM. For example, it seems imperative to highlight the target behaviors within the video segment. These studies focused on decreasing undesired behaviors. It may be difficult for children to see the absence of a behavior in a video and then understand that the behavior needs to decrease.

There may be more promise for teaching new behaviors. Results for increasing desired behaviors for preschoolers such as self-help and communication have had somewhat better results (Buggey, 1995; Dowrick & Raeburn, 1995; Hepting & Goldstein, 1996). For example, Hepting and Goldstein (1996) used VSM to teach three preschoolers with developmental disabilities to use linguistic structures such as attribute + object or verb + object semantic relations. VSM did not result in generalized changes in the children's target behaviors until a prompt was introduced and the videotapes were viewed in the child's classroom. Buggey (1995) combined VSM and VM in a multiple baseline design across participants to teach three preschoolers with developmental delays to use the contractible copula *is*. The children viewed videotapes of an adult using the structure and themselves using the structure. The preschoolers demonstrated significant changes in their use of the linguistic structure. Despite these difficulties VSM is potentially effective for teaching preschool children a variety of behaviors. VSM has not been used previously to teach the use of AAC systems. VSM with AAC systems such as pictures may be a powerful tool for increasing communication behaviors.

In summary, requesting is an early and important communication function. Previous research indicates the effectiveness of using pictures to help children request. However, using pictures to request might not necessarily help children make accurate picture discriminations. This study sought to combine VSM, a form of modeling, with AAC strategies to facilitate requesting and accurate picture discriminations. This study took advantage of the child seeing him/herself engaging in correct picture discriminations and enjoying the results of correct discriminations and requests through a VSM procedure. When pictures are being used as a communicative tool, the AAC user has multiple opportunities to refer to the pictures. This procedure also had the advantages of providing the child with multiple opportunities to view themselves on video using the pictures to request. In this case, VSM illustrated the participant using pictures, relatively non-transient, stable stimuli, to request desired play items.

## CHAPTER 2

### STATEMENT OF PROBLEM

For children with severe communication impairments, Augmentative and Alternative Communication systems (AAC) have been used to help establish basic communication skills like requesting. Because preschool children with developmental disabilities might have difficulty with picture discrimination, one cannot assume that discrimination skills are well developed and that these children will utilize these referents in AAC communication (Schreibman, 2000). By capitalizing on the strengths of Video Self Modeling and picture symbols, this project aimed to promote requesting and picture discrimination in preschool children with developmental delays to enable them to receive requested items.

The purpose of this research project was to investigate the use of pictures and VSM to facilitate requesting and picture discrimination in play. It is imperative to teach alternative forms of communication when appropriate, such as picture symbol communication. This study provided vital information for developing effective AAC systems for preschool children by incorporating VSM. This study addressed the following three research objectives:

Objective 1: To investigate the extent to which the use of video self-modeling facilitates requesting in preschool children.

Objective 2: To investigate the extent to which video self-modeling facilitates picture discrimination.

Objective 3: To investigate the extent to which naïve judges perceive or socially validate differences in the communication skills of children before and after intervention.

Following are a list of definitions for frequently occurring terms, child behaviors, and treatment fidelity.

#### *Frequently Occurring Terms*

1. **Request:** To indicate a desire for a certain item or activity.
2. **Discrimination:** To indicate a correct selection from two or more options following a request from another person. For example “Give me the square.” Options include a square and circle.
3. **Auditory-Visual Discrimination:** To associate a particular auditory stimulus with a particular visual stimulus regardless of the position of the visual stimulus and order of

auditory stimulus. For example, “Put it in the red box.” Options include a red box and yellow cylinder that alternate positions randomly.

4. **Picture Exchange:** The individual is required to **give** a picture to receive an item. The picture must be placed in the person’s hand, and the AAC user receives the item displayed on the picture, thus picture exchange. The picture is exchanged for the item it represents.

5. **Augmentative & Alternative Communication (AAC) System:** An integrated group of four components used by an individual to enhance communication (American Speech-Language Hearing Association [ASHA], 1991, p.10): (a) *symbols*- methods used for visual, auditory, and/or tactile representation of conventional concepts; (b) *aids*- aided: visual graphic representations such as objects, pictures, photographs, line drawings, written words, and Braille; unaided: gestures, manual sign sets, and spoken words; (c) *selection techniques*- the method by which an individual transmits messages; and (d) *strategies*- specific ways in which AAC aids, symbols, and techniques are used to develop and/or enhance communication.

6. **Exclusion:** A training technique that teaches new concepts in the presence of known concepts. For example the individual is presented with a known item (apple) and an unknown item (sled); when asked for the sled the person selects the correct item because he or she knows an apple is NOT a sled, allowing one to use a process of elimination.

7. **Voice Output Device or Device:** an electronic communication aid that produces synthetic or natural voice recorded speech, also known as Voice Output Communication Aid or VOCA.

## CHAPTER 3

### METHOD

#### *Overview of Study Sequence*

First families were recruited and selected to participate in the intervention. The selection process consisted of assessing the child's developmental characteristics including language, motor skills, cognition, picture identification, and selection abilities. After the children were selected to participate, target vocabulary was identified through play observations at home and school as well as discussions with the family. Following target vocabulary selection, children participated in video preparation. After video preparation, baseline data collection provided opportunities for participants to request items that went along with desirable play activities. Following baseline, VSM was introduced sequentially according to a multiple baseline design across participants. If VSM did not result in accurate requesting with pictures, then a matching to video procedure was instituted followed by direct teaching without the video, if necessary.

#### *Participant Selection Criteria*

Four children were recruited in collaboration with the Florida State University regional Center for Autism and Related Disabilities. Caregivers received a letter describing the study and participation requirements. Families contacted the researcher if they were interested in participating in the study. The researcher explained the project and determined interest and child qualifications for participation. Families who agreed to participate received written information about the study and signed an informed consent form (see Appendix B and C). Prior to initiation of the baseline condition, children were assessed using the *Mullen Scales of Early Learning* (Mullen, 1995) and an experimenter-created assessment for common picture identification, in a location that was convenient to the family and interaction partner such as the home or clinic. The *Mullen Scales of Early Learning* is a comprehensive measure for children from birth to 68 months of age. It assessed the child's abilities in visual, motor, receptive and expressive language domains. Specifically, the visual reception scale assessed processing of visual patterns such as organization, sequencing, and awareness. The gross and fine motor scales assessed motor control, planning, and mobility. The receptive and expressive language scales assessed auditory organization, sequencing, and memory, and language production or speaking ability. The experimenter created assessment consisted of eight trials with a 2 picture array for each trial.

The caregiver and child were chosen based on the following inclusion criteria:

- Children two to five years of age;
- A significant developmental delay as defined by one or more standard deviations below the mean on the *Mullen Scales of Early Learning* (Mullen, 1996);
- No co-existing developmental/medical conditions, e.g., visual impairments, hearing impairments, and severe cerebral palsy (i.e. severe motor delays);
- Typical fine motor and gross motor development as defined by no more than one standard deviation below or above the mean on *The Mullen Scales of Early Learning*;
- Ability to select pictures by pointing (physical gesture: child uses hand or finger to touch picture) or giving (physical gesture: child hands picture to person) through an experimenter created assessment (i.e., demonstrates the ability to scan and point/give pictures);
- Inability to identify target words (i.e., vocabulary words used in intervention) receptively through selection of pictures by pointing, touching, or giving;
- Agreement to participate in the completion of evaluation measures including: videotaping in the home and/or clinic, child and family formal and informal measures, interviews and satisfaction surveys in the clinic and/or home.

### *Participants*

The names of the children participating in this study have been changed to protect their identity. Mike was a 5-year-old Caucasian boy diagnosed with autism. Prior to this study he had received speech therapy two times a week for two months. At the time of the study, he was a student in a self-contained kindergarten classroom with other children with disabilities. Mike made simple 1-2 word requests such as “water,” “all done,” and “go away”, which were often unintelligible and single word protests accompanied by a contact gesture (“no” while pushing). Mike had moderate to severe echolalia and often engaged in repetitive play actions. Mike also had challenging behaviors that included pinching, pushing, and hitting. Mike showed a lack of shared enjoyment and often avoided eye contact. He was compulsive and ritualistic with such things as seat position, the positioning of objects in his immediate area, and schedules. He often engaged in inappropriate emotional responses. Mike also turned the pages of books, ran, and jumped around on the playground, and followed simple commands. On the *Mullen Scales of Early Learning*, Mike scored below the 1<sup>st</sup> percentile and was more than 2 standard deviations below the mean in receptive and expressive language. For visual reception, Mike could match

and sort objects into two categories and nest cups. However, he could not complete age appropriate tasks like discriminating left from right, or matching letters or words. For receptive language he could comprehend simple questions and directions and recognize body parts but he did not appear to understand concepts like “in,” “under,” or two-part commands. On the experimenter created picture assessment, Mike correctly identified three of the eight pictures without a gesture or repetition of instructions. He correctly identified four of the eight pictures following a repetition of the command. On the target word assessment, Mike did not identify any of the pictures that were to be used for intervention.

James was a 5 year old African American boy who had been diagnosed with autism. Prior to this study he received speech therapy inconsistently over the course of 3 years, and during the study he was a student in a self-contained kindergarten classroom that included other children with disabilities. He remained nonverbal and he produced very few vocalizations. James vocalized using a small range of vowel sounds (e, i) and two consonants (b, d). He required repetition of verbal direction, and gestural cues to know where to go and what to do. He was observed playing beside children versus with children. He engaged in repetitive play activities, such as digging and pouring sand or running around in circles. James liked to carry some type of small toy, a beanie baby or stuffed animal, in each hand like. When James wanted something he typically took an adult by the hand and led them to the item. James also engaged in behaviors such as hand and arm flapping and loud, inappropriate noises. On the *Mullen Scales of Early Learning*, James scored below the 1<sup>st</sup> percentile and was more than 3 standard deviations below the mean in expressive and receptive language. For visual reception, James could look for fully or partially hidden objects, look at pictures, match objects, and nest cups. However, he could not complete tasks like associating objects with their function or match items by size. For receptive language he recognized familiar names and words such as “bye” or “sit down” but he did give objects on verbal cue without a gesture and he did not appear to recognize body parts. On the experimenter created picture assessment, James correctly identified one of the eight pictures with repetition only cue. He correctly identified two of the eight pictures with repetition and open hand cue. On the target word assessment, James did not identify any of the pictures to be used for intervention.

Noah was a 5-year-old Caucasian boy diagnosed with autism. Prior to this study, he had not received any speech therapy. At the time of the study, he was a student in a self-contained

kindergarten classroom with other children with disabilities. Noah communicated through one word requests, protests, and pointing. He used jargon and had moderate to severe echolalia. Some of Noah's other skills included running, jumping, scribbling on paper, and following simple commands such as "come here" and "sit." Noah also engaged in behaviors such as hand wringing and inappropriate emotional responses like laughing when nothing is funny. On the Mullen Scales of Early Learning, Noah scored below the 1<sup>st</sup> percentile and was more than 2 standard deviations below the mean in expressive and receptive language. For visual reception, Noah could match and sort objects by shape, size, and color. However, he could not match by spatial detail or spatial position. For receptive language he could comprehend two part commands, identify prepositions, and pictures but he did not identify action words in pictures, functions of objects, or size concepts. On the experimenter created picture assessment, Noah correctly identified six of the eight pictures. He correctly identified one of the eight pictures with repetition. On the target word assessment, Noah did not identify any of the pictures to be used for intervention.

John was a 3 year, 6 month old Vietnamese boy who had been diagnosed with autism. Prior to this study, he received occupational therapy and speech therapy once per week for seven months. At the time of the study, he was in an integrated preschool classroom for children with and without disabilities. John made simple 1-2 word requests such as "mine," "my turn," and "take off" and single word protests accompanied by a distal gesture ("no" while pointing or shaking head). John occasionally repeated words spoken by others and was repetitive at times. The words that John imitated were typically not used in appropriate context. Some of John's other skills included sorting shapes, nesting cups, using scissors, running, and jumping around on the playground and engaging in activities with peers. On the *Mullen Scales of Early Learning*, John scored below the 1<sup>st</sup> percentile and was more than 2 standard deviations below the mean in receptive and expressive language. For visual reception, John could match and sort objects by shape, size, and color. However, he could not match by spatial detail or position. For receptive language he could follow two-part commands, identify prepositions, and pictures but he did not appear to understand concepts like size, function of objects, or action words. On the experimenter created picture assessment, John correctly identified one of the eight pictures without a gesture or repetition of instructions. He correctly identified six of the eight pictures

following a repetition of the command and an open hand gesture. On the target word assessment, John did not identify any of the pictures that were to be used for intervention.

The interaction partner was a 31 year old, African American female and the author of the dissertation. At the time of the study she was a doctoral student in the Department of Communication Disorders. Her educational experiences included a bachelor and a master degree in Communication Disorders. Her professional experiences included providing speech-language therapy services to children and adults in a variety of settings including long term care, school, and in home services. Her biographic sketch is included at the end of this document.

### *Settings and Session Organization*

The study was conducted in families' homes for three (Mike, James, Noah) of the four participants and at school for one (John) of the participants. Sessions occurred in the afternoon and multiple children were seen in a day. Parents and teachers were not in the room during the viewings or testing. First, an area was set up for viewing the video on a portable DVD player. The child sat on the floor or at a table and the DVD player was placed directly in front of the child. Video viewings occurred in the living room area for the participants at home and in a small classroom for the child at school. Second, this same area was used for the play activities.

Each video viewing session lasted approximately one minute per activity. This sequence progressed through four play activities and the play activities were viewed twice and randomly ordered for viewing. Thus, the total video viewing time was approximately 8-9 minutes. After the child viewed all eight video segments, observation data were collected. If the child had difficulty sitting to watch the video, he received one opportunity to have a one-minute break. Each child participated in at least three sessions of approximately 30 minutes each week for 12 weeks.

### *Materials*

Parent or teacher reports and observations in the home and/or school were used to indicate preference for play activities. The researcher selected four play activities to be used with each child. Mike's activities were puzzle, cook, farm, and matching. Noah's activities were bus, farm, cook, and book. James' activities were dinosaur, cook, puzzle, and potato head. John's activities were puzzle, matching, farm, cook, play dough, dress girl). A picture set of four 2.5" by 2.5" colored line drawings were selected from the Picture Communication Symbols (Mayer-Johnson, 1992). Each object had a corresponding picture. The objects were toys like baby dolls,

puzzles, dinosaurs, and cooking items. The picture and object sets were chosen from routines in which the child participated at home or school but for which s/he had no vocabulary. The children had to choose from four pictures.

### *Procedures*

The procedural components included: the selection of play activities and pictures, the preparation of the self-modeling video, and the play observations. The variations in the experimental conditions that preceded play observations are described in the experimental design and conditions section that follows.

*Picture Selection.* Conversation was started with the family to explain the intervention. The activities required the use of specific toys for participation. The researcher observed the child at home and at school during typical play activities. The researcher chose vocabulary targets for familiar play activities (e.g., puzzle). A list of preschool words was consulted and the most common words were excluded to avoid likely confounds with everyday experiences (Beukelman, McGinnis, & Morrow, 1991). This was to insure that the children were not familiar with the chosen vocabulary. The researcher assessed the child's knowledge of the target vocabulary prior to the initiation of intervention to ensure that they were not a part of the child's vocabulary. If the child could "point to" or "give" the correct picture upon request from a selection of two, those words were not selected as vocabulary targets. The interaction partner used symbols from the Mayer-Johnson Picture Communication Set. The pictures were laminated 2.5" x 2.5" color line drawings.

*Video Preparation.* The video preparation occurred prior to baseline sessions and was filmed in one session lasting approximately 60 minutes. Appendix D provides the scenes that were used for the video preparation. Video segments were shot in scenes and then edited together. The first scene depicted the interaction partner providing the stimulus for the first play activity. The Interaction Partner (seated next to the child) provided the appropriate stimuli for the play activity (e.g., "Let's play with the puzzle. Give me the picture of the puzzle."). In the second scene, the camera pans across the four picture selections. In the third scene, the child appears to be searching for the correct picture. In the fourth scene, the camera showed a close up of the child giving the appropriate picture. Camera angles were adjusted as necessary to capture the child selecting the picture.

The Interaction Partner (seated out of view of camera) gave the child a gestural cue to choose the correct picture (e.g., pointing to the puzzle). If the child did not respond to the gestural prompt, the Interaction Partner used a partial physical prompt at the elbow to get the child to give the correct picture. The fifth scene showed the Interaction Partner giving the child positive verbal feedback (e.g., Yes, we need the puzzle!). The sixth scene shows the Interaction partner giving the item that matches the picture to the child and the child and the Interaction Partner playing with the objects associated with each play activity for approximately 30 seconds. The videotape was edited to remove any visible prompts, and any negative affect displayed by the child. The final product showed the child engaging in the routine independently and using the pictures appropriately. This procedure occurred for the four play activities. There were two examples for each play activity with the target pictures in different locations.

*Play Observations.* The child received two opportunities to choose from four pictures associated with four play activities. The interaction partner placed four pictures, approximately one inch apart, in a line approximately eight inches in front of the child. The placement of pictures was randomized for each trial. The play items were kept out of the child's reach. The child received a stimulus from the interaction partner that was appropriate for the activity in question (e.g., "Let's play with the puzzle. Give me the picture of the puzzle."). If the child pointed to, touched, or gave the appropriate picture (e.g., puzzle) associated with the puzzle, he gained access to the puzzle for 1 minute. If the child pointed to, touched, or gave an incorrect picture, the interaction partner provided feedback (e.g., "That's not the puzzle.") and then moved on to the next stimulus item. This procedure was used to ensure that the child only received training from the videotapes and not from the interaction partner. The interaction partner went through the sequence of activities twice. Thus, the child received two opportunities to choose the appropriate picture. Sessions were videotaped for coding and reliability purposes. Table 3 shows an example of the stimuli, the script, and procedures used for each play activity.

#### *Experimental Design and Conditions*

A multiple baseline design across participants was used to assess experimental effects. The dependent variable was the number of accurate requests through giving pictures. Once a stable baseline (at least three observations) was established for all participants, intervention was initiated with the first participant, while baseline measures for the other three participants continued. VSM treatment was initiated in succession for each participant. If other intervention

conditions such as matching to video and direct teaching were needed to establish discriminative learning, they were introduced in a multiple baseline fashion. The effects of VSM were evaluated for (a) giving pictures as well as (b) accurate picture selection.

*Baseline.* During baseline, children watched four minutes of “Baby Einstein: Baby MacDonald” (Walt Disney, 2004). After viewing video clips, the child was given eight opportunities to request play materials from their four target vocabulary activities. The baseline condition served as a control and involved the same sequence of activities, as the intervention condition except the videotape was not relevant to the behavior being taught. Consequently, children were not expected to change their responding when given opportunities to request play materials during the baseline condition. They were not expected to begin to give a picture or make accurate picture discriminations until VSM was introduced.

*Video Viewing Intervention.* Procedures identical to those described in baseline were implemented during the video viewing intervention, but the child watched eight 1-minute, randomly ordered video clips of himself selecting the appropriate picture, receiving the correct item and verbal reinforcement, and then engaging in each play routine. Cues such as “Watch the tape” or “Pay attention” were used to redirect the child’s attention if needed. For Mike these cues were not sufficient to gain his attention. Thus, the researcher used tangibles such as tic tacs in a variable interval schedule to reinforce him for paying attention. The child watched the video of himself at least three times a week. As in the baseline condition, after viewing video clips, the child was given eight opportunities to request play materials for each of the four play activities.

*Branch steps.* A criterion of 4 of 8 (50%) correct was used to denote that the behavior was emerging and 6 of 8 (75%) correct across at least 3 sessions denoted that the behavior was learned. A branch step was initiated, if VSM alone did not increase requesting and discrimination. The first branch step integrated matching to sample with VSM. It provided the child with an opportunity to match the picture on the video with the picture in front of him/her during the video viewing. This branch step was referred to as matching-to-video.

During the *matching-to-video branch step*, the interaction partner placed the four pictures, approximately one inch apart, in a line approximately eight inches in front of the child. The video screen was placed approximately one inch behind the pictures. The placement of pictures corresponded with the placement of pictures in the video. The interaction partner paused at three different scenes for each of the pictures which provided 12 opportunities to match during

the video viewing. Each time, the child received a stimulus from the interaction partner appropriate for the activity in question (e.g., “Show me puzzle.”). If the child pointed to, touched, or gave the appropriate picture (i.e., puzzle), he received verbal praise and the interaction partner moved on to the next trial. If the child gave an incorrect response or did not respond, the interaction partner pointed to the correct picture on the screen and waited 5 seconds for the child to respond again. If the child responded incorrectly or did not respond, the interaction partner used a hand over hand prompt to help the child match the picture to the picture on the video screen.

Table 3. Example Stimuli for Video Self-Modeling

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There are four play activities: Puzzle, Dinosaur, Book, and Cook.

*Puzzle Activity*

Interaction Partner: Lets play with the puzzle. Give me the picture of the puzzle.

Child: Gives picture of puzzle.

***If child doesn't give correct picture—***

Interaction Partner: Moves to next stimulus item.

*Dinosaur Activity*

Interaction Partner: Let's play with the dinosaurs. Give me the picture of dinosaur.

Child: Gives picture of dinosaur.

Interaction Partner: Gives the child the dinosaurs and says "Yes, we need the dinosaur."

***If child doesn't give correct picture—***

Interaction Partner: Moves to next stimulus item.

*Book Activity*

Interaction Partner: Let's read a book. Give me the picture of book.

Child: Gives picture of book.

Interaction Partner: Gives the child the book and says "Yes, we need the book."

***If child doesn't give correct picture—***

Interaction Partner: Moves to next stimulus item.

*Cook Activity*

Interaction Partner: Let's cook. Give me the picture of cooking.

Child: Gives picture of cooking.

Interaction Partner: Gives the child the pot and spoon and says "Yes, we need the cooking."

***If child doesn't give correct picture—***

Interaction Partner: Moves to next stimulus item.

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After the video viewing, children participated in play observations exactly as described above. Table 4 provides an example of the stimuli, the script, and procedures used during matching to video play activities.

Three of the children received a minimum of 5 sessions of matching to sample. If matching to sample did not increase requesting and discrimination, a second branch step of direct teaching was initiated. With direct teaching the children no longer viewed the video segments. They were taught to give the correct picture following a point and then a physical prompt.

During the *direct teaching branch step*, the videos were withdrawn and no longer used for teaching purposes. The interaction partner placed the four pictures, approximately one inch apart, in a line approximately eight inches in front of the child. The placement of pictures was randomized for each session. The play items were kept out of the child's reach. The child received a stimulus from the interaction partner that was appropriate for the activity in question (e.g., "Let's play with the puzzle. Give me the picture of the puzzle."). If the child pointed to, touched, or gave the appropriate picture (i.e., puzzle) associated with the puzzle, he gained access to the puzzle for 1 minute. If the child responded incorrectly or did not respond, the interaction partner pointed to the correct picture (e.g., puzzle) and waited 5 seconds for the child to respond. If child responded incorrectly or did not respond, the interaction partner used a hand over hand prompt to help the child give the picture and the child gained access to the puzzle for 1 minute. The interaction partner went through the sequence of activities twice. Thus, the child received two opportunities to choose the appropriate picture.

Table 4. Example Stimuli for Matching to Video

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There are four play activities: Puzzle, Dinosaur, Book, and Cook.

**Pause the videotape...**

*Puzzle Activity*

Interaction Partner: Show me the puzzle.

Interaction Partner: “Yes, that’s the puzzle.”

***If child doesn’t give correct picture—***

Interaction Partner: No, that’s not the puzzle. Show me the puzzle (while pointing to puzzle on tv).

Child: Points, touches, gives picture of puzzle.

Interaction Partner: “Yes, that’s the puzzle.”

***If child doesn’t give correct picture (X2)—***

Interaction Partner: “No, that’s not the puzzle, Here is the puzzle” while holding the correct picture next to the picture on the TV screen.

*Dinosaur Activity*

Interaction Partner: Show me dinosaur.

Child: Points, touches, gives picture of dinosaur.

Interaction Partner: “Yes, that’s dinosaur.”

***If child doesn’t give correct picture—***

Interaction Partner: No, that’s not dinosaur. Show me dinosaur (while pointing to dinosaur on tv).

Child: Points, touches, gives picture of dinosaur.

Interaction Partner: “Yes, that’s dinosaur.”

***If child doesn’t give correct picture (X2)—***

Interaction Partner: “No, that’s not dinosaur, Here is dinosaur” while holding the correct picture next to the picture on the TV screen.

*Cook Activity*

Interaction Partner: Show me cook.

Child: Points, touches, gives picture of cook.

Interaction Partner: “Yes, that’s cook.”

***If child doesn’t give correct picture—***

Interaction Partner: No, that’s not cook. Show me cook (while pointing to cook on tv).

Child: Points, touches, gives picture of cook.

Interaction Partner: “Yes, that’s cook.”

***If child doesn’t give correct picture (X2)—***

Interaction Partner: “No, that’s not cook, Here is cook” while holding the correct picture next to the picture on the TV screen.

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### *Data Collection & Scoring*

*Child Measures.* Data collection began in September and was completed in December. Measures were based on coding of the number of pictures correctly identified when responding to the verbal stimuli and the communication mode (i.e., give, word) used to choose the picture. For example, if the child pointed to the picture of the puzzle following that stimulus, the child received a plus for a correct response and “PT” for the point or touch. If the child pointed to, touched, or gave pictures associated with the other three play activities in response to the puzzle stimuli the child received a minus denoting an incorrect response and PT for the point or touch or a G for give. Table 5 shows the form that was used to code child data.

*Child Attending.* As a component of treatment fidelity, data were collected during video viewing to determine the frequency with which children attended to the videos. Momentary time sampling was used to estimate the frequency of child attention. The child was considered to be attending if he was looking at the video screen for 10 seconds at the end of each minute. The child was not considered to be attending if he was not looking at the video screen for the entire 10 seconds.

During baseline when the children were watching the Baby Einstein video viewing, attention was scored at the end of each of four 60-second intervals during the 4 minute video. During VSM viewing, attention was scored at the end of each of eight 60-second intervals, which corresponded to the 8 stimulus scenes. This information was used to determine whether there were any differences in children’s interest in the Baby Einstein video versus the video of themselves. A summary of the attending to video data is presented in Table 6.

Table 5. Example of Child Coding Form

Child Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Definitions:**

NR- Child receives an opportunity to choose picture but does not make a selection.

+ Child chooses the correct picture that corresponds to the stimulus.

- Child chooses incorrect picture for stimulus presented.

PT-Child points to or touches a picture

W- Child names the picture.

G- Child picks up the picture and offers it to the interaction partner

| Trial     | Activity   | Response |
|-----------|------------|----------|
| 1         | Child Care | + (PT)   |
| 2         | Building   | + (PT)   |
| 3         | Bubbles    | + (W)    |
| 4         | Meals      | - (PT)   |
| 5         | Child Care | - (PT)   |
| 6         | Building   | NR       |
| 7         | Bubbles    | + (G)    |
| 8         | Meals      | - (G)    |
|           |            |          |
| # Correct | 4          |          |
| # PT      | 4          |          |
| # W       | 1          |          |
| # G       | 2          |          |

NR = No response

+ = Correct Response

- = Incorrect Response

PT = Point/Touch

W = Word

G = Give

Table 6. Child attention to videos

| Child | Baseline Video | VSM Intervention |
|-------|----------------|------------------|
| Mike  | 30%            | 53%              |
| Noah  | 100%           | 100%             |
| James | 49%            | 58%              |
| John  | 84%            | 98%              |

*Generalization Probes.* Generalization probes were conducted once the child reached a criterion of 4 of 8 (50%) correct for at least three sessions. The generalization sessions occurred on different days than the regular sessions. On the first generalization session, the parent and graduate student watched the interaction partner progress through one stimulus activity. Then the parent or graduate student provided the stimulus for the activities. There were two types of generalization probes. One type of probe was generalization to a naturalistic context. The child had an opportunity to choose the activity he would like to play versus choosing the appropriate picture for the stimulus (i.e., “What would you like to play with?”). This probe assessed whether the child would continue to give a picture in response to a more open-ended question that permitted more spontaneous requesting.

The second type of probe was generalization to another person, the parent or a graduate student. For Noah, and Mike these probes occurred with parents and for John these probes occurred at school with a graduate student. The situation was set up similar to the play observations. The parent or student provided the stimulus and the appropriate play items associated with the activity following a correct request from the child. The child again had two opportunities per play activity to make a correct picture selection.

Noah participated in eight generalization sessions that included 4 in the naturalistic context and 4 sessions in the person context with his mother. Mike participated in 15 generalization sessions that included 11 in the naturalistic context and 4 sessions in the person context with his mother. John participated in eight generalization sessions that included 4 in the naturalistic context and 4 sessions in the person context with the graduate student. James did not participate in generalization sessions, because he did not learn to make accurate picture selections.

*Social Validation.* The researcher compiled randomly ordered, representative video vignettes of each child's communication behavior pre- and post-intervention. There were a total of 8 video segments: one pre-treatment and one post-treatment segment per child. The video segments showed the Interaction Partner providing a stimulus and the child receiving the four picture selections, and gaining or not gaining access to the play items based on their responses. The segments chosen were representative samples of each child's baseline and intervention performance (i.e., average performance, not the best or worst segments). Video segments were selected from mid-baseline and mid-intervention sessions that were typical of the child's behavior. Undergraduate students viewed the video segments at individual computer stations. Segments were presented in a counterbalanced order to ensure pre-post segments for each child were not consecutive and were separated by at least one segment from another child. Appendix E shows the questionnaire developed to assess specific communication behaviors. The students rated different aspects of child communication using a 5-point scale (rarely to most of time). Six questions assessed information about the child's use of pictures, sounds, words, gestures, and participation during the activity. Thirteen undergraduate students from the Department of Communication Disorders at Florida State University completed this questionnaire. These items were analyzed using repeated measures *t*-tests.

*Treatment Fidelity Measures.* A graduate coder, a doctoral student in the Department of Communication Disorders who was unfamiliar with the hypothesis of the study, completed forms that documented the frequency of prompts and opportunities provided to each child during observations sampled across baseline and treatment conditions. Treatment fidelity was collected for 90% of the sessions. These fidelity measures were completed to ensure that each child received the appropriate stimulus and number of opportunities to choose the correct picture during these conditions. Appendix F showed the form that was used to document fidelity for VSM and Appendix G showed fidelity for matching to sample and direct teaching. The treatment fidelity score across all children for interaction partner variables (i.e., set up context, stimulus, reinforcement, play period, stimulus, prompt 1 and 2) was 100%.

### *Reliability*

Prior to the study, the researcher trained a graduate coder for approximately two weeks. Descriptions and examples of each behavior were reviewed. First, the researcher explained the definitions to the coder and then they watched at least three video clips and noted the presence of

any target behaviors. The researcher and graduate coder previewed and coded training videotapes that showed the interaction partner and child interactions during the play routines. Any clarifications or resolution of coding decision were written down for future reference. After this, the researcher and coder completed video viewing and forms independently. Inter-observer reliability was calculated using inter-judge agreement percentages. Once the inter-observer agreement of the target skills reached a criterion level of 75% for at least three video clips the graduate coder was considered familiar enough with the procedures to analyze the samples. To maintain high reliability throughout the experiment, inter-observer agreement was assessed for 30% of the experimental data. The average inter-observer agreement for Mike, Noah, James, and John were 93%, 98%, 98%, and 92%, respectively. Inter-observer agreement for coding of child behaviors across children ranged from 63% to 100% with a mean agreement score of 95%. For Mike there was one reliability session during intervention at 63%. It was difficult to see whether Mike pointed, touched, or gave a picture and the images on the pictures because of a poor video image resulting from inappropriate positioning of the camera.

## CHAPTER 4

### RESULTS

The purpose of this research project was to investigate the use of pictures and VSM to facilitate requesting and picture discrimination in play. The first objective explored the extent to which VSM facilitated requesting. This objective was addressed through a frequency count of the number of times the child gave a picture across eight trials. Because the children participated in VSM as well as matching to sample and direct teaching, an analysis of the number of sessions per training condition and changes in the frequency of giving are explained for each condition as necessary. The second objective examined the extent to which VSM facilitated accurate picture discriminations. Accurate picture discriminations were analyzed across the eight trials for each training condition. The third objective investigated the extent to which naïve judges perceived differences in the communication skills of children before and after intervention. This data was analyzed using a repeated measures *t* test across the six questions.

#### *Frequency of Giving Responses*

The frequency of each child's giving response across each experimental condition is displayed in Figure 1. Mike participated in 5 baseline, 5 VSM, 10 matching to sample, and 18 direct teaching sessions over a 13 week period. As can be seen in Figure 1, Mike's picture giving remained below 3 of 8 during baseline and remained low with the initiation of VSM. When matching to sample was introduced Mike's giving rose to 8 of 8 trials but as he continued to give incorrect pictures his giving behavior was extinguished. When direct teaching was introduced, Mike's giving increased from 0 of 8 trials to 8 of 8 trials. With the introduction of generalization trials, Mike's giving remained high. James participated in 8 baseline, 5 VSM, 5 matching to sample, 5 direct teaching with four pictures (denoted by Dx4), and 7 direct teaching with two pictures sessions (denoted by Dx2) over an 11 week period. James' picture giving ranged from 0 to 4 of 8 trials during baseline sessions. When VSM was introduced, James' picture giving increased dramatically after two sessions and eventually to 8 of 8 trials. His giving remained above baseline and criterion levels with the introduction of subsequent conditions.

Noah participated in 8 baseline, 8 VSM, 7 matching to sample, and 12 direct teaching sessions over a 12 week period. Noah gave a picture 8 of 8 trials most of the time. His giving behavior remained consistent across conditions. John gave a picture on 4 of 8 trials during most of the sessions in Baseline 1. He learned 2 of the 4 pictures and gave those 2 pictures on a

consistent basis. Consequently, two new pictures were added and a second set of baseline observations was conducted. In Baseline 2, his giving dropped to 0 of 8 trials. When the training stimulus (i.e., “Let’s play with the [playdough, puzzle, girl]. Give me\_\_\_\_.”) was presented, John did not attempt to give a picture. When VSM was introduced John, increased his giving response and remained at or above criterion levels. When the generalization stimulus (e.g., What would you like to play?) and generalization with a graduate student were introduced, John’s giving remained above baseline levels. John participated in 7 baseline 1, 4 baseline 2, and 16 VSM sessions over a 10 week period.

In summary, when video self-modeling was introduced, two of three participants (James, and John) increased their picture giving. For the third participant, Mike, improvement in giving responses was not demonstrated until the matching to sample condition and not consistently until the direct teaching condition was introduced. Noah, on the other hand, gave pictures during baseline and thus there was no room for improvement. Performance of participants during generalization probes was consistent with training effects.

#### *Frequency of Correct Picture Use*

The frequency of each child’s correct picture discrimination and correct production of words is displayed in Figure 2. Mike’s baseline levels of picture and word use ranged from 0 to 2 correct responses. He did not exceed two correct responses in baseline, VSM, or matching to sample conditions. His correct use of pictures and words increased with the introduction of direct teaching. His correct picture use remained above baseline levels and exceeded criterion for generalization as well. His correct word use also improved, but remained variable during this condition.

Noah’s baseline levels of picture and word use ranged from 0 to 3 correct responses. When VSM was initiated his responses remained at baseline levels. Thus, matching to sample was initiated. With matching to sample his responses remained at baseline levels. It was not until direct teaching that Noah’s correct picture responses improved beyond baseline levels. His responses continued to exceed criterion levels during generalization probes. Word use began to emerge, but was inconsistent during the direct teaching condition.

James’ correct word use remained at 0 during each phase of the study. James’ correct picture use hovered around chance responding across each condition. Following five sessions of direct teaching, James did not reach criterion level for correct picture selections. Although direct

teaching was modified with the picture selections reduced from four pictures to two pictures and the number of trials increased from 8 to 16 trials, James' responses continued to be inconsistent and he did not meet criterion. Thus, intervention was discontinued when his correct responses dropped to 3 out of 16 trials.

One can see that during Baseline 1, John's correct picture selections increased to 4 of 8 trials and his correct verbal naming (words) began to mirror his picture selections. John's word responses were partial imitations that followed the prompt (e.g., "Let's play with the puzzle. Give me puzzle."). Because correct picture selections began to emerge for John during Baseline 1, a second baseline was initiated with two new pictures (e.g., dress girl and playdough). When baseline 2 began, John's level of correct responses dropped to 0 and his imitation of words increased to 7 of 8 trials. When VSM was initiated, his correct responses quickly increased to 8 out of 8 trials but his word imitation decreased to Baseline 1 levels. When generalization to a different stimulus (e.g., "What would you like to play?") was introduced, John's correct responses decreased slightly and were not as stable but his correct responses remained above baseline levels. When generalization to the graduate student was initiated, John's correct responses remained high.

In summary, only John increased his correct picture discriminations when video self-modeling was introduced. Matching-to sample had no effect on picture discrimination learning, but Mike and Noah increased their frequency of correct picture discriminations and exceeded criterion levels when direct teaching was initiated. James' correct picture discriminations did not exceed baseline levels during any of the three intervention procedures. Mike, Noah, and John exceeded and maintained criterion levels over at least three sessions during generalization probes.

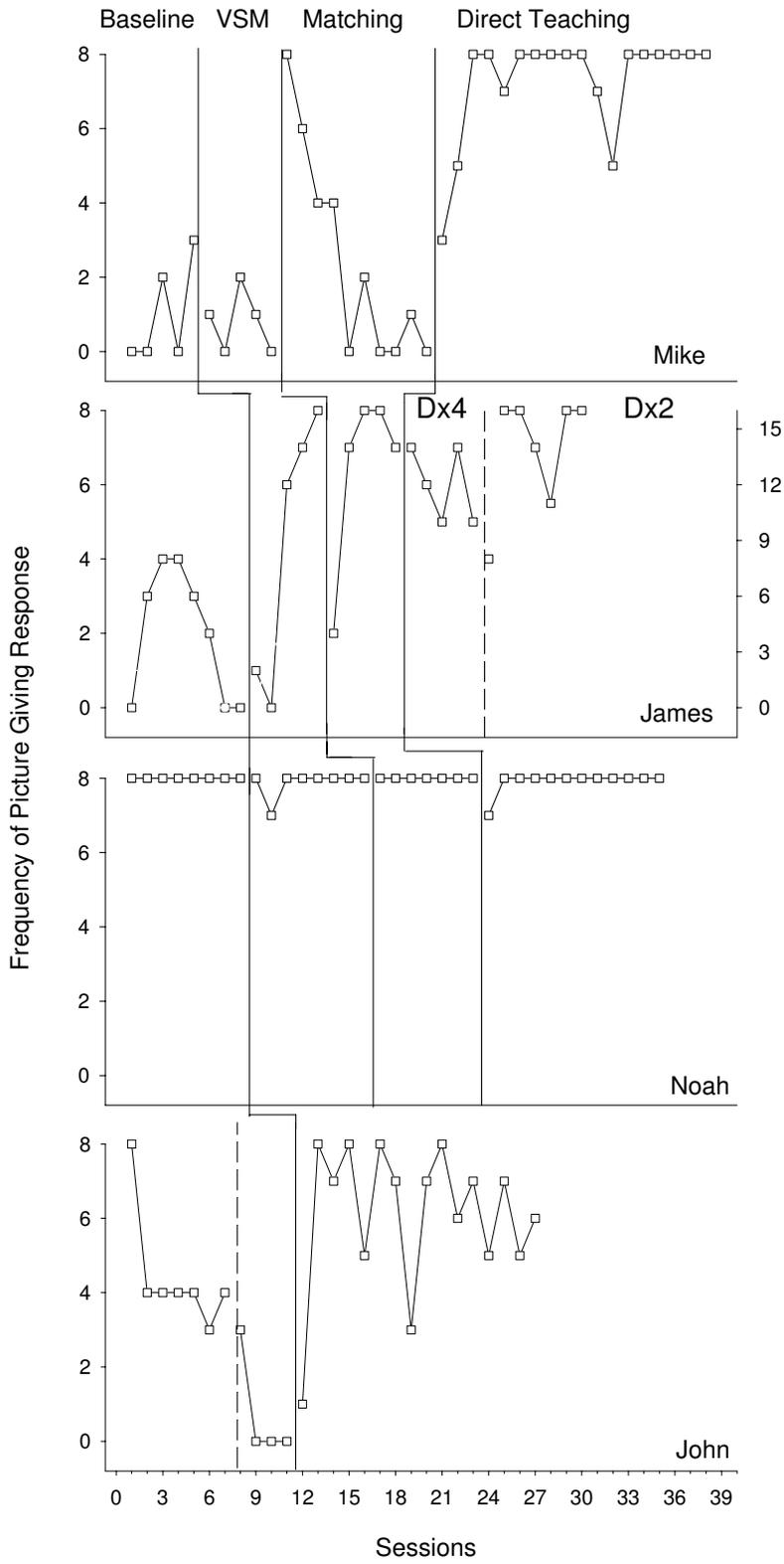


Figure 1. Children's giving responses across each experimental condition.

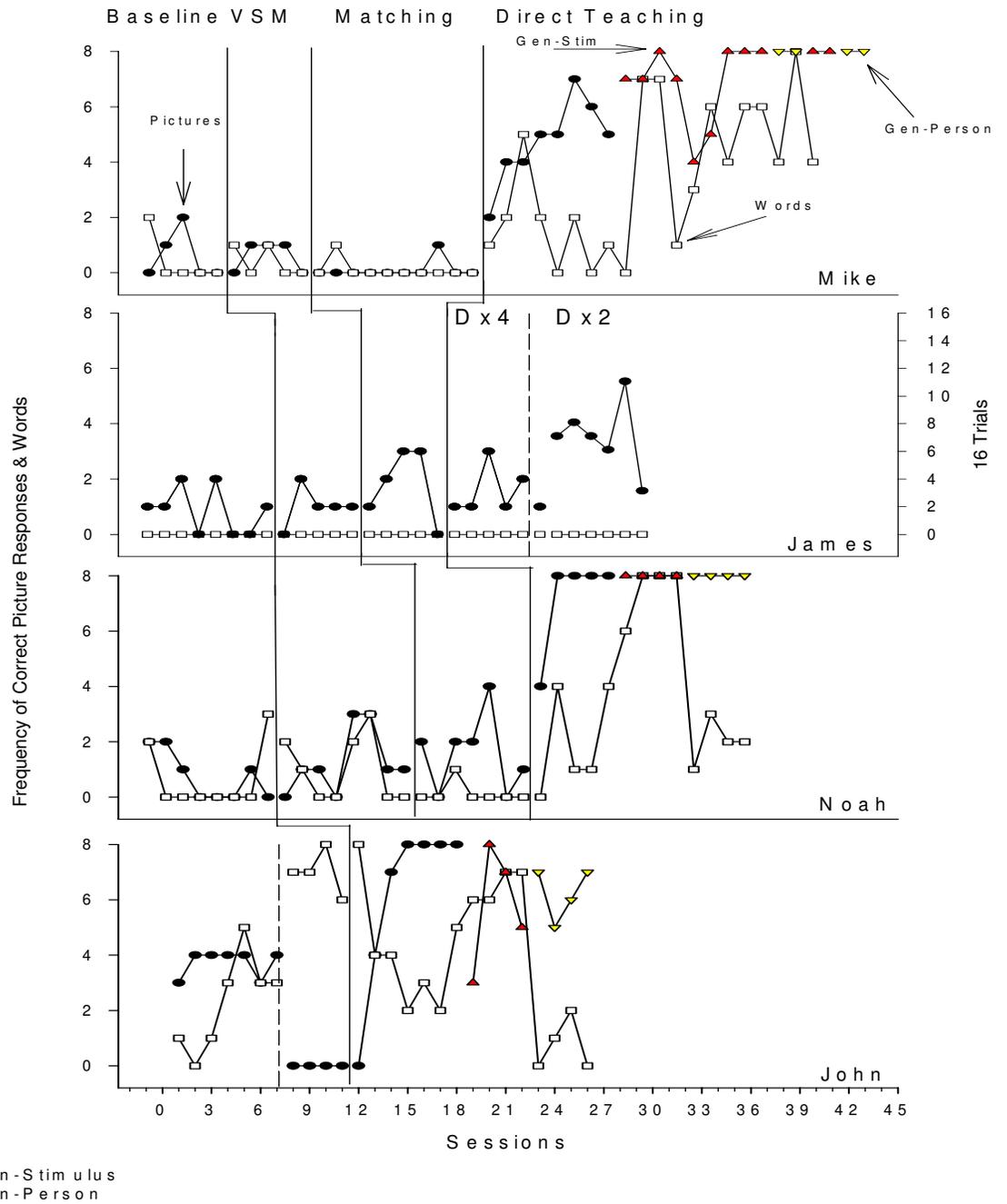


Figure 2. Children's correct picture discrimination, word use, and generalization.

### *Noun and Verb Selection Analysis*

An item analysis of correct noun versus correct verb selection was completed to determine whether there were any differences in selection accuracy. The results are as follows: James selected nouns during baseline at 13% accuracy and verbs with 6% accuracy. He selected nouns during intervention with 30% accuracy and verbs with 17% accuracy. John selected nouns and verbs during baseline 1 and 2 with 46% and 0% accuracy, respectively and nouns and verbs during intervention with 81% and 79% accuracy, respectively. Mike selected nouns during baseline with 5% and verbs with 10% accuracy. He selected nouns and verbs during intervention with 36% and 32% accuracy, respectively. Noah selected nouns and verbs during baseline with 6% and 19% accuracy and nouns and verbs during intervention with 45% and 52% accuracy. Thus, there was no consistent advantage of the more iconic pictures of nouns over the more abstract pictures of verbs.

### *Judges' Social Validation Ratings*

The mean ratings of participants' communication before and after treatment provided by 13 judges are summarized in Table 8. Repeated measures *t*-tests were conducted to compare judges' perceptions of child communication before and after intervention. There were statistically significant differences between pre-and post intervention ratings for certain questions for all four children.

For John, raters perceived differences in his use of pictures,  $t(12)=4.20, p<.001$ , his use of sounds,  $t(12)=5.69, p<.001$ , his turn taking,  $t(12)=7.68, p<.001$ , his participation,  $t(12)=8.75, p<.001$ , and his enjoyment,  $t(12)=12.22, p<.001$ . For Noah, raters perceived differences in his use of sounds,  $t(12)=3.27, p<.01$ , his turn taking,  $t(12)=2.80, p<.05$ , his participation,  $t(12)=2.50, p<.05$ , and his enjoyment,  $t(12)=2.89, p<.05$ . For Mike, the raters only perceived differences in his use of sounds,  $t(12)=3.10, p<.01$ . For James, raters perceived differences in his use of sounds,  $t(12)=7.50, p<.001$ , and his use of gestures,  $t(12)=2.96, p<.05$ .

Table 7. Mean (and SD) ratings of Participants' Communication before and after treatment.

|              | <u>Pictures</u> |                  | <u>Sounds</u>  |                  | <u>Gestures</u> |                 | <u>Turn taking</u> |                  | <u>Participation</u> |                  | <u>Enjoyment</u> |                  |
|--------------|-----------------|------------------|----------------|------------------|-----------------|-----------------|--------------------|------------------|----------------------|------------------|------------------|------------------|
|              | <u>Pre</u>      | <u>Post</u>      | <u>Pre</u>     | <u>Post</u>      | <u>Pre</u>      | <u>Post</u>     | <u>Pre</u>         | <u>Post</u>      | <u>Pre</u>           | <u>Post</u>      | <u>Pre</u>       | <u>Post</u>      |
| <i>John</i>  | 1.08<br>(0.28)  | 2.69 *<br>(1.49) | 2.15<br>(1.57) | 4.62 *<br>(0.65) | 2.15<br>(1.28)  | 3.00<br>(1.08)  | 1.23<br>(0.60)     | 4.00 *<br>(1.00) | 1.54<br>(0.78)       | 4.23 *<br>(0.93) | 1.77<br>(0.93)   | 4.70 *<br>(0.63) |
| <i>Noah</i>  | 2.08<br>(1.26)  | 3.23<br>(1.69)   | 2.70<br>(1.54) | 1.23*<br>(0.44)  | 2.69<br>(1.44)  | 2.08<br>(1.32)  | 3.38<br>(1.33)     | 4.31*<br>(1.03)  | 4.15<br>(1.07)       | 4.70*<br>(0.63)  | 3.92<br>(0.86)   | 4.54*<br>(0.78)  |
| <i>Mike</i>  | 2.46<br>(1.39)  | 1.77<br>(1.09)   | 1.92<br>(0.95) | 2.77*<br>(1.17)  | 2.38<br>(0.96)  | 3.08<br>(1.39)  | 3.31<br>(1.18)     | 2.62<br>(1.04)   | 3.54<br>(1.39)       | 4.00<br>(0.82)   | 3.31<br>(1.18)   | 3.62<br>(0.77)   |
| <i>James</i> | 1.92<br>(1.26)  | 2.92<br>(1.26)   | 2.31<br>(1.11) | 4.62*<br>(0.51)  | 2.15<br>(.99)   | 3.31*<br>(1.18) | 3.15<br>(1.21)     | 3.46<br>(1.05)   | 3.62<br>(1.39)       | 4.54<br>(0.88)   | 4.00<br>(0.91)   | 4.62<br>(0.65)   |

\* repeated measures *t*-test significant at  $p < .05$

## CHAPTER 5

### DISCUSSION

#### *Frequency of Giving Response*

This study sought to provide new information on the effects of Video Self-Modeling (VSM) for facilitating requesting with pictures. The first objective was to investigate the extent to which VSM would facilitate requesting by giving a picture for an activity. It was effective for facilitating requesting in two of the three children who were not already giving pictures during baseline. James and John began to request using pictures when the VSM intervention was initiated; Mike, on the other hand, began to request with pictures when the VSM condition was modified to include matching to the video. The behavior began to extinguish, however, as Mike realized he was not obtaining the play activities because his selections were incorrect. Noah gave pictures during baseline and as he continued to do so, there was no room for improvement in his giving of pictures to request. For James, the giving of pictures did not appear to extinguish even as he made incorrect picture selections. It appears as though the giving behavior in the video was salient enough for these three children to realize that they needed to give a picture in order to play with the activity. These data support previous research in which investigators taught children to request information (Angelo & Goldstein, 1990), and request activities (Johnston et al., 2003). Prior to the initiation of the study Angelo and Goldstein (1990) ensured accurate picture discrimination. They used a direct teaching technique that included simultaneously labeling the picture name and pointing to the picture. The children did not proceed to the information-requesting task until they could identify each picture. Johnston et al. (2003) used one picture selection therefore there was no need for the children to discriminate among two or more pictures. Thus, the children learned to request using a single picture.

#### *Frequency of Accurate Picture Selection*

The second objective was to investigate the extent to which VSM facilitated picture discrimination. Unfortunately, it was not effective for teaching three of the four children in this study to make accurate picture discriminations for play activities. VSM alone was effective for John only. It must be noted that of these four children, John had the most advanced receptive and expressive language skills; he also exhibited the fewest and lowest magnitude of challenging behaviors. VSM was not an effective tool for facilitating picture discriminations in the other three children. Except for James, it is obvious that these children could learn to discriminate

among the pictures. Once direct teaching was initiated, Mike and Noah learned to discriminate and make correct picture selections. It may be that direct teaching was more successful than VSM and matching to video sample because the child could focus on the visual discriminations such as the interaction partner's point to the actual picture rather than attending to the entire auditory-visual discrimination components in the video. For most of the children involved in this study direct teaching appeared to be an effective and possibly a more efficient method for teaching picture discrimination. Because this intervention condition was implemented last, one cannot determine the role that the prior experiences may have played. There are several factors that could have contributed to the ineffectiveness of the VSM.

#### *Ineffectiveness of VSM*

It is difficult to isolate the combination of factors that affect learning. It is possible that the behaviors in the video were not salient, that the children were not motivated to watch the video, or that they did not possess the necessary skills to complete the task. It was hypothesized that the children in this study would learn to use the pictures to request during play activities. Three of the four children learned to use pictures to request play activities. However, two of these three children required direct teaching to learn to discriminate. Thus, these results do not support the use of VSM alone as an efficient teaching tool, at least not for teaching these children under these circumstances. Including VSM within an ongoing play activity may have been beneficial. For example, one could begin the play activity, and then present a brief video sample of children using the pictures to request and make accurate discriminations, and finally collect data on the picture use during the play activity.

*Length of Video Segments.* First, the picture discriminations that occurred in the context of the videos may not have been obvious to these children. In relation to the relevant portion of the video segment, the picture discrimination viewing lasted approximately 10 seconds for each 1-minute video scene. Perhaps the video segments were too long. The entire viewing session was eight minutes. It is difficult to determine the time frame for viewing sessions based on past research. For those studies that included information about the length of the videotapes (Buggey, 1995; Dowrick & Raeburn, 1995; Hepting & Goldstein, 1996; Reamer et al., 1998) the average viewing time appeared to be 3-5 minutes. For future research it would be beneficial to investigate the viewing lengths that appear to be the most conducive to learning target behaviors. It also is possible that one of the key components of the video (discriminating) was not recognized as an

important behavior for these children. Changes to the videos could involve focusing in on the pictures versus creating scenes that exactly mimicked what would happen in the play observations. For example, one could cut out the scenes that depicted the interaction partner making the requests, and including only the scenes of the child scanning the pictures, making a correct selection, and receiving the item. This or similar modifications in the video modeling require further investigation.

*Child Attention.* Second, each child's capacity to attend to the stimuli may have affected their ability to respond appropriately. Noah and John attended to the stimuli at 98% or above. Mike and James' capacity to attend to the stimuli was much lower. Their average attention scores were 53% and 58% in intervention. This is notable, as James did not learn to discriminate between the picture selections across any of the conditions and Mike learned to discriminate following direct teaching but there continued to be variability in his accurate picture selection. In contrast to VSM, there was more face-to-face interaction during direct teaching. Mike's attending may have increased secondary to this didactic context. It is not surprising to find that children who do not attend or who have competing behaviors are more likely to have trouble learning the desired behaviors.

*Child Motivation.* Another factor that may have contributed to the ineffectiveness of VSM is motivation. Motivation and interests appear to be critical factors for viewing the videos. Bandura (1965) has suggested that symbolic models, such as those on television, are intrinsically motivating. It was hoped that children would be motivated to watch these videos of themselves and cue into the relevant stimuli and imitate the target behaviors. Mike was not particularly interested in watching the video of the cartoon or himself. He required external reinforcement such as tic tacs to watch the video. He often would try to leave during the video viewing and engage in disruptive behaviors such as pinching and hitting. When he was sitting appropriately, he often appeared to be looking out the window or staring blankly at the video screen. In contrast, John, James, and Noah appeared to enjoy watching themselves on video. John and Noah did not require any external reinforcers and required, few or no prompts to pay attention to the video. Both pointed to their pictures on the screen and said their name. James required at least one verbal prompt during each video viewing, and he needed to have an item such as a stuffed toy in one hand. He did not point to himself or say his name, but he did watch the video. Overall, John and Noah attended just as well to themselves as they did to the Baby Einstein

video. Mike and John appeared to show more interest in viewing themselves versus viewing the Baby Einstein video but because their attention levels were low during baseline this increase in attention did not appear to affect their accurate picture selections.

*Child's Capacity to Discriminate.* Another factor involves each child's level of discrimination skills and the capacity to learn picture discriminations through VSM. For three of the four children in this study it appears as though they were capable of these picture discriminations, however, the means by which they learned these discriminations varied. Previous research indicated that typically developing children could integrate auditory-visual information by the age of three and that the sequence of learning these tasks was the same for children with and without disabilities (Casey & Kerr, 1977). Thus, the capacity for learning the desired behavior appeared to be present but providing a model through VSM for the child to imitate was only effective for John. The other children require more intrusive strategies such as gestural and physical prompts.

According to previous research, awareness, communicative intent, world knowledge, and memory appear to be the most salient behaviors for the use of pictures (Rowland & Schweigert, 2003). Mike, Noah, and John appeared to possess awareness, communicative intent, and world knowledge. The factor that may be different for these three children is memory. John had the capacity to store the required discrimination information in his memory and then retrieve the information during the play observations. Mike and Noah appeared to have difficulty recalling this information as necessary. Because of Mike and Noah's lack of recognition memory, direct teaching appeared to be a more effective teaching technique. The consequences of understanding and learning the behavior were immediate for direct teaching versus waiting until the end of the eight-minute video and recognizing the required picture discriminations.

James, on the other hand, appeared to lack communicative intent, world knowledge, and memory. He appeared to possess a component of awareness for understanding causal relationships or purposeful direction of behavior. That is, if he wanted something he would grab your hand and lead you to the item or hold out items that required assistance from another person. However, he did not appear to have an understanding of self as displayed by little or no reaction to viewing himself on the video. He also did not use eye gaze, objects, or vocalizations as a form of communicative intent.

Therefore, VSM paired with pictures may not be the most appropriate strategy for teaching accurate picture requesting for these children. Future research could investigate the use of VSM with children that possess the cognitive factors that are most salient for the use of two-dimensional symbols. It seems important to explore the skills required by preschoolers to benefit from VSM. If children have difficulty observing and remembering both auditory and visual stimuli, it seems that they would have difficulty learning stimulus elements from videos. All of the children in this study had an autism spectrum disorder. Many children with autism must be taught to decipher complex stimuli (Scribman, Charlop, & Koegel, 1982). Adequate contextual cues did not appear to reduce stimulus overselectivity. Many children with developmental disabilities have trouble responding to multiple stimuli in their environment (Lovaas et al., 1979). Children may attend to irrelevant cues that do not help them respond appropriately to stimuli. During VSM, the camera attempted to zoom in on relevant cues from the Interaction Partner, the pictures, and the child giving the picture, and the child receiving the item. This allowed the child to follow along with what the researcher perceived as relevant cues. The child's opportunity to observe himself giving the picture appeared to be the most salient characteristic. Future research could examine the requisite skill sets that might be required for learning from videos.

It was difficult to predict whether VSM would be an effective procedure for facilitating picture discrimination in young children because there is limited research in the use of VSM and no research in the use of VSM to teach picture discrimination. This study seems consistent with the findings of Carr (2003) who used pictures to examine the discrimination skills of children with autism. Only one of the seven children in the Carr (2003) study learned to discriminate among the four pictures. In addition, VSM required children to make distinctions between pictures versus actions directly related to the children themselves. It is possible that the object-focused pictures could have increased the difficulty of the VSM condition. Merriman et al. (1996) concluded that typically developing preschoolers had difficulty selecting novel verbs for object-focused actions versus self-focused actions.

Because VSM has been a powerful observational learning method when used to teach older children and adults, it was hypothesized that the participants of this study would learn skills required for discrimination. Although VSM may be an effective tool for increasing requesting in young children who lack memory and communicative intent, its effectiveness for teaching

discriminations in young children may be limited. Future research could determine whether young children who possess all the factors associated with the mastery of two-dimensional symbols: awareness, communicative intent, world knowledge, and memory can learn picture discrimination through VSM.

As noted, John learned to request by giving a picture following the introduction of VSM. His language characteristics were more appropriate than the other participants in terms of his understanding and use of gestures and words to communicate. Even though John communicated through 1-2 word phrases, he used communication in a variety of functions such as requesting, protesting, social greetings, and commenting, whereas the other participants primarily used communication to request and protest. They did not communicate through a variety of functions, as did John. On the other extreme, James was more than 3 SD below the mean on the *Mullen Scales of Early Learning*. This indicated that he could understand simple gestures and commands and vocalize using a limited number of consonant vowel combinations but he did not use words or name or identify objects or pictures in a functional manner. It seems appropriate to conclude that VSM may not be efficacious for children with such limited communication abilities. However, this premise is speculative, as it is based on this study with a small sample of children. More research applying VSM to teaching young children with disabilities various skills is needed.

#### *Social Validity Assessment*

The third objective of this study was to investigate the extent to which naïve judges perceived differences in the communication skills of children before and after intervention. There were statistically significant changes between pre-post-intervention video segments for sounds, gestures, turn-taking, participation, and enjoyment. It is important to consider the extent to which these subjective judgments agreed with objective measures of behavior change.

First, judges noticed differences in John's use of pictures. He was the only child with the significant pre-post differences in picture use. It seems appropriate that viewers may not notice significant differences in the other children's use of pictures because the children required more training and remained below criterion for a longer period of time. The changes in picture use that these children experienced following direct teaching was not obvious to this set of naïve viewers.

Interestingly, judges noticed significant changes in all the children's use of sounds. Objective data collection focused on the child's correct use of words associated with the

appropriate picture selection. There were changes in Mike's and Noah's use of words following the introduction of direct teaching. James' and John's use of words remained at baseline levels throughout each intervention phase. There were no objective data collected that focused solely on sounds. Thus, judges may have recognized changes in James' use of sounds from baseline to intervention, and judges may have noticed a qualitative change in John's use of words (e.g., less imitation and more initiation).

For gestures, judges noticed differences for James. This corresponds with the objective changes in James' use of giving a picture. Judges did not notice any differences in the gestures of Mike, Noah, or John. This corresponds well with Noah's objective data because his giving behavior remained constant across experimental conditions. The judges' perceptions of Mike's and John's behavior did not correspond with objective measures of their behavior. Both Mike and John 'gave' during baseline but Mike's level of giving increased and stabilized, and John's giving increased again after Baseline 1 but did not necessarily stabilize.

For turn-taking, judges noticed differences for John and Noah. John and Noah made correct picture selections most frequently. If children did not make a correct picture discrimination they did not get to play. Thus, judges may have noticed a change in turn-taking based upon the frequency of correct picture selections, which increased the children's opportunities to play and engage in turn-taking.

The same results can be seen for participation and enjoyment. Judges noticed differences in the participation and enjoyment of John and Noah. Both of these children had more opportunities to play, which increased their frequency of participation, whereas, Mike and James had limited opportunities to play because their responses were incorrect more often than John and Noah. Fewer opportunities to play and participate translated into less enjoyment. It is likely that children appeared not to enjoy themselves if they had fewer opportunities to play with activities and Mike tended to display negative affect if he did not receive the opportunity to play. He knew that the interaction partner had toys and that he wanted to play with them. It appeared that more opportunities to play affected judges' perceptions of turn-taking, participation, and enjoyment.

*Social Validity Limitations.* After further review of the instrument, the context for gathering the necessary information from judges could be improved. It may have been better to use more questions that focused on requesting via picture use (i.e., child uses picture to request

or child gains access to object after using picture to request) versus questions that focused on changes in general communication (e.g., sounds, gestures, words). This intervention focused primarily on learning to use pictures to request a play activity and did not directly focus on changes in sounds and words. Another issue that relates to the structure of the questionnaire is that the children received a limited number of opportunities to use a picture to request. The video segments that the judges viewed were only a minute long. It may have been more beneficial to allow judges to view a longer session of requesting opportunities. In terms of the way the questionnaire is structured, judges might rate Question 1 as “rarely” even if the child chose correctly because they only viewed a one-minute segment. This issue leads to other questions regarding the scale as well. If the behaviors in question do not occur frequently then the scale may need adjusting. The scale on the questionnaire ranged from “rarely” to “most of the time.” It may be better to change the questionnaire to a scale that focuses on quality that includes statements like very well, pretty good, ok, not very well, and not well at all versus frequency

#### *Future Research*

Another potentially beneficial area of research would be to explore the strategies that might be most effective in conjunction with VSM. It is worth noting that many VSM investigations involving preschoolers did not rely solely on VSM to promote changes in targeted behaviors (Buggey, 1995; Hepting & Goldstein, 1996). For example, Buggey (1995) allowed children to pause the video and imitate responses from the video in addition, to providing positive verbal reinforcement during video viewing. Hepting and Goldstein (1996) also introduced branching steps when VSM alone did not effect change. Their branching steps included time delay, introducing a question or mand (e.g., “What do you need?”), and moving the video viewing into the classroom.

It may be beneficial to explore the range of behaviors that can be taught effectively using VSM and VM. The cognitive demands of language may be different from the demands of motor skills and problem behaviors that have been targeted in the past. These behaviors include social initiations, perspective taking, physical skills, and task fluency (Charlop-Christy, Le, & Freeman, 2000; Dowrick & Raeburn, 1995; Lasater & Brady; 1995; Leblanc, Coates, Daneshvar, Charlop-Christy, Morris, & Lancaster, 2003; Nikopoulos & Keenan, 2004). Teaching language skills may necessitate additional efforts to ensure learning. In this study, children were expected to learn specific requesting skills in addition to discrimination skills. The children’s inability to

discriminate among the pictures on an AVD task seems to rely specifically on the language domain, an area of weakness for many children with autism.

### *Implications*

Even though the success of VSM in this study was primarily limited to learning to request, it may be a time-efficient, personnel-conserving, cost-efficient teaching tool. Access to video is available to most educators and in most homes, with continuing technical advances making taping and editing easier. The use of VSM may be especially enticing for teachers and parents because many opportunities for viewing and practice exist with the possibility of many more children receiving services more frequently. There is quite a bit of time needed for editing the video. However, little time is required for filming or subsequently for implementation. Charlop-Christy, Le, and Freeman (2000) compared VM to live models. They reported that the amount of time for training and implementing the VM was approximately one third that of live modeling and the cost to employ models for VM was approximately half that of live modeling.

VSM may be viewed as an extension or variation of other modeling techniques to enhance language development, such as Aided Language Stimulation (ALS). Under VSM, the children acted as their own model versus a teacher, parent, or other facilitator. However, there are inherent differences to seeing models on videotape versus seeing live models. Viewing video models could be at odds with the social context or interaction an individual receives from another person. Even though this study did not focus on teaching social behaviors, language itself is intrinsically social. The social component of live models versus videotaped models could be explored further. There is not enough research comparing the different forms of modeling to draw definitive conclusions about preferred methods for teaching the social component of language.

In summary, the children in this study could learn to give a picture as a request for play activities. However, the use of VSM is questionable as a teaching method for accurate picture selection. Three children learned to give a picture following VSM and three children learned to discriminate among pictures following VSM or direct teaching. Future research should continue to explore the use of VSM interventions with young children with developmental delays.

APPENDIX A  
Human Subjects Approval Form



Office of the Vice President For Research  
Human Subjects Committee  
Tallahassee, Florida 32306-2763  
(850) 644-8633 · FAX (850) 644-4392

## APPROVAL MEMORANDUM

Date: 5/17/2005

To:  
**Felicia Darden**  
**MC 2007**

Dept.: **COMMUNICATION DISORDERS**

From: **Thomas L. Jacobson, Chair**

A handwritten signature in black ink, appearing to read "Thomas L. Jacobson", with a long horizontal flourish extending to the right.

Re: **Use of Human Subjects in Research**  
**Video Self-Modeling to Facilitate Picture Discriminations in Children with**  
**Developmental Delays**

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Human Subjects Committee at its meeting on **4/13/2005**. Your project was approved by the Committee.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals which may be required.

If the project has not been completed by **4/12/2006** you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRB00000446.

cc: Howard Goldstein  
HSC No. 2005.290

## PARENT AGREEMENT TO PARTICIPATE IN CLINICAL INVESTIGATION

**Project Title:** Use of Pictures and Video Self-modeling to Increase Symbolic Communication in Preschoolers with Developmental Delays

Your child is being asked to participate in a research project described in this form below. This research project is governed by the rules of both the federal government and Florida State University. These rules require that you give your signed agreement for participation in this project. This research is being conducted by Felicia Darden, M.S., CCC-SLP under the guidance of Howard Goldstein, PhD CCC-SLP who is a Professor at Florida State University. For further information, please contact Felicia Darden at 645-2618 or Dr. Howard Goldstein at 644-6264.

The investigator will explain to you the purpose of this project, the procedures to be used, as well as potential risks and benefits associated with participation in this project. You may ask questions to help you understand this study. A basic explanation of this study is written below. Please read this explanation and discuss any questions you might have with the investigator.

If you decide that you will participate in this project, please sign this form on the line below, in the presence of the person who has explained the project to you. You will be given a copy of this form to keep.

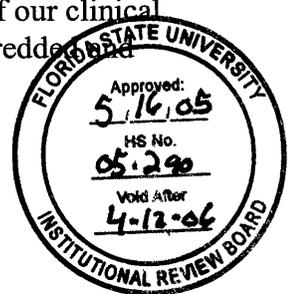
**Nature and Purpose of the Project:** The purpose of this project is to investigate a procedure for teaching children with language delays to ask for desired objects using pictures and words. We will edit a videotape to show your child interacting appropriately in four play activities and use the video to model how to use a picture communication system. The estimated duration of the project is approximately 17 weeks. Once initial interviews are completed, two visits (about 30 minutes long) will be scheduled each week according to your convenience and schedule availability.

**Explanation of Procedures:** The investigator will complete an initial assessment to determine how your child communicates and how she/he requests and responds to your communicative attempts. Intervention will begin following the observation of your child during the target play activities. The intervention itself will consist of your child viewing her/himself using pictures to make choices for play activities and actual participation within target activities in order to enhance your child's picture discrimination and requesting skills. All sessions will be videotaped for purposes of data collection.

**Discomforts and Risks:** These procedures do not involve activities that would cause discomfort to you or your child or put you at any risk. However, if you or your child should become upset with involvement in the intervention, you can decide to withdraw from the study at any time.

**Benefits:** You and your child may benefit from this project in many ways. First, there is a possibility of learning useful techniques that help your child request certain items or activities. Second, the results of this study will provide empirical evidence of the effectiveness of video self-modeling and picture procedures within play activities.

**Confidentiality:** All records relating to this project will remain confidential and will be handled and safeguarded according to standard clinical policy. Videotapes that are used for data coding and analysis will be kept in a locked office in the research laboratory consistent with the professional standards of our clinical facility. All records will be maintained until 2010. After that time, written records will be shredded and videotapes will be bulk erased.



**Refusal/Withdrawal:** At any time during your participation in this study, you will have the opportunity to refuse participation or withdraw from the study at any time without prejudice or effect on you.

**Risks:** We do not expect any unusual risks as a direct result of participation in this project, as the intervention procedures involve standard clinical procedures.

**Videotaping:** Your child will be videotaped by the clinician during the intervention sessions. These videotapes will be kept by the project staff in a locked room and will be saved indefinitely. These videotapes will be accessible only to clinical staff, unless otherwise specified by you. We ask your permission to use segments of these videotapes for educational purposes; however, this is optional.

I ACKNOWLEDGE THAT I HAVE READ AND FULLY UNDERSTAND THE ABOVE EXPLANATION OF THE PROJECT THAT ALL OF MY QUESTIONS HAVE BEEN SATISFACTORILY ANSWERED, AND I GIVE PERMISSION FOR MY CHILD TO PARTICIPATE IN THIS RESEARCH PROJECT.

I agree to have video/cd segments of my child viewed by others for research.

I want to view video/cd segments prior to use.

I do not agree to have video/cd segments of my child viewed by others for research.

Signature of Parent \_\_\_\_\_ Date \_\_\_\_\_

I CERTIFY THAT I HAVE EXPLAINED FULLY TO THE ABOVE PARENT THE NATURE AND PURPOSE, PROCEDURES, POSSIBLE RISKS AND POTENTIAL BENEFITS OF THIS RESEARCH PROJECT.

Signature of Investigator \_\_\_\_\_ Date \_\_\_\_\_

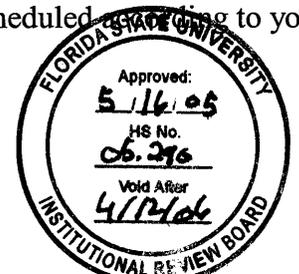
AGREEMENT TO PARTICIPATE IN CLINICAL INVESTIGATION  
Social Validity Assessment

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The investigator will explain to you the purpose of this project, the procedures to be used, as well as potential risks and benefits associated with participation in this project. You may ask questions to help you understand this study. A basic explanation of this study is written below. Please read this explanation and discuss any questions you might have with the investigator.

If you decide that you will participate in this project, please sign this form on the line below, in the presence of the person who has explained the project to you. You will be given a copy of this form to keep.

**Nature and Purpose of the Project:** The purpose of this project is to determine whether there are perceivable differences in and children's communication within play routines. Judgments will be based on your observations of videotapes showing children with language delays before and after treatment. Once initial interviews are completed, one session (about 60-75 minutes long) will be scheduled according to your convenience and schedule availability.



**Explanation of Procedures:** You will be asked to view a videotape containing 8 segments of children participating in play routines with interaction partners. Each segment is approximately one minute long. You will complete a brief questionnaire for each segment (total of 8 questionnaires). The completion time for each questionnaire is approximately 1-2 minutes.

**Discomforts and Risks:** These procedures do not involve activities that would cause discomfort to you or put you at any risk. However, if you should become upset with involvement in this project, you can decide to withdraw from the study at any time.

**Benefits:** First, results will help us learn whether differences stemming from early intervention with children with disabilities are readily perceptible to observers, in general. Second, the results of this study will help us evaluate the effectiveness of using video self-modeling to teach picture discriminations and requesting.

**Confidentiality:** All records relating to this project will remain confidential and will be handled and safeguarded according to standard clinical policy. Questionnaires that are used for data coding and analysis will be kept in a locked office in the research laboratory consistent with the professional standards of our clinical facility. All records will be maintained for until 2010. After that time, written records will be shredded.

**Refusal/Withdrawal:** At any time during your participation in this study, you will have the opportunity to refuse participation or withdraw from the study at any time without prejudice or effect on you.

**Risks:** We do not expect any unusual risks as a direct result of participation in this project, as the questionnaire procedures involve standard clinical procedures.

**Videotaping:** You will not be videotaped during the session.

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Vice President for the Office of Research at (850) 644-8633.

I ACKNOWLEDGE THAT I HAVE READ AND FULLY UNDERSTAND THE ABOVE EXPLANATION OF THE PROJECT, THAT ALL OF MY QUESTIONS HAVE BEEN SATISFACTORILY ANSWERED, AND I GIVE CONSENT TO PARTICIPATE IN THIS RESEARCH PROJECT.

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

I CERTIFY THAT I HAVE EXPLAINED FULLY TO THE ABOVE PARENT THE NATURE AND PURPOSE, PROCEDURES, POSSIBLE RISKS AND POTENTIAL BENEFITS OF THIS RESEARCH PROJECT.

\_\_\_\_\_  
Signature of Investigator

\_\_\_\_\_  
Date



## APPENDIX B

### Sample Letter of Invitation to Participate

Dear Parent,

You and your child are invited to participate in an intervention study to be initiated this summer in the home. This study will be conducted as an independent research project by Felicia Darden, a doctoral candidate in Speech-Language Pathology, under the guidance of Dr. Howard Goldstein at the FSU Department of Communication Disorders. The purpose of this study is to help your child request desired items using a picture communication system through the use of video self-modeling. It is hoped that your participation in this study will help in determining the effectiveness of pictures and video self-modeling in facilitating your child's communication development within play activities.

The long-term goal of this project is to facilitate requesting in preschoolers (48-60 months) with developmental delays within play routines and activities. The estimated duration of the project is approximately 14 weeks. The current project is divided into four phases: Assessing how your child communicates and requests, Observing your child using pictures to request in play routines, Helping your child use pictures to request through videos and prompting, and Helping your child request in play routines with you.

If you are interested in having your child participate in this study, please contact Felicia Darden at 645-2618, 321-6656, or Dr. Howard Goldstein at 644-6264. We look forward to hearing from you soon!

Respectfully,

Felicia Darden, M.A., CCC-SLP

Doctoral Candidate

Medium Shot

Child & Researcher looking at one another

Pictures on table & toys on shelf in foreground

“Let’s play with the -----.”

Rearrange toys (8 takes)

\_\_\_\_\_



Close up from child’s perspective

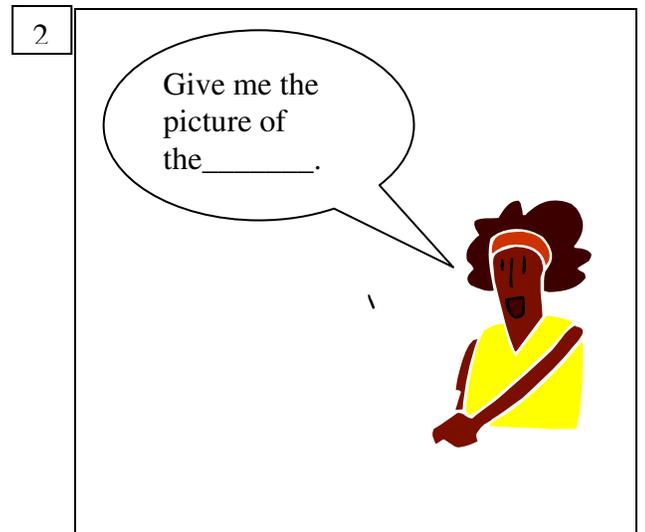
Researcher

“Give me the picture of the -----.”

8 takes

\_\_\_\_\_

\_\_\_\_\_



Close up from child’s perspective

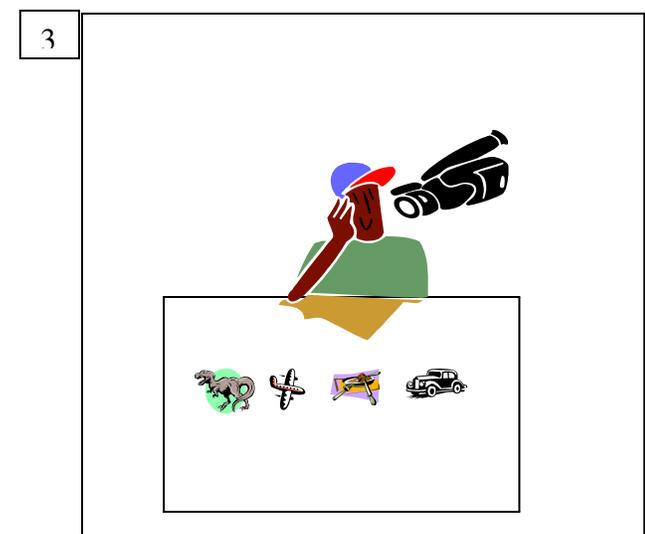
(over child’s shoulder)

Pan across 4 pictures

Rearrange order of pictures (8 takes)

\_\_\_\_\_

\_\_\_\_\_



Close Up

Each Picture

Rearrange order of still images

---

---

---

Medium Shot

Child

Looking for correct picture.

Shot of images on cards but can't tell what they are

---

---

Medium Shot

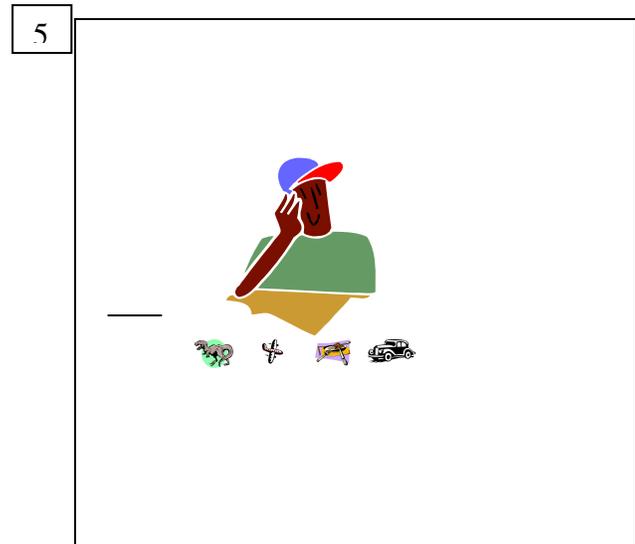
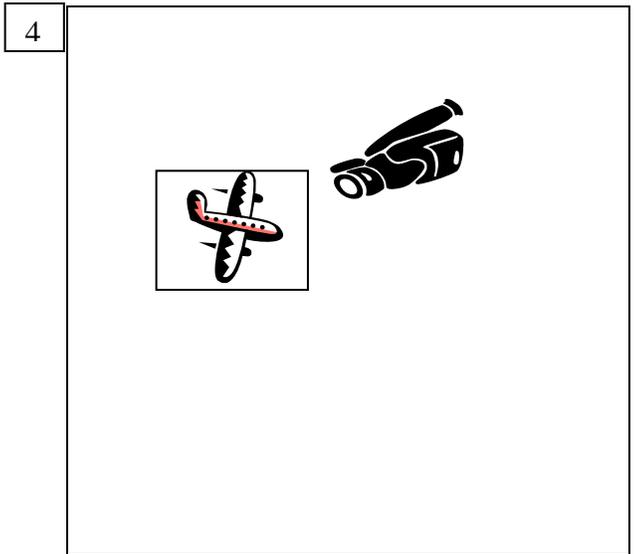
Child & Researcher

Child Giving Picture to researcher

Zoom in on correct picture in child's hand

---

---



Medium Shot \_\_\_\_\_

Researcher accepting picture \_\_\_\_\_

Researcher looking at picture \_\_\_\_\_

Researcher matching picture with toy \_\_\_\_\_

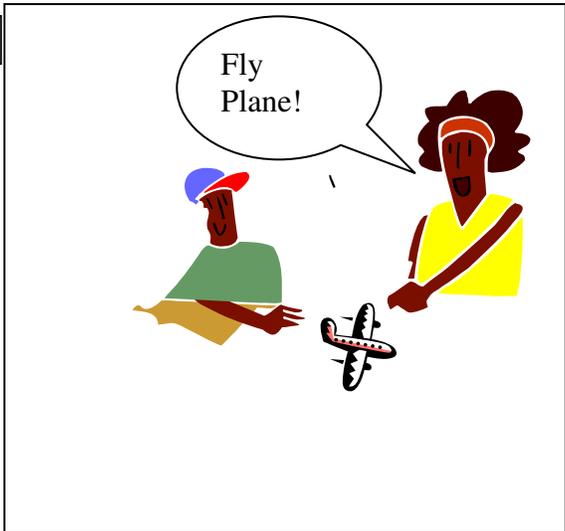
Researcher giving toy and verbal praise \_\_\_\_\_

“Yes that’s the -----!” \_\_\_\_\_

7



8



Medium Shot \_\_\_\_\_

Child & Researcher \_\_\_\_\_

Playing with items. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Medium Shot

Researcher holding correct picture

“Give me the picture of the -----“

8 takes

---

---

Close Up

Toy with Picture

---

---

---

---

2A

Give me the  
picture of  
the\_\_\_\_\_.



5A



## APPENDIX D

### Social Validity Questionnaire

The purpose of this project is to determine whether there are any obvious differences in children's requesting within play activities. You will be viewing videos of children either before or after participation in treatment. You will be viewing 8-one-minute video segments. The order is mixed up. After viewing each segment you are asked to answer the following questions.

What was the **child** doing? Rate each of the following (circle one choice for each)

#### A) Communicating using pictures

|                     |                   |               |                   |          |
|---------------------|-------------------|---------------|-------------------|----------|
| <u>5</u>            | <u>4</u>          | <u>3</u>      | <u>2</u>          | <u>1</u> |
| most of<br>the time | more<br>than half | about<br>half | less<br>than half | rarely   |

#### B) Communicating using sounds

|                     |                   |               |                   |          |
|---------------------|-------------------|---------------|-------------------|----------|
| <u>5</u>            | <u>4</u>          | <u>3</u>      | <u>2</u>          | <u>1</u> |
| most of<br>the time | more<br>than half | about<br>half | less<br>than half | rarely   |

#### C) Communicating using gestures

|                     |                   |               |                   |          |
|---------------------|-------------------|---------------|-------------------|----------|
| <u>5</u>            | <u>4</u>          | <u>3</u>      | <u>2</u>          | <u>1</u> |
| most of<br>the time | more<br>than half | about<br>half | less<br>than half | rarely   |

#### D) Taking turns with the adult

|                     |                   |               |                   |          |
|---------------------|-------------------|---------------|-------------------|----------|
| <u>5</u>            | <u>4</u>          | <u>3</u>      | <u>2</u>          | <u>1</u> |
| most of<br>the time | more<br>than half | about<br>half | less<br>than half | rarely   |

#### E) Participating in the routine

|                     |                   |               |                   |          |
|---------------------|-------------------|---------------|-------------------|----------|
| <u>5</u>            | <u>4</u>          | <u>3</u>      | <u>2</u>          | <u>1</u> |
| most of<br>the time | more<br>than half | about<br>half | less<br>than half | rarely   |

#### F) Enjoying the activity

|                     |                   |               |                   |          |
|---------------------|-------------------|---------------|-------------------|----------|
| <u>5</u>            | <u>4</u>          | <u>3</u>      | <u>2</u>          | <u>1</u> |
| most of<br>the time | more<br>than half | about<br>half | less<br>than half | rarely   |

Questionnaire Form: Demographic Information

The following demographic information will be summarized to describe the participants in this study. Individual information will be kept strictly confidential.

1. Date of Birth\_\_\_\_\_ Age \_\_\_\_\_ Gender (Circle) male female
2. Race (Circle) African American Hispanic Asian Caucasian Other
3. Occupation \_\_\_\_\_ Length of time in occupation\_\_\_\_\_
4. Education completed\_\_\_\_\_
5. Do you currently attend college? (Circle) yes no If yes, what is your major?\_\_\_\_\_
6. Do you have children and/or siblings? (Circle) yes no If yes, how many? \_\_\_\_\_children \_\_\_\_\_siblings
7. Have any of your children/siblings ever had a social-communication, speech, or language delay?  
(Circle) yes no
8. If yes, did s/he receive services (speech therapy, preschool program, etc)? (Circle) yes no
9. Do you or have you worked with preschool children? (Circle) yes no If yes, do/did any of these children have developmental delays or disabilities? (Circle) yes no

APPENDIX E



**Treatment Fidelity VSM**

Child's Name: \_\_\_\_\_

Date: \_\_\_\_\_

Routine: \_\_\_\_\_

Indicate the number of prompts and opportunities by placing a number on the line.

| Trials    | Set up<br>Context | Child<br>Attending | Presented<br>Stimulus | Reinf.<br>Response<br>Appropriately | 30-1 min<br>Play<br>Period | Other<br>Notes |
|-----------|-------------------|--------------------|-----------------------|-------------------------------------|----------------------------|----------------|
| 1         | +                 | +                  | +                     | +                                   | +                          |                |
| 2         | +                 | +                  | +                     | +                                   | +                          |                |
| 3         | +                 | -                  | +                     | N/A                                 | +                          |                |
| 4         | +                 | +                  | +                     | +                                   | +                          |                |
| 5         | +                 | +                  | +                     | +                                   | +                          |                |
| 6         | +                 | +                  | +                     | +                                   | +                          |                |
| 7         | +                 | +                  | +                     | +                                   | +                          |                |
| 8         | -                 | -                  | +                     | N/A                                 | +                          |                |
| Total +   | 7                 | 6                  | 8                     | 6                                   | 6                          |                |
| Total -   | 1                 | 2                  | 0                     | 0                                   | 0                          |                |
| Total N/A | 0                 | 0                  | 0                     | 2                                   | 2                          |                |
|           |                   |                    |                       |                                     |                            |                |
|           |                   |                    |                       |                                     |                            |                |

NA = Not applicable  
 + = Correct  
 - = Incorrect

N/A will only occur for reinforcing the child's selection and the play period. The child will not receive the verbal reinforcement if they do not choose the appropriate picture.

APPENDIX F



**Treatment Fidelity Matching to Sample/Direct Teaching**

Child's Name: \_\_\_\_\_

Date: \_\_\_\_\_

Routine: \_\_\_\_\_

Indicate the number of prompts and opportunities by placing a number on the line.

| Trials  | Stimulus | Reinf.<br>Response 1<br>Appropriately | Prompt 1 | Reinf.<br>Response 2<br>Appropriately | Prompt 2 | Reinf.<br>Response 3<br>Appropriately | Other Notes |
|---------|----------|---------------------------------------|----------|---------------------------------------|----------|---------------------------------------|-------------|
| 1       | +        | +                                     | +        | +                                     | +        | +                                     |             |
| 2       | +        | +                                     | +        | +                                     | +        | +                                     |             |
| 3       | +        | +                                     | -        | -                                     | +        | -                                     |             |
| 4       | +        | +                                     | +        | +                                     | +        | +                                     |             |
| 5       | +        | +                                     | +        | +                                     | +        | +                                     |             |
| 6       | +        | +                                     | +        | +                                     | +        | +                                     |             |
| 7       | +        | +                                     | +        | +                                     | +        | +                                     |             |
| 8       | -        | -                                     | -        | -                                     | +        | -                                     |             |
| Total + | 7        | 7                                     | 6        | 6                                     | 8        | 6                                     |             |
| Total - | 1        | 1                                     | 2        | 2                                     | 0        | 2                                     |             |
|         |          |                                       |          |                                       |          |                                       |             |
|         |          |                                       |          |                                       |          |                                       |             |
|         |          |                                       |          |                                       |          |                                       |             |

The interaction partner is NOT required to move to Prompt 2 or 3 if the child points to , touches, or gives the correct picture in response to Prompt 1.

If the child's response is not correct, then the interaction partner moves to Prompt 2 which includes a point to picture on TV.

If still no correct response, then interaction partner moves to Prompt 3 and places picture next to same picture on TV.

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## BIOGRAPHICAL SKETCH

### **Certification and Licensure**

**1999-- American Speech-Language Hearing Association**

Certificate Of Clinical Competence

**2001--2005 State of Florida**

Certified Speech-Language Pathologist

**1998-2001 State of Texas**

Certified Speech-Language Pathologist

### **Education**

**2001-2006** Doctorate of Philosophy in Communication Disorders, Florida State University

**1996-1998** Master of Arts in Communication Disorders, University of Houston

**1992-1996** Bachelor of Science in Communication Disorders, University of Houston

### **Current Professional & Research Interests**

Social-communication development, severe communication disorders, early childhood development, early intervention, routines-based intervention, natural environments, social validity

### **Experience**

**2004-2005 National Institute on Deafness and Other Communication Disorders Fellow**

Responsible for the design and application of augmentative and alternative communication interventions and the social validity assessment of routines based intervention for children with severe disabilities; dissemination of research reports and grant preparation; analyzing and coding data.

**2002-2003 Autism Leadership Doctoral Fellow, Florida State University**

Responsible for the design and application of clinical interventions and research methods in relation to autism; dissemination of research reports and grant preparation; analyzing and coding data.

**2001-2002 D.D. Leadership Training Doctoral Fellow, Florida State University**

Responsible for the design and application of clinical interventions and research methods in relation to developmental disabilities; dissemination of research reports and grant preparation; analyzing and coding data.

**1998-2001 Speech-Language Pathologist, UCP of Greater Houston**

Provided evaluation, assessment and therapeutic intervention of speech, language and oral-motor function to children between the ages of birth to three years of age in naturalistic settings; Implemented Individualized Family Service Plans to achieve family and child outcomes; Coordinated services with doctors, medical personnel and community services to provide family with needed medical evaluations, respite and welfare services; Provided in-service to staff regarding the use of communication and feeding strategies;

**1998-1998 Speech-Language Pathologist, Schurman Physical Therapy**

Provided evaluation, assessment and therapeutic intervention of language, cognitive functioning and dysphasia therapy to adult patients in a skilled nursing facility; Performed modified barium swallow studies; Provided in-service to staff and family for appropriate implementation of swallowing precautions and augmentative communication.

**1998-1998 Speech-Language Pathology Assistant, Ben Taub Hospital**

Provided evaluation, assessment and therapeutic intervention of speech, language, cognitive functioning, and dysphasia therapy to children and adult patients in an acute care setting; Performed modified barium swallow studies and bedside swallow study for implementation of feeding and swallowing precautions and therapy; Evaluated and provided services to patients ranging from tracheotomy and voice to young patients in the neonatal intensive care unit requiring feeding therapy; Trained caregivers and staff for communication strategies and feeding therapy and precautions;

Professional Memberships

- 2004-** Society for Research in Child Development
- 1999--** American Speech-Language Hearing Association
- 1996-1998** Houston Association of Communication Disorders
- 1996-1998** National Student Speech-Language Hearing Association

**Statistical Knowledge & Programs**

- Statistical Process Software System (SPSS)
- Sigma Plot
- Multi Option Observation System for Experimental Studies (MOOSES)
- Descriptive and Inferential Statistical Applications
- General Linear Modeling
- Non-Parametric Analysis
- Multivariate Analysis
- Clinical Research Methods

**Honors and Awards**

- 2004-2006** National Institutes of Deafness and Other Communication Disorders Fellow
- 2003-** Honor Society of Phi Kappa Phi
- 2002-2003** Delores Auzenne Scholar
- 2002** American Speech-Language Hearing Association Travel Fellow
- 1997-199** Graduate Scholar, Houston Association of Communication Disorders (HACD)
- 1992-1996** Moody Scholar, Moody Foundation
- 1992-1996** Academic Excellence Scholar, University of Houston

### **Teaching Experience**

- Florida State University
- 2003** **Undergraduate**—Child Language Disorders

### **Service Activities/Presentations**

- 2005** **Florida State University- Communication Disorders Department**  
**Research Supervisor-** Video-Self Modeling
- 2005** **University of Arkansas Medical School Consortium**  
CEU Presentation: Autism Spectrum Disorders: From Preschool to School Age
- 2005** **Symposium for Research in Child Language Disorders Conference**  
Poster Presentation: Social Validity Assessment: An Application to Routines Based Intervention
- 2005** **Symposium for Research in Child Language Disorders Conference**  
Poster Presentation: Using Pictures to Increase Communication in a Child with ASD
- 2005** **American Speech-Language Hearing Association**  
Invited participant of 3<sup>rd</sup> Annual Research Conference: Lessons for Success
- 2005** **Society for Research in Child Development**  
Millennium Scholars Junior Mentor at 2005 SRCDC Conference
- 2005** **Florida State University- Communication Disorders Department**  
**Guest Lecturer-** Undergraduate Nature of Autism
- 2004** **American Speech-Language Hearing Association National Convention**  
Poster Presentation: Using Pictures to Increase Communication in a Child with ASD
- 2004** **American Speech-Language Hearing Association National Convention**  
Seminar: Analysis of Evidence Based Practice Evaluation Criteria: A Synthesis and Application
- 2004** **Florida State University- Communication Disorders Department**  
**Guest Lecturer-** Undergraduate Intro. Comm. Disorders
- 2004** **Florida State University- Communication Disorders Department**  
**Guest Lecturer-** Graduate Leadership Training
- 2004** **Florida State University- Communication Disorders Department**  
**Guest Lecturer-** Undergraduate Nature of Autism

- 2003 Florida State University- Communication Disorders Department  
Research Supervisor- Pictures for Communication**
- 2002 Florida State University- Communication Disorders Department  
Research Supervisor- Facilitating Joint Engagement**
- 2002 Florida State University- Special Education Department  
Guest Lecturer- Undergraduate Severe Disorders & Dev. Delay**
- 2002 Center for Autism and Related Disabilities-Florida State University  
Community Practicum: Administration and reliability coding for the  
Systematic Observation of Red Flags for children with autism.**
- 2002 Florida State University- Communication Disorders Department  
Guest Lecturer- Undergraduate Language Differences**
- 2002 American Speech-Language Hearing Association National  
Convention**  
Poster Presentation: Facilitating Joint Engagement in Parent-Child Interaction
- 2001 Lawton & Rhea Chiles Center for Healthy Mothers & Babies**  
Community Practicum: Involved in research and dissemination of information  
concerning evidence-based programs for child abuse prevention, public engagement,  
and leadership training.
- 2000 Mental Health Mental Retardation Authority of Harris County**  
Cultural Diversity Workshop: Involved in research and dissemination of  
information to service providers and families regarding cultural diversity  
and tolerance.
- 2001 ECI Infant Development Program**  
Children's Protective Services: Responsible for research and  
dissemination of information regarding policy and procedures related to  
reporting suspected abuse or neglect.
- 2001 ECI Infant Development Program**  
Training on Hawaii Early Learning Profile: Responsible for teaching staff  
usage of Language Assessment measures.

**Publications/Manuscripts**

- Darden, F. (manuscript submitted for review). Using of pictures to increase  
symbolic communication. Augmentative and Alternative Communication.
- Darden, F. (manuscript). Social Validity Assessment: An application to routines  
based intervention.
- Darden, F. (manuscript). Evidence based practice in AAC for preschool children.